BRE001-b
Mucinous Lesions of the Breast: Spectrum of Disease and Imaging-pathologic Correlation

Education Exhibits
Location: BR Community, Learning Center

Participants
Seo Yeon Park (Presenter): Nothing to Disclose
Hyo Soon Lim MD: Nothing to Disclose
Sook Hee Heo: Nothing to Disclose
Jin Woong Kim MD: Nothing to Disclose
Sang Soo Shin MD: Nothing to Disclose

TEACHING POINTS
Teaching Points 1. To demonstrate the spectrum of breast diseases that contains mucin. 2. To illustrate the mucinous breast lesions with radiologic-pathologic correlation. 3. To know that core biopsy results of mucin extravasation or mucocele like lesion warrant close radiologic-pathologic correlation and should consider excision.

TABLE OF CONTENTS/OUTLINE

BRE002-b
Unusual Benign Breast Lesions: Imaging-pathologic Correlation

Education Exhibits
Location: BR Community, Learning Center

Participants
Hyo Soon Lim MD: Nothing to Disclose
Seo Yeon Park: Nothing to Disclose
Go Eun Kim (Presenter): Nothing to Disclose
Jin Woong Kim MD: Nothing to Disclose
Suk Hee Heo MD: Nothing to Disclose
Sang Soo Shin MD: Nothing to Disclose

TEACHING POINTS
1. To overview the imaging findings of unusual benign breast lesions with clinical manifestations. 2. To demonstrate the radiologic-pathologic correlation in various benign breast masses. 3. To know the imaging findings of benign breast lesions to avoid the unnecessary biopsy procedure.

TABLE OF CONTENTS/OUTLINE

BRE003-b
Gynecomastia vs Pseudogynecomastia: Imaging Diagnosis, Cause and Treatment

Education Exhibits
Location: BR Community, Learning Center

Participants
Woo Jin Yang (Presenter): Nothing to Disclose
Jung Kyu Ryu MD, PhD: Nothing to Disclose
Sun Jung Rhee MD: Nothing to Disclose
Jeong Yoon Song: Nothing to Disclose

TEACHING POINTS
1) To review the imaging findings of gynecomastia and pseudogynecomastia. 2) To review various causes of gynecomastia and pseudogynecomastia. 3) To review difference in treatments of gynecomastia and pseudogynecomastia.

TABLE OF CONTENTS/OUTLINE
1. Imaging features of normal male breast, gynecomastia and pseudogynecomastia A. Mammography. B. Ultrasonography C. CT, MR. 2. Cause of gynecomastia and pseudogynecomastia A. Physiologic gynecomastia: neonates, pubertal boys, and elderly men B. Pathologic gynecomastia: a increase in estrogen, a decrease in testosterone, medication or drug and idiopathic C.

**BRE004-b**

**Radiologic Pathology Correlation is the Key for the Management of Unusual and Challenging Suspicious Breast Lesions**

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

- Samy Ammari (Presenter): Nothing to Disclose
- Laurent Dercle MD: Nothing to Disclose
- Clarisse Dromain MD: Nothing to Disclose
- Martin Schlumberger: Nothing to Disclose
- Sandra Canale: Nothing to Disclose
- Salima Hibat: Nothing to Disclose
- Corinne Balleyguier MD: Nothing to Disclose

**TEACHING POINTS**

- Determining if pathology is concordant with image findings
- Learning the management of discordant cases

**TABLE OF CONTENTS/OUTLINE**

Introduction: The management of suspicious breast lesions is increasingly based on image-guided percutaneous biopsies. It is becoming a key procedure for the diagnosis and is a valuable tool in a preoperative setting (providing prognostic and predictive parameters). The radiologist must identify the lesion, perform the biopsy, determine if pathology is concordant with image findings and learn the management of discordant cases. Teaching points: This pictorial essay describes unusual benign and malignant breast lesions, uncommon radiological (mammography and/or ultrasonography) and pathological findings. It includes numerous malignant lesions: tubular, mucinous, papillary and medullary carcinomas, cystic glandular carcinoma, angiosarcoma, apocrine carcinoma, breast lymphoma, breast fibromatosis, Paget breast disease and Abrikossof tumor. Conclusion: A proper management requires a close collaboration of the radiologist with an interdisciplinary team and an active involvement in correlating radiologic and radiologic findings. Indeed, there is an overlap in imaging between the benign and the malignant lesions and radiologists must be aware of unusual and challenging diagnosis.

**BRE005-b**

**Bloody Nipple Discharge: Is Breast MRI the Way of the Future?**

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

- Kristin Leigh Harris DO (Presenter): Nothing to Disclose
- Vanessa Van Duyn Wear MD: Nothing to Disclose

**TEACHING POINTS**

Evaluation of bloody nipple discharge is a frequent diagnostic dilemma for many breast imagers. When standard imaging is non-diagnostic, breast MRI is a non-invasive modality that has been proven to increase the sensitivity of identifying intraductal pathology. The purpose of this exhibit is: 1. To illustrate benign and malignant causes of bloody nipple discharge, including a multimodality pictorial review of common intraductal pathology. 2. To review the traditional imaging approach and potential pitfalls that may limit the standard evaluation of nipple discharge, including: mammography, ultrasound, and ductography. 3. To emphasize the emerging role of breast MRI in the evaluation of pathologic nipple discharge.

**TABLE OF CONTENTS/OUTLINE**

1. Normal ductal anatomy
2. Common benign and malignant etiologies of bloody nipple discharge: - Intraductal papilloma - Ductal hyperplasia - DCIS - Invasive ductal carcinoma
3. Standard approach to pathologic nipple discharge: Imaging findings and potential pitfalls of conventional techniques, including: - Mammography - Ultrasound - Ductography - Pictorial review of select intraductal pathology
4. Emerging role of MRI in evaluation of pathologic nipple discharge - Indications/advantages - Review of current literature
5. Sample cases: MRI appearance of select intraductal pathology

**BRE007-b**

**Comprehensive Review of the Anatomy and Disease in the Axilla: A Multimodality Approach**

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

- Hyo Soon Lim MD (Presenter): Nothing to Disclose
- Seo Yeon Park: Nothing to Disclose
- Sook Hee Heo: Nothing to Disclose
- Jin Woong Kim MD: Nothing to Disclose
- Sang Soo Shin MD: Nothing to Disclose

**TEACHING POINTS**

1. To illustrate the normal anatomy of axilla with multimodality approach. 2. To demonstrate the radiologic-pathologic correlation in various axillary disease. 3. Awareness of normal anatomy and the spectrum of various axillary diseases can facilitate differential diagnosis of axillary masses.

**TABLE OF CONTENTS/OUTLINE**

A. Anatomy of axilla
B. Usefulness and limitation of various imaging modalities
C. Accessory breast in axilla and accessory...

BRE009-b

Fat Injections for the Reconstructed Breast: Clinical and Imaging Features

Education Exhibits
Location: BR Community, Learning Center

Certificate of Merit

Participants
Emily Marie Brown MD (Presenter): Nothing to Disclose
Jason K. Mann MD: Nothing to Disclose
Sally Goudreau MD: Nothing to Disclose
Stephen Jacob Seiler MD: Nothing to Disclose

TEACHING POINTS
1. Fat injection (or lipofilling) is an increasing popular adjunct technique utilized by plastic surgeons to improve breast symmetry and contour following reconstruction.
2. Patients may have delayed symptoms following the procedure, including focal pain and/or a palpable lump.
3. Fat injections have a characteristic sonographic appearance of a complex ovoid mass with peripheral hyperechoic material and central anechoic fluid. Alternate findings mirror the classic spectrum of fat necrosis.
4. Knowledge of the characteristic features of fat injections permits a more confident diagnosis while relieving patient anxiety and avoiding unnecessary workup.

TABLE OF CONTENTS/OUTLINE
Overview of the surgical technique:
- Indications
- Illustration of procedure (to be created by our medical illustrator)
Review of the presenting signs/symptoms (at follow-up):
- Common symptoms
- Typical physical exam findings
Multimodality review of the imaging findings (with case examples):
- Ultrasound (the primary modality utilized for diagnostic evaluation)
- Mammography
- MRI
Clinical Implications
Summary

BRE010-b

Accelerated Partial Breast Irradiation: What the Radiologist Needs to Know

Education Exhibits
Location: BR Community, Learning Center

Participants
Carrie Margaret Rochman MD (Presenter): Nothing to Disclose
Shayna Showalter: Nothing to Disclose
Timothy Norman Showalter MD: Nothing to Disclose
Heather Renee Peppard MD: Consultant, Siemens AG Research Grant, Hologic, Inc
Brandi Tamara Nicholson MD: Stockholder, Hologic, Inc
Jennifer A. Harvey MD: Researcher, Hologic, Inc Researcher, VuCOMP, Inc Researcher, Volpara Solutions, Ltd Shareholder, Volpara Solutions, Ltd Shareholder, Hologic, Inc

TEACHING POINTS
Accelerated Partial Breast Irradiation (APBI) is a group of rapidly evolving techniques for the delivery of localized radiation therapy to a lumpectomy bed following breast conservation for breast cancer. ABPI is gaining popularity as an alternative to whole breast irradiation due to shortened length of treatment and decreased toxicity to the breast, heart, and lung. As the entire breast will not receive radiation, it is essential to exclude multi centric disease. The radiologist plays a critical role in patient selection and follow up. The purpose of this exhibit is to review current data available on APBI techniques, review criteria for patient selection, and review spectrum of post treatment imaging findings. Images from our institution will illustrate teaching points.

TABLE OF CONTENTS/OUTLINE
BRE011-b

PET-MRI in Evaluation of Breast Cancer

Education Exhibits
Location: BR Community, Learning Center

Participants
- Nelly Salem MD (Presenter): Nothing to Disclose
- Peter F. Faulhaber MD: Speaker, Koninklijke Philips NV Grant, Koninklijke Philips NV Medical Advisor, MIM Software Inc
- Raymond Muzic PhD: Research Grant, Koninklijke Philips NV
- Kuan-Hao Dylan Su: Nothing to Disclose
- Donna M. Plecha MD: Advisory Board, Hologic, Inc Research Grant, SuperSonic Imagine

TEACHING POINTS
1. Utilization of an integrated PET-MRI system enables visualization of PET and MRI data with the patient in the same position. This allows direct comparison of PET and MRI images.
2. The MRI component allows for superior soft-tissue contrast.
3. The PET component provides information about tumor metabolic activity.
4. The high sensitivity of MRI coupled with high specificity of PET could provide accurate evaluation of extent of disease, staging and follow-up after treatment.

TABLE OF CONTENTS/OUTLINE
- Introduction: Imaging plays a vital role in staging breast cancer, the formulation of the appropriate treatment regimen, and assessing response to therapy. Purpose: The purpose of this study is to evaluate the role of PET-MRI in optimizing imaging evaluation of patients with breast cancer.
- Role of PET-MRI in Patients with Breast Cancer: By utilizing an integrated PET-MRI system, patients benefit from the soft-tissue contrast and information on vascularity provided by MRI in addition to the metabolic information yielded from PET.
- Conclusion: Our institution's experience with PET-MRI in breast cancer patients yields promising results. The use of an integrated PET-MRI system opens the door to many interesting questions, guiding the direction of our future work.

BRE012-b

Uncommon Malignant Breast Tumors: Differential Diagnosis and Findings on MRI

Education Exhibits
Location: BR Community, Learning Center

Participants
- Hazuki Takishima MD (Presenter): Nothing to Disclose
- Kohei Inoue MD, PhD: Nothing to Disclose
- Ken Motoori MD: Nothing to Disclose
- Takashi Uno: Nothing to Disclose

TEACHING POINTS
1. To understand their radiological findings and collate with pathological features. 2. To use this knowledge for differential diagnosis.

TABLE OF CONTENTS/OUTLINE
- Purpose and aim: The vast majority of invasive breast carcinomas are invasive ductal carcinoma, not otherwise specified (IDC-NOS) and invasive lobular carcinoma and the others are uncommon. Each of the uncommon types does not always have the same frequency of lymph node metastasis or the same prognosis in terms of the differentiation of the pathological or immunohistological feature. Because they don't always show a characteristic radiological feature, it is difficult to distinguish some cases from benign tumors. So it is very important to recognize the character of these tumors.
- Content organization: We present MRI images of uncommon breast tumors (mucinous carcinoma, neuroendocrine tumors, invasive micropapillary carcinoma, apocrine carcinoma, metaplastic carcinoma, sebaceous carcinoma) and examined radiological findings as compared with pathological features.
- Summary: Uncommon types of breast carcinoma are not seen very frequently, but their radiological features often overlap. Thus, it is necessary to have a sufficient understanding of the radiological findings of each tumor.

BRE013-b

Prevalent Round Interval Breast Cancers: Radiological and Pathological Characteristics

Education Exhibits
Location: BR Community, Learning Center

Participants
- Rebecca Geach BMBCh, BSC (Presenter): Nothing to Disclose
- Elisabeth Kutt FR CR: Nothing to Disclose
- Alexandra M. Valencia MD, FR CR: Nothing to Disclose

TEACHING POINTS
1) Review the radiological findings of our interval breast cancers at the time of screening and diagnosis for women in their first (prevalent) screening round. 2) Review the histopathological subtypes/grade of our interval cancers and correlation with radiographic findings including both mammography and MRI. 3) Present our interval data with regard to learning points for cancers that were deemed to either have minimal signs or suspicious abnormalities on their screening mammograms that were not reported.

TABLE OF CONTENTS/OUTLINE
- Description of current UK NHS breast screening programme (NHSBSP)/definition of prevalent interval breast cancers
- Presentation of 71 interval cancers in our institution between 2005 and 2009 including: - Interval year of diagnosis -- Radiological findings at diagnosis on mammography/ultrasound/MRI - Histopathological review of interval cancers - MRI/ultrasound findings in mammographically occult interval cancers - Pictorial review of our interval cancers that had minimal signs/suspicious lesions on screening mammography that were not reported by two independent readers: a learning experience
### BRE014-b

**Various Different Looks of Fat Necrosis of the Breast: Spectrum of Imaging Findings at Multi-imaging Modalities**

**Education Exhibits**

**Location:** BR Community, Learning Center

**Participants**

- Jin Hee Moon MD (Presenter): Nothing to Disclose
- Joo Yeon Chung MD: Nothing to Disclose
- Kyoonsoon Jung: Nothing to Disclose

**TEACHING POINTS**

Fat necrosis is a common benign entity that may pose a challenge to clinicians and breast radiologists. Radiologists should become familiar with various different looks of fat necrosis to avoid unnecessary biopsies. The purpose of this exhibit is to review imaging findings of fat necrosis of the breast at multi-imaging modalities, including mammography, ultrasound, MR imaging, CT and PET/CT.

### TABLE OF CONTENTS/OUTLINE

1. Clinical features of fat necrosis: Many clinical factors to the cause of fat necrosis and patient’s symptoms
2. Pathologic findings: Understanding the etiology and pathogenesis of fat necrosis
3. Imaging findings 1) Mammography: variable mammographic presentation and alteration of fat necrosis 2) Ultrasound and MRI: variable sonographic and MR imaging appearances and its correlation with mammography 3) PET/CT: variable looks of fat necrosis as incidental findings and its correlation with other breast imaging
4. Conclusion: There is a wide range of manifestations of fat necrosis from typically benign to worrisome for malignancy. To understand the etiology, pathogenesis and to familiar with imaging appearances of fat necrosis can help radiologists to avoid unnecessary biopsies.

### BRE016-b

"All that Glisters is not Gold"... or Cancer: Discriminating among Positive Findings in PEM (Positron Emission Mammography)

**Education Exhibits**

**Location:** BR Community, Learning Center

**Participants**

- Mariana Barbara Jimenez Bernal MD (Presenter): Nothing to Disclose
- Maria Lara MD: Nothing to Disclose
- Mary Carmen Herrera-Zarza MD: Nothing to Disclose
- Regina De La Mora Cervantes MD: Nothing to Disclose
- Luis Alberto Ruiz Elizondo MD: Nothing to Disclose
- Gisela Estrada MD: Nothing to Disclose
- Jose Luis Criales Cortes MD: Nothing to Disclose

**TEACHING POINTS**

1. Understand the basic principles of PEM. 2. Describe the differences between PEM and PET. 3. Clinical indications for PEM. 4. Depict variants of 18 FDG uptake and its histopathologic correlation, as well astro describe the spectrum of imaging findings of diverse breast pathological entities. (Staging detection of breast cancer is crucial for an effective treatment. PEM provides complementary information to mammography being a functional noninvasive imaging method with a higher spatial resolution detecting lesions measuring less than 2 mm. We demonstrate illustrative diverse cases with mammography correlation).

### TABLE OF CONTENTS/OUTLINE

1. Basic principles of PEM using 18 FDG. 2. Advantages of PEM vs PET 3. PEM indications 4. Spectrum of imaging findings and their correlation with mammography. -The great mimics: Mastitis, fat necrosis, post-surgical changes. -Analysis of illustrative cases according to the 18 FDG uptake levels. -PEM utility as an emerging new tool for breast imaging and it’s impact on therapeutic decisions.

### BRE017-b

**Imaging War on Breast Cancer Goes Nuclear... Positron Emission Mammography: A Conscientious Approach for an Emerging Diagnostic Weapon**

**Education Exhibits**

**Location:** BR Community, Learning Center

**Participants**

- Luis Azpeitia MD (Presenter): Nothing to Disclose
- Gisela Estrada MD: Nothing to Disclose
- Mariana Barbara Jimenez Bernal MD: Nothing to Disclose
- Daniela Angulo Salazar MD: Nothing to Disclose
- Luis Alberto Ruiz Elizondo MD: Nothing to Disclose
- Mary Carmen Herrera-Zarza MD: Nothing to Disclose
- Regina De La Mora Cervantes MD: Nothing to Disclose
- Jose Luis Criales Cortes MD: Nothing to Disclose
- Maria Lara MD: Nothing to Disclose

**TEACHING POINTS**

Breast cancer remains the most prevalent in women of developed countries. Although mammography is the gold standard system for breast cancer surveillance it isn’t a infallible method and we must continue improving our imaging screening and staging techniques. Devices that could more precisely map the extent of invasive and noninvasive disease would lead to more accurate actions. Positron Emission Mammography is an emerging molecular technology that provides high-resolution images
of hypermetabolic lesions in the breasts merging both morphological and functional features with remarkable sensitivity, specificity and accuracy. The purpose of this exhibit is: 1-Getting the PEM to be considered as a truly powerful adjunct to conventional breast imaging and to promote its usage. 2-To make clear the advantages, disadvantages, indications and contraindications in PEM imaging. 3-To identify and interpret the PEM imaging findings using the proposed lexicon and classification in order to achieve consistent, standardized reporting and management.

TABLE OF CONTENTS/OUTLINE

**BRE018-b**

Practical Assessment of Positron Emission Mammography (PEM) Descriptors: Radiologist Perspective

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

- Jorge Andres Abreu MD : Nothing to Disclose
- GLORIA PALAZUELOS : Nothing to Disclose
- Juliana Ocampo MD (Presenter): Nothing to Disclose
- Carolina Rumie Valois : Nothing to Disclose
- Andres Vasquez MD : Nothing to Disclose
- Javier Andres Romero MD : Nothing to Disclose

**TEACHING POINTS**

To study and evaluate the impact of new imaging technologies, as Positron Emission Mammography PEM, in the diagnosis and management of common diseases of breast. To review the utility of PEM in the study of patients with high suspicion of malignancy in mammography and ultrasound (BI-RADS® categories 4c and 5). To explain the application of the descriptors in PEM studies. To identify the characteristics of breast lesions detected by PEM: Size, Uptake and localization.

**TABLE OF CONTENTS/OUTLINE**

- Explain the use of descriptors in cases of PEM at our institution, compared with findings in Ultrasound and mammography.
- Explain an easy and correct way to interpret a PEM.

**BRE019-b**

Establishing a Radioactive Seed Localization Program

*Education Exhibits*

*Location: BR Community, Learning Center*

*Certificate of Merit*

**Participants**

- Michele Beth Drotman MD : Nothing to Disclose
- Anna Starikov BS (Presenter): Nothing to Disclose
- Janine T. Katzen MD : Nothing to Disclose
- Timothy D’Alfonso MD : Nothing to Disclose
- Allison Dana Levy MD : Nothing to Disclose

**TEACHING POINTS**

Discuss the advantages of radioactive seed localization over the traditional needle localization for pre-operative patients. Outline the steps to establishing such a program and solutions that can ease the transition to this relatively new technique.

**TABLE OF CONTENTS/OUTLINE**

- Radioactive seed localization is an alternative to needle localization of breast lesions both of which serve as a guide to assist the surgeon in the operating room. Seed localizations offer the advantages of flexibility of scheduling and patient comfort. The initial step is organizing a multidisciplinary approach involving the breast surgeons, pathologists and radiologists. Next, a safety protocol must be in place including radiation safety and handling of the radioactive I-125 seeds. Finally, the program can be instituted once all of the medical specialties and associated staff have had the proper training and certification. Establishing such a program involves many steps but has the potential to improve quality of patient care.

**BRE020-b**

Intraductal Papilloma: Accuracy of Needle Biopsy

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

- Andre Queiroz de Morais (Presenter): Nothing to Disclose
- Marcelo Menezes Medeiros : Nothing to Disclose
- Juliana Alves Souza : Nothing to Disclose
- Luciana Karla Lira Franca : Nothing to Disclose
- Almir Bitencourt MD : Nothing to Disclose
- Luciana Graziano MD : Nothing to Disclose
- Camila Guatelli : Nothing to Disclose
- Elvira Ferreira Marques : Nothing to Disclose

**TEACHING POINTS**

- Intraductal Papilloma presents with a wide spectre of lesions, varying from benign to atypical papillomas until invasive
papillary carcinoma. Due to morphological resemblance between the papillary lesions, the interpretation and the histological differentiation are difficult. Biopsies with inadequate material increase the underestimation rate. Objective: a literature review, evaluating the accuracy of the percutaneous needle biopsy for papillary lesions, identifying the underestimation rate and the radiological malignity signs. Some clinical and radiological aspects are useful to predict the chances of malignancy associated with papillary lesions: BIRADS® classification (underestimation rate around 25% for 4C or 5 category), patients older than 50 years old, lesion size above 1,5 cm and more than 3 cm of distance to the breast nipple. The majority of studies suggests a surgical excision for atypical papillomas. Regarding the intraductal papillomas without atypia, there are controversies on its management, however, the concordance between the radiological and histopathological findings can make the imaging follow-up a possible choice.

TABLE OF CONTENTS/OUTLINE

Breast papillary lesions
Diagnosis
Treatment
Follow-up
Management
Percutaneous needle biopsy
Histopathological-Imaging correlations
Safe follow-up

BRE101
Breast Imaging Findings Related to Interventions: Complications, Recurrences, and Rare Findings

Education Exhibits
Location: BR Community, Learning Center

Participants
- Eren D. Yeh MD (Presenter): Nothing to Disclose
- Elisabeth P. Frost MD: Nothing to Disclose
- Catherine Streeto Giess MD: Nothing to Disclose
- Sughra Raza MD: Consultant, Seno Medical Instruments, Inc
- Robyn L. Birdwell MD: Nothing to Disclose

TEACHING POINTS
1. Radiologists should be aware of potential pitfalls during procedures. 2. Radiologists should be familiar with usual and unusual patterns of recurrence following treatment for breast cancer. 3. Radiologists should be familiar with rare and unusual clinical presentations following breast interventions.

TABLE OF CONTENTS/OUTLINE

Using a case based review format, we will present and discuss examples from our teaching files of problematic imaging findings related to breast interventions. Cases to be presented will include examples of errors of technique and interpretation at wire localization, and core biopsy under mammographic, sonographic, and MRI guidance, as well as cases of unusual and rare findings following breast surgery and treatment for breast cancer.

BRE102
Breast Magnetic Resonance: A Useful Tool for Marking Tumors Previous to Conservative Surgery

Education Exhibits
Location: BR Community, Learning Center

Participants
- Vicente Martinez De Vega MD (Presenter): Nothing to Disclose
- Susana Linares Gonzalez MD: Nothing to Disclose
- Janeth Heralia Oyola Tovar MD: Nothing to Disclose
- Diana Carina Mollinedo MD: Nothing to Disclose
- Leire Alvarez Perez BMedSc: Nothing to Disclose
- Miguel Chiva De Agustín: Nothing to Disclose
- Manuel Recio Rodriguez: Nothing to Disclose

TEACHING POINTS
1. MRI is a useful technique for localizing preoperatively breast cancers that are not visualized with ultrasound or mammogram. 2. Titanium hook wires guided with MRI can be used to mark single or multiple tumors or to localise the anterior and posterior margins of a large tumor. 3. Marking lesions, displayed only with MRI, by injecting radiotracer 99mTc-nanocolloid guided with MRI (MR ROLL technique) can be used to localise the sentinel lymph node (SNOLL technique). 4. Interventional procedures guided with MRI are very useful techniques to mark breast tumors. This techniques are accurate, sure and fast.

TABLE OF CONTENTS/OUTLINE

Breast MRI is more sensitive for detecting breast cancer than mammography and ultrasound. There are breast cancers that are only detected by MRI. Histological diagnosis is made by MRI-guided vacuum assisted biopsy. To perform conservative surgery, is necessary to mark the lesion with a hook wire guided by mammography (over a titanium marker placed after the MR biopsy) or guided with MRI directly (more accurate). Another method is marking the tumor by injection of a nanocolloid radiotracer guided with MRI (ROLL-SNOLL technique). 1. General description of interventional procedures guided with breast MRI used for presurgical marking of breast tumors (titanium hook wires or MRI ROLL technique) 2. Indications 3. Results 4. Advantages
Breast Model for Teaching the Needle Localization Procedure

Education Exhibits
Location: BR Community, Learning Center

Participants
Neil Thayil MD (Presenter): Nothing to Disclose
Jeffrey Brooks MD: Nothing to Disclose

PURPOSE
With regards to mammographic needle localization procedures, it is felt that speed and accuracy are of the essence to have a successful procedure and to minimize the degree of pain/discomfort experienced by the patient. Since acquisition of these procedural skills requires hands-on experience and since it is not ideal for any inexperienced resident to practice such procedures on patients, it is strongly believed that a well constructed breast simulation model can serve as an important educational tool to help residents attain the skills necessary to perform these procedures in an efficient and competent manner while limiting possible harm/discomfort to patients.

METHOD AND MATERIALS
To simulate the breast, we purchased turkey products and injected them with a suspension of crushed egg-shells to mimic breast calcifications. A curriculum was provided to the senior residents at our institution. This included a powerpoint lecture that was aimed at providing information pertaining to adequate procedural pre-planning as well as step-by-step instructions on how to skilfully execute a mammographic needle localization procedure. The residents then received hands-on experience by practicing needle localization procedures with the created breast simulation models. The residents also completed pre and post surveys that were used to assess their experience with regards to the effectiveness of the curriculum and their overall comfort levels with performing mammographic needle localization procedures.

RESULTS
Evaluation of pre and post surveys is currently underway, but initial analysis reveals that the residents overwhelmingly considered their experience with the breast simulation models to be very educationally useful. In particular, early analysis indicates that after completing the curriculum, the majority of residents reported an increase in their overall confidence level in being able perform accurate needle localizations.

CONCLUSION
Breast simulation models are useful educational tools that, when used effectively, can allow residents to become comfortable and skilled with mammographic needle localization procedures before performing them on patients.

CLINICAL RELEVANCE/APPLICATION
Models for procedures are important so physicians can gain experience and confidence. Development of a model for teaching needle localization procedures will benefit both patients and doctors.

Challenges, Precautions and Mishaps in Breast MRI Procedures and Outcomes: Strategies to Optimize Success

Education Exhibits
Location: BR Community, Learning Center

Certificate of Merit

Participants
Sona Ajit Chikarmane MD (Presenter): Nothing to Disclose
Catherine Streeter Giess MD: Nothing to Disclose
Robyn L. Birdwell MD: Nothing to Disclose

TEACHING POINTS
MRI-guided breast procedures are a safe and increasingly routine method for evaluating suspicious MRI-detected breast lesions. Despite this, MRI-guided procedures can be challenging, with relatively high biopsy cancellation rates ranging from 8-17%. Our objective is to 1) review problematic factors in breast MRI procedures and 2) provide strategies for optimizing success and subsequent lesion management.

TABLE OF CONTENTS/OUTLINE
1) Provide a brief review of breast MRI procedure indications and technical considerations, including set-up strategies (i.e. positioning, grid pressure) 2) Discuss optimizing timing of breast MRI procedures to minimize potential hormonal influences, particularly in pre-menopausal women 3) Address reasons for and strategies to prevent procedure cancellations 4) Demonstrate challenging lesion locations, particularly posterior and medial lesions, and discuss the role of supplemental tools for biopsy (i.e. use of targeted ultrasound and mammography localization after clip placement with MRI guidance rather than MRI core biopsy) 5) Review the importance of pathology correlation (no specimen, discordant or non-specific results) and follow-up strategies of benign biopsies (six-month follow-up and when to re-biopsy or surgically excise) 6) Display challenging cases and review potential mishaps, strategies for success, and management

Decision Making Strategies to Recommend MRI Biopsy. Will You Biopsy this Lesion? Yes or No? A Radiology-Pathology Correlation
**Participants**

- Kirti Manohar Kulkarni, MD (Presenter): Nothing to Disclose
- Sujay K. Sheth, MD: Nothing to Disclose
- Charlene A. Sennett, MD: Nothing to Disclose
- David Victor Schacht, MD: Nothing to Disclose
- Hiroyuki Abe, MD: Consultant, Seno Medical Instruments, Inc

**TEACHING POINTS**

Breast Radiologists need to tweak the MRI interpretation threshold based on the history and reason for the MRI: e.g. staging MRI vs. high risk screening MRI. This will help reduce the false positive biopsy rate and maintain the credibility of breast MRI at your institution/practice. Background symmetric enhancing breast parenchyma can sometimes give a clue towards the decision. Role of MRI phenotypes such as morphology of the lesion and kinetic data in the decision making process will be discussed.

**TABLE OF CONTENTS/OUTLINE**

The cases will be presented in a quiz format. The question to be answered is: (1) Will you biopsy this lesion and why? (2) What do you think pathology may show? A radiology-pathology correlation will be shown for each case in the discussion. We will present various pathology scenarios that can explain the enhancing lesion. Key strategies to biopsy or not biopsy the lesion will be highlighted in the discussion of each case.

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**BRE106**

**Hello Old Friend, What's New? Revisiting Fibroadenomas and Emerging Management Options**

**Participants**

- Melissa Marie Joines, MD (Presenter): Nothing to Disclose
- Stephanie Anne Lee-Felker, MD: Nothing to Disclose
- Simin Bahrami, MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: 1. To review the spectrum of multimodality imaging characteristics of breast fibroadenomas. 2. To highlight patient and clinical factors in addition to imaging characteristics with a specific emphasis on treatment implications. 3. The indications and selection criteria for cryoablation of breast fibroadenomas.

**TABLE OF CONTENTS/OUTLINE**

1. Overview of fibroadenomas including pathology 2. Comprehensive review of breast fibroadenoma imaging characteristics on Mammography, Ultrasound, and MRI 3. Review of fibroadenoma mimics 4. Delineation of patient and clinical factors relevant to the management of breast fibroadenomas, including patient risk factors, patient preference, and physical exam findings 5. Brief overview of treatment options for breast fibroadenomas such as conservative management/imaging follow-up, surgical resection, and breast cryoablation 6. Review indications, patient and imaging selection criteria of breast cryoablation for fibroadenomas 7. Overview of ultrasound guided cryoablation technique

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**BRE111**

**Real-time Virtual Sonography-guided Vacuum-assisted Breast Biopsy for Lesions Initially Detected with Breast MRI; Why and How to Do It**

**Participants**

- Takayoshi Uematsu, MD, PhD (Presenter): Nothing to Disclose
- Shogo Nakano: Nothing to Disclose

**TEACHING POINTS**

The purpose of this educational exhibit is to describe the principles of and useful tips for identifying and correlating lesions initially detected with breast MRI when performing real-time virtual sonography (RVS)-guided vacuum-assisted breast biopsy. We discuss and illustrate RVS-guided vacuum-assisted breast biopsy techniques, indications for the procedure, technical considerations, and associated complications.

**TABLE OF CONTENTS/OUTLINE**


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**BRE112**

**Redefining Radiologic Breast Localization with Radioactive Seeds**

**Participants**

- Sara Ann Majewski, MD (Presenter): Nothing to Disclose
- Prasanna R. Kumar, MBBS, MD: Nothing to Disclose
TEACHING POINTS

To describe the technique of preoperative imaging-guided radioactive seed localization of the breast, present advantages of radioactive seed localization and highlight distinct features of radioactive seeds in comparison to conventional needle localization.

TABLE OF CONTENTS/OUTLINE

A. Explain Radioactive Seed Localization Technique  
B. Review Indications and Contraindications  
C. Present Advantages and Disadvantages of Radioactive Seed Localization Compared to Conventional Needle Localization  
D. Show Examples  
E. Present Potential Pitfalls

**BRE113**

Step-by-Step: Planning a Needle Localization Procedure

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

- Megan Jenkins Kalambo MD (Presenter): Nothing to Disclose
- Basak Erguvan Dogan MD: Nothing to Disclose
- Lumarie Santiago MD: Nothing to Disclose
- Sarah DeSnyder MD: Nothing to Disclose
- Michael Gilcrease MD, PhD: Nothing to Disclose
- Gary J. Whitman MD: Nothing to Disclose

**TEACHING POINTS**

1. Lesion size, type and configuration play an important role in localization planning.  
2. Localization of lesions with associated calcifications need to be performed under mammographic guidance, non-calcified single masses can be localized with ultrasound using a single wire.  
3. Post-neoadjuvant therapy, the footprint of residual disease must be localized.  
4. Localization of intraductal lesions: galactography and methylene blue injection followed by needle localization ensures excision of entire ductal system.

**TABLE OF CONTENTS/OUTLINE**

This exhibit will review steps involved in planning successful image-guided preoperative needle localization. Case-based review will include:  
1. Planning Stage: Determining approach, number and type of needles, need for bracketing or localization of the targeted lesion, by illustrating various lesion types and challenging lesions.  
2. Procedure Stage: review of patient positioning, imaging steps and preoperative communication with the surgeon. MRI, ductogram and Tomosynthesis-guided localization.  
3. Post-procedure Stage: specimen radiography in assessing successful excision, margin status and the need to obtain additional tissue.  
4. Illustration of potential complications, including wire migration, fractured wire, clip migration during localization with management suggestions.

**BRE114**

The Cosmetically Altered Breast: Review of Surgical Techniques and Benign Radiological Findings to Aid in Interpretation of Mammography

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

- Lane M. Roland MD: Nothing to Disclose
- Mohammed Imran Qurashi MD (Presenter): Nothing to Disclose
- Donald R. Herdt MD: Nothing to Disclose
- Nana Mizuguchi MD: Nothing to Disclose
- Bradley M. Calobrace MD: Nothing to Disclose
- Sarah Greer Mizuguchi MD: Nothing to Disclose
- Elizabeth Riley MD: Speakers Bureau, Amgen Inc Speakers Bureau, F. Hoffmann-La Roche Ltd

**TEACHING POINTS**

As elective cosmetic breast procedures are among the most commonly performed procedures in the United States, we will review the spectrum of imaging findings to familiarize the radiologist interpreting mammograms. 1. Review surgical techniques and how they translate into findings seen on mammography 2. Review normal and benign imaging findings seen in the cosmetically altered breast 3. Understand when additional imaging may be indicated

**TABLE OF CONTENTS/OUTLINE**

1. Diversity of surgical techniques seen with elective cosmetic breast surgery: *augmentation *expansion *reduction mammoplasty *mastopexy *free silicone 2. Spectrum of findings encountered when imaging the cosmetically altered breast: Review the range of normal appearance and benign findings with sample cases 3. When additional adjunctive breast imaging may be indicated for a cosmetic breast patient Review the current FDA recommendations for patients with silicone breast implants

**BRE115**

The In's and Out's of Ductography: A Quiz-based Review for Residents (and All Radiologists!)

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

- Laura Suzanne Sheiman MD (Presenter): Nothing to Disclose

**Certificate of Merit**
TEACHING POINTS

Although the ductogram provides valuable information, there is much confusion about the indications for the exam and how it is performed. As ductograms do not occur frequently at our institution, many residents lack a familiarity with the procedure. This exhibit is intended to review the indications, technique and potential imaging findings of ductography with multiple case examples.

TABLE OF CONTENTS/OUTLINE

The exhibit will be presented in quiz format. Quiz content will include: -Indications for ductography -Technique (with tips and tricks of an experienced radiologist) -Potential imaging findings -Further management

BRE116

Therapeutic Application of Ultrasound Guided Vacuum Irrigation and Drainage In Challenging Abscesses and Seromas

Education Exhibits

Location: BR Community, Learning Center

Participants

William Wei Lian Teh MBChB, FRCR : Speaker, Hologic, Inc Speaker, Devicor Medical Products, Inc
Sophie Harriet Pattison MBChB, FRCR (Presenter): Nothing to Disclose
Mia Morgan MBBS, FRCR : Nothing to Disclose

TEACHING POINTS

The current gold standard for the treatment of breast abscesses is for percutaneous aspiration repeated as clinically necessary. If this method fails then formal surgical incision and drainage may be required. This may result in cosmetic morbidity and also requires the general sequelae of an operation i.e. general anaeasthetic, and hospitalisation. Following surgery for breast cancer, patients can develop haematomas or loculated seromas that do not resolve with simple aspiration. This can delay post operative radiotherapy. In order to avoid surgical incision and drainage for these two categories, we have been successfully performing ultrasound guided vacuum irrigation and drainages at our institution.

TABLE OF CONTENTS/OUTLINE

Introduction Technique Figure 1: Vacuum biopsy introduced into abscess following local anaesthetic administration. Figure 2: Device in use: US image of the sampling notch in septations of abscess Figure 3: A large septated postsurgical seroma. Conventional drainage was hindered by the thick fibrous septae and viscous content. Figure 4.: Utilising the biopsy function, the septae were divided. A saline washout through the vacuum bore followed by suction permitted irrigation and drainage of the contents. Figure 5: A small residual fibrous cavity remained. Video Experience Conclusion

BRE118

Tomosynthesis-guided Breast Biopsy: Nuts and Bolts

Education Exhibits

Location: BR Community, Learning Center

Participants

Monica Liwen Huang MD (Presenter): Nothing to Disclose
Beatriz E. Adrada MD : Nothing to Disclose
Marion Elizabeth Scoggins MD : Nothing to Disclose
Deanna Lynn Lane MD : Nothing to Disclose
Basak Erguvan Dogan MD : Nothing to Disclose

TEACHING POINTS

1) With increasing implementation of digital breast tomosynthesis (DBT) and detection of mammographically and sonographically occult tomosynthesis lesions, tomosynthesis-guided breast biopsy is now a necessity. 2) A tomosynthesis-identified suspicious breast lesion should undergo targeted breast ultrasound for ultrasound-guided biopsy if possible, with clip placement within the lesion and post-biopsy tomosynthesis confirmation. 3) Principles of tomosynthesis-guided breast biopsy and stereotactic biopsy share similarities but have many differences. 4) With detailed planning and creativity, tomosynthesis-guided biopsy without dedicated tomosynthesis guidance software may be performed when the basic principles of tomosynthesis-guided biopsy are understood.

TABLE OF CONTENTS/OUTLINE

1) Basic principles of digital breast tomosynthesis. 2) Principles of tomosynthesis-guided breast biopsy. 3) Equipment and software necessary to perform tomosynthesis-guided breast biopsy. 4) Indications and breast lesion selection process for tomosynthesis-guided biopsy. 5) Step by step instructions in performing a tomosynthesis-guided breast biopsy with tomosynthesis-guidance software. 6) Alternative tomosynthesis guided biopsy methods utilized or may be attempted to obtain tissue diagnosis in the absence of tomosynthesis guidance software.

BRE119

All You Have to Know about Imaging of Male Breast Diseases

Education Exhibits

Location: BR Community, Learning Center

Participants

SILVIA LLAVEIRAS BORRELL (Presenter): Nothing to Disclose
Jaime Isern MD : Nothing to Disclose
Ana Maria Martinez Jimenez : Nothing to Disclose
MariaJose Conde Martinez : Nothing to Disclose
TEACHING POINTS

1) To describe and illustrate radiological features of breast male diseases. 2) To learn about the differential diagnosis and diagnostic difficulties. 3) To correlate the imaging with histology of benign and malignant lesions. 4) To discuss the appropriate clinical management.

TABLE OF CONTENTS/OUTLINE

It is important for radiologists to understand the appearances of both benign and malignant male breast lesions. We will present a pictorial experience, including clinical and imaging findings (mammograms, US and CT) with pathologic correlation. 1) We first review the normal anatomy of male breast. 2) The list of cases includes: Benign conditions: Pseudogynecomastia, Gynecomastia (glandular, dendritic and nodular pattern), Diabetic Fibrous Mastopathy; Epidermoid Cyst Inclusion; Myofibroblastoma; Mastitis: Mondor’s disease; Lipoma and Fibroadenolipoma. Malignant lesions: Ductal Carcinomas, Papillary Carcinoma and costal Chondrosarcoma (detected on mammogram). Finally we show an unusual anatomical variant corresponding to the Sternumis muscle which can induce to errors on mammograms 3) Summary of main points to remember. 3) At the end of the exhibit the viewer will be familiarized with the diagnosis of male breast disorders.

BRE121

Architectural Distortion Revisited: Benign and Malignant Etiologies Unmasked by Tomosynthesis

Education Exhibits

Location: BR Community, Learning Center

Participants

Amado B. Del Rosario DO (Presenter): Nothing to Disclose
Cathleen P. Hendershot MD: Nothing to Disclose
Gary Tozbikian MD: Nothing to Disclose
Jeffrey Robert Hawley MD: Nothing to Disclose
Mitva J. Patel MD: Nothing to Disclose
Adele Lipari DO: Nothing to Disclose
Selin Carkaci MD: Consultant, Hologic, Inc

TEACHING POINTS

1. Review the causes of architectural distortion (AD)
2. Review the multimodality imaging features of AD
3. Demonstrate how AD can present subtly and be detected accurately by tomosynthesis for biopsy purposes
4. Provide histopathological correlation
5. Determine appropriate management and follow-up

TABLE OF CONTENTS/OUTLINE

1. Architectural Distortion (AD) background including, but not limited to radial scar, LCIS, papilloma, dense stromal fibrosis, and DCIS
2. Multimodality imaging review of AD
3. Role of tomosynthesis and tomosynthesis guided biopsy
4. Pathophysiology of uncommon lesions causing AD
5. Radiological-Pathological Concordance for appropriate management and follow-up 6. Summary

BRE122

BI-RADS 5th Ed: Asymmetries Decoded

Education Exhibits

Location: BR Community, Learning Center

Certificate of Merit

Participants

Geraldine Kang: Nothing to Disclose
Ifeanyi C. Onyeacholem MD: Nothing to Disclose
Joanne Shimogaki Bae: Nothing to Disclose
Youn Jeong Kim MD: Nothing to Disclose
Jade De Guzman MD: Nothing to Disclose
Haydee Ojeda-Fournier MD (Presenter): Nothing to Disclose

TEACHING POINTS

Mammographic asymmetries may represent a spectrum of benign to malignant lesions. There has been a refinement in the asymmetry lexicon nomenclature over the last several editions of the BI-RADS manual, including a new term in the 5th Ed of BI-RADS. It is important for the radiologist involved in breast imaging to understand what these terms mean and how to manage the findings related to mammographic asymmetries. At the end of this educational exhibit the learner will: Define the meaning of asymmetries; Provide imaging examples for each of the asymmetry descriptors; Present an algorithm for the management of mammographic asymmetries; Self assessment with image case review and questions in multiple choice format.

TABLE OF CONTENTS/OUTLINE

Introduction; Historical perspective; Definitions: Asymmetry, Global asymmetry, Focal Asymmetry, Developing asymmetry;
Breast Tomosynthesis Screening: A Pictorial Review of Benign and Malignant Pathology

Education Exhibits
Location: BR Community, Learning Center

Certificate of Merit

Participants
Abraham Hyeon Jeon MD (Presenter): Consultant, Hologic, Inc

TEACHING POINTS
The aim of this pictorial review is to provide an overview of digital breast tomosynthesis in the screening population. 1. The learner should be able identify and confidently diagnosis benign pathology on screening breast tomosynthesis without need for additional imaging. 2. The learner should be able to recognize suspicious and malignant features on screening breast tomosynthesis and how to tailor a more focial diagnostic workup based on tomosynthesis findings (e.g., additional mammographic imaging versus breast ultrasound). 3. A brief overview of implementation of digital breast tomosynthesis in the screening setting will be presented.

TABLE OF CONTENTS/OUTLINE
Overview of Digital Breast Tomosynthesis (DBT) technology and clinical data Bening masses seen on DBT Benign calcifications seen on DBT Malignant pathology seen on DBT Implementation of DBT in the Screening population Future developments in DBT and summary

Can You Detect It? Missed Breast Cancers in Breast Imaging

Education Exhibits
Location: BR Community, Learning Center

Magna Cum Laude

Participants
Anubha Wadhwa MD (Presenter): Nothing to Disclose
Mary Beth Gonyo MD : Nothing to Disclose

TEACHING POINTS
The main causes of missed cancers on mammography are dense breasts, subtle asymmetries, slow developing densities and poor positioning or technique. False negative ultrasound may be related to detection errors or interpretation errors, especially with isoechoic masses, nearly circumscribed masses or subtle areas of architectural distortion. This is a quiz based presentation reviewing cases of missed breast cancer on mammography and ultrasound and understanding radiologic pathologic correlation.

1. Old comparison mammograms are our best friend in mammography. Comparison with at least two or three prior mammograms is necessary, especially to identify subtle changes and developing densities.
2. Isoechoic masses and subtle areas may be missed on ultrasound if proper ultrasound parameters are not used and adjusted during the exam.
3. It is important to have a good quality control program and a good audit system in every breast imaging section.

TABLE OF CONTENTS/OUTLINE
1. Quiz based presentation of various causes of undetected cancers on mammography and identification of learning points from each case. 2. Cases of missed cancers on ultrasound. Understanding mammographic-sonographic correlation and correlation of ultrasound with clinical findings. 3. Radiologic-Pathologic correlation: Identification of discordant results on biopsy.

Contrast Enhanced Spectral Mammography (CESM) - Indications, Protocol, Interpretation and Pitfalls

Education Exhibits
Location: BR Community, Learning Center

Participants
Lydia Liao MD, PhD (Presenter): Nothing to Disclose
Luna Li MD, PhD : Nothing to Disclose
Pauline Germaine DO : Nothing to Disclose
Elizabeth Tinney RRA : Nothing to Disclose

TEACHING POINTS
CESM is a new FDA approved diagnostic study using CT contrast to detect breast cancer by providing morphologic and functional information detecting abnormal anatomic structures and angiogenesis. CESM has a shorter test time, an increased accessibility and is relatively inexpensive when compared to breast MRI. Our institution is one of the first few centers in the country acquired CESM and we have done more than 1,000 exams including 100 cases of tissue diagnosis proven breast cancer from the end 2012 to present. The focus of this presentation is to discuss CESM mechanism, indications of the protocol, pitfalls including artifacts. The illustration cases in cooperating with history, other imaging study findings and tissue diagnosis focus on the morphology and the enhancement characteristics of both malignant and benign lesions on CESM.
TABLE OF CONTENTS/OUTLINE
CESM is one of the contrast studies and provides both morphologic and functional information of breast lesions. Malignant lesions demonstrate most medium to strong enhancement with morphologic characteristics that could be distinguished from benign lesions. CESM sometime pick up abnormal enhancing lesions even then regular digital mammography and ultrasound are negative. CESM has some unique artifacts. The most common artifacts are breast-within-breast, halo, and ripple artifact.

BRE126
Cracking the Cluster Conundrum: Practical Applications of Digital Breast Tomosynthesis in the Characterization of Breast Calcifications

Education Exhibits
Location: BR Community, Learning Center

Participants
Danea Johnette Campbell MD (Presenter): Nothing to Disclose
James Henderson MD: Nothing to Disclose
Hilda Theresa Tejero MD: Nothing to Disclose
Monica M. Yepes MD: Nothing to Disclose
Geetika Klevos MD: Nothing to Disclose
Fernando Collado-Mesa MD: Nothing to Disclose
Jorge Andres Infante Mendez MD: Nothing to Disclose
Jose Miguel Net MD: Nothing to Disclose

TEACHING POINTS
Digital breast tomosynthesis (DBT) has been shown to improve detection and characterization of breast lesions that would otherwise be obscured on full field digital mammography (FFDM) leading to decreased recall rates. Despite these advantages, DBT falls behind FFDM in the detection of calcifications. However, DBT can be useful in accurately characterizing calcifications when seen. The goal of this educational exhibit is to show: 1. DBT can be used effectively in the characterization of breast calcifications. 2. Dermal calcifications can be confirmed by evaluating the 'bookend' slabs. 3. DBT can elucidate additional diagnostic features of the calcifications not readily apparent on full field mammography, for example DBT is useful in demonstrating scattered calcifications which appear clustered on FFDM. 4. DBT may result in reduced need for additional images after screening mammography, thereby reducing diagnostic mammograms and additional radiation.

TABLE OF CONTENTS/OUTLINE
Dermal Calcifications Vascular Calcifications Cluster Conundrum- Cluster vs Scattered Looking Ahead - Potential Pitfalls and Successes

BRE127
Dense Breasts: More than Cancer Camouflage

Education Exhibits
Location: BR Community, Learning Center

Participants
Clayton R. Taylor MD (Presenter): Nothing to Disclose
Mitva J. Patel MD : Nothing to Disclose
Selin Carkaci MD : Consultant, Hologic, Inc

TEACHING POINTS
• Classification and multimodality evaluation of breast density • Implications of breast density for screening mammography • Increased relative risk of malignancy seen with dense breasts • Current state laws governing breast density reporting and their implications • Supplemental screening, including whole breast screening ultrasound and MRI

TABLE OF CONTENTS/OUTLINE
• Brief discussion of history of breast density • Breast density evaluation with digital mammography, breast tomosynthesis, magnetic resonance imaging and computed tomography • Updated BI-RADS lexicon for mammographic density and ultrasound tissue composition reporting • Subjective versus semi-automated and automated breast density evaluation • Implications of dense breast tissue for screening and breast cancer risk • State laws regarding breast density reporting and insurance coverage • Supplemental screening - current and potential future role of ultrasound and MRI

BRE128
Developing Asymmetries on Mammography: A Multi-modality Approach to Assessment and Management

Education Exhibits
Location: BR Community, Learning Center

Selected for RadioGraphics

Participants
Allyson Louise Chesebro MD (Presenter): Nothing to Disclose
Catherine Streeto Giess MD : Nothing to Disclose
Nicole S. Winkler MD : Nothing to Disclose
Robyn L. Birdwell MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is:
1. To review the BIRADS definitions for mammographic asymmetry (one-view) and focal asymmetry (two view) with...
To review the various etiologies of developing mammographic asymmetries

To outline a protocol for comprehensive diagnostic mammographic evaluation for developing asymmetries

To discuss the role and limitations of correlative ultrasound (US), magnetic resonance imaging (MRI) and digital breast tomosynthesis in the assessment and management of developing asymmetries

TABLE OF CONTENTS/OUTLINE

Review and illustrate the BIRADS definition of mammographic "asymmetry" and "focal asymmetry." Outline the various etiologies of mammographic asymmetries - benign and malignant. Discuss the diagnostic workup of developing one or two view asymmetries, including appropriate and inappropriate utilization of targeted breast US, digital breast tomosynthesis, and diagnostic breast MRI in assessment and management. Illustrate examples of mammographic developing asymmetries with multi-modality imaging and histopathologic correlation. Discuss the potential for delayed diagnosis because of negative correlative US.

BRE130
Digital Breast Tomosynthesis Revealed: What You See Only with 3D

Education Exhibits
Location: BR Community, Learning Center

Participants
Dorothy Amy Sippo MD (Presenter): Nothing to Disclose
Anjuli A. Shah MD: Nothing to Disclose
Lisa A. Mullen MD: Nothing to Disclose
Cecilia Margaret Brennecke MD: Nothing to Disclose
Sally D. Herschorn MD: Stockholder, Hologic, Inc Spouse, Stockholder, Hologic, Inc
Ashley Cimino-Mathews MD: Nothing to Disclose
Susan Caroline Harvey MD: Nothing to Disclose

TEACHING POINTS

1) To review how 3D digital breast tomosynthesis (DBT) and subsequent synthesized 2D images are obtained and interpreted. 2) To discuss how 3D DBT and synthesized 2D images can improve screening recall rate and cancer detection rate. 3) To identify changes in diagnostic breast imaging workflow when using 3D DBT and synthesized 2D techniques compared with 2D mammography.

TABLE OF CONTENTS/OUTLINE

3D DBT and 2D synthesized imaging techniques: Overview of image acquisition and interpretation. Findings identified with 3D DBT and 2D synthesized imaging not visible with conventional 2D mammography: - Breast cancer: - Invasive ductal carcinoma - Ductal carcinoma in situ - Invasive lobular carcinoma - High risk lesions: - Complex sclerosing lesion - Intraductal papilloma - Benign lesions: - Cyst - Fibroadenoma - Dense stromal fibrosis Ways that 3D DBT reduces screening mammography recall rate: - Demonstration of asymmetries to be summation of normal tissue - Localization of skin lesions, including calcifications - Identification of vascular calcifications Workflow changes in the diagnostic setting with 3D DBT: - Fewer additional views - Improved localization and characterization of masses - Evaluation of extent of disease using 3D DBT for newly diagnosed cancer

BRE131
Digital Breast Tomosynthesis-guided Wire Localization: A Guide to Surgical Excision of Mammographically and Sonographically Occult Lesions

Education Exhibits
Location: BR Community, Learning Center

Participants
Margaret Ann Mays MD (Presenter): Nothing to Disclose
Grace Ingram MD: Nothing to Disclose
Surekh Salil Joshi MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to: - Discuss method of Digital Breast Tomosynthesis-guided (DBT-guided) wire localization - Demonstrate the utility of DBT-guided wire localizations in mammographically and sonographically occult lesions.

TABLE OF CONTENTS/OUTLINE

1. Review of Digital Breast Tomosynthesis. 2. Description of method used in DBT-guided wire localization. 3. Clinical utility and Indications for Tomosynthesis-guided wire localizations. 4. Discuss two cases of DBT-guided wire localizations performed at our institute with radiologic pathologic correlation. 5. Future directions and summary: With increasing use of 3D imaging, previously occult lesions will be more frequently detected. In such occult suspicious lesions, DBT-guided wire localization could be used to guide surgical excision.

BRE132
Lactational Calcifications on Mammography: An Educational Review

Education Exhibits
Location: BR Community, Learning Center

Participants
Cathleen Clare Heffernan MD: Nothing to Disclose
Elizabeth Victoria Geffen MD (Presenter): Nothing to Disclose
Cecilia Luz Mercado MD: Nothing to Disclose

TEACHING POINTS

As more women delay childbearing, a larger percentage of them are entering the screening population and, as a result,
As more women delay childbearing, a larger percentage of them are entering the screening population and, as a result, mammography is capturing new calcifications that have developed during lactation. We will use cases from our database and outline a variety of appearances of lactational calcifications on mammography to familiarize radiologists with its spectrum of appearances. 1) Lactational calcifications are most commonly diffuse or scattered; occasionally regional or rarely grouped. 2) They can be bilateral or unilateral. If unilateral, we have noted that the calcifications often correlate with the side of dominant milk production. 3) Morphology is most often round or punctate, sometimes rim. Amorphous or coarse heterogeneous is less commonly seen. 4) Management recommendations are usually short interval follow-up.

**TABLE OF CONTENTS/OUTLINE**

1) Pathophysiology of lactational calcifications. 2) Illustrative cases demonstrating the range of appearances of lactational calcifications. 3) Review of our database citing most common imaging findings including morphology and distribution using the BI-RADS lexicon. 4) Review of management recommendations.

**BRE133**

**Mammographic BIRADS 3 Lesions Upgraded During Imaging Surveillance: Common Errors in Initial/Subsequent Assessment and How to Avoid Them**

*Education Exhibits*

*Location: BR Community, Learning Center*

- Cum Laude
- Selected for RadioGraphics

**Participants**

- Aya Michaels MD (Presenter): Nothing to Disclose
- Catherine Streeto Giess MD : Nothing to Disclose
- Chris Sungwon Chung MD : Nothing to Disclose
- Elisabeth P. Frost MD : Nothing to Disclose
- Robyn L. Birdwell MD : Nothing to Disclose

**TEACHING POINTS**

1. To review mammographic criteria for probably benign (BIRADS 3) lesions according to the BIRADS lexicon
2. To discuss the complementary but occasionally conflicting roles of mammographic change versus morphology in assessing and managing BIRADS 3 lesions
3. To illustrate challenging clinical situations affecting assessment and management, including lesion location, lack of prior studies, US correlation, and effect of technology on assessment of stability
4. To present a pictorial review of upgraded BIRADS 3 lesions, benign and malignant, with assessment and management lessons

**TABLE OF CONTENTS/OUTLINE**

1. A brief overview of the mammographic criteria for a probably benign (BIRADS 3) lesion on mammography
2. Discuss the balance between imaging morphology and demonstrable imaging change or increased lesion conspicuity
3. Illustrate the role and limitations of diagnostic US in evaluation of mammographic BIRADS 3 lesions
4. Illustrate benign and malignant cases upgraded from probably benign to suspicious during imaging follow-up that demonstrate important teaching points

**BRE134**

**Noninfectious Inflammatory and Reactive Breast Disorders as Well as Their Mimics: A Spectrum of Diagnostic Imaging Features with Radiologic-Pathologic Correlation and Emphasis on Management**

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

- Alena Levit MD (Presenter): Nothing to Disclose
- Rachel Shields MD : Nothing to Disclose
- Avice M. O’Connell MD : Nothing to Disclose

**TEACHING POINTS**

After completing reviewing this presentation, the reader will be able to:

1. Understand characteristic imaging features of breast abscess and inflammatory breast carcinoma
2. Discuss common radiologic manifestations and the value of different diagnostic procedures of uncommon breast disorders with pathologic correlation, where applicable, that can mimic carcinoma and lead to misdiagnosis
3. Describe the most relevant clinical features, diagnostic work-up, and management of these conditions

**TABLE OF CONTENTS/OUTLINE**

The content will be organized into groups according to their respective cause. Common breast conditions that may be mimicked by noninfectious inflammatory diseases: breast abscess and inflammatory breast carcinoma Systemic diseases: diabetic mastopathy, sarcoidosis, and amyloidosis Noninfectious inflammatory diseases: idiopathic granulomatous mastitis, fat necrosis, mammary duct ectasia Vascular disorders: Mondor disease A brief discussion of the disease and patient presenting symptoms will be followed by the images from the mammography and ultrasound workup. A discussion of the imaging findings and management, if applicable, will follow. Sections will end with pearls/learning points.

**BRE135**

**Nonmalignant Architectural Distortion Detected only by Tomosynthesis: Imaging Findings, Pathological Correlation and Clinical Significance**

*Education Exhibits*

*Location: BR Community, Learning Center*
Participants
Limin Yang, MD, PhD (Presenter): Nothing to Disclose
Jeong Mi Park, MD: Nothing to Disclose
Laurie Lee Fajardo, MD, MBA: Scientific Advisory Board, Hologic, Inc; Scientific Advisory Board, Koninklijke Philips NV

TEACHING POINTS
Recognition of nonmalignant architectural distortion imaging findings on Tomosynthesis will help to distinguish benign from subtle malignant architectural distortion and reduce false positive biopsy rate.

TABLE OF CONTENTS/OUTLINE
Tomosynthesis detects both benign and malignant architectural distortion that is occult on 2D mammography. Being familiar with imaging features of benign and malignant architectural distortion can reduce false positive biopsy rate for benign architectural distortion. We demonstrate imaging features of 9 patients with nonmalignant architectural distortion detected on Tomosynthesis (occult on 2D mammogram) and correlate with pathology. Six were radial scar/sclerosing complex lesions and 3 were sclerosing adenos. Nonmalignant architectural distortion tends to be more symmetrically distributed without central high density and may be stable from prior studies, while malignant architectural distortion tends to be bigger in size, asymmetrically distributed with irregular central high density. The majority of nonmalignant architectural distortions are small in size and difficult to detect or subtle on ultrasound. Distinguishing imaging features between benign and subtle malignant architectural distortion may permit recommendation for 6 month followup rather than biopsy, improving specificity and accuracy of breast cancer screening with tomosynthesis.

BRE136
Optimizing Digital Mammographic Image Quality: Common Artifacts Encountered During the QC Process

Education Exhibits
Location: BR Community, Learning Center

Selected for RadioGraphics

Participants
Rashmi Jayadevan, MD, MBA (Presenter): Nothing to Disclose
M. Julie Armada, MD: Nothing to Disclose
Rola M. Shaheen, MBBS, MD: Nothing to Disclose
Constance Mulcahy: Nothing to Disclose
Priscilla Jennings Slanetz, MD, MPH: Nothing to Disclose

TEACHING POINTS
Routine mammographic screening has been shown to reduce mortality from breast cancer by up to 30%. In order to maximize this benefit, close attention to image quality is critical. While quality control processes for analog mammography are well-established, given the increasing utilization of digital units, it is essential that breast specialists be familiar with the steps and the inherent challenges for digital mammography. The purpose of this exhibit is: 1) To review the steps of the quality control process for digital mammography with special attention to artifacts that might be encountered and their potential impact on image quality. 2) To delineate the specific roles of the imaging team in identification and remedy of commonly encountered digital artifacts.

TABLE OF CONTENTS/OUTLINE
The exhibit will be divided into three main components: 1. Artifacts encountered by the technologist or physicist during the routine QC (quality control) process including those related to daily QC (detector non-uniformity, detector cleanliness), weekly QC (flat field test, phantom malfunctions), and monthly QC (AOP and SNR checks). 2. Artifacts encountered by radiologist or technologist during daily workflow, such as defective detector pixels, ghosting and printer calibration. 3. Artifacts related to the patient such as skin ointment, antiperspirant or motion.

BRE137

Education Exhibits
Location: BR Community, Learning Center

Certificate of Merit

Participants
Amy Chudgar, MD (Presenter): Nothing to Disclose
Elizabeth McDonald, MD, PhD: Nothing to Disclose
Susan Weinstein, MD: Nothing to Disclose
Phillip Andrew Yamartino, BS: Nothing to Disclose
Emily F. Conant, MD: Scientific Advisory Board, Hologic, Inc

TEACHING POINTS
The purpose of this exhibit is to review and compare the common clinical indications for breast MRI in two screening populations: one with digital mammography (DM) and the other with digital breast tomosynthesis (DBT). We will compare utilization rates and pictorially present examples of breast MRI used in the following clinical scenarios: high risk screening, breast cancer staging and problem solving prompted from mammographic findings.

TABLE OF CONTENTS/OUTLINE
1. Discuss the common clinical indications for breast MRI
3. Illustrative examples of both concordant and discordant MR and DM or DBT imaging and a comparison of rates of utilization for problem solving and staging MR will be shown from our experience of over 23,000 DBT screening exam as compared to the year prior of DM only screening.
BRE138

Relationship between Positioning, Radiation Exposure, Imaging Quality and the Effects on Diagnosis for Breast Imaging

Education Exhibits
Location: BR Community, Learning Center

Participants
Jie Zhang PhD (Presenter): Nothing to Disclose
Aurora Yvonne Luna MD: Nothing to Disclose
Margaret M. Szabunio MD: Nothing to Disclose

TEACHING POINTS
1. Learn appropriate breast positioning 2. Understand the effects of varying breast thickness on radiation exposure 3. Understand the effects of compression on image quality 4. Understand potential effects on diagnosis due to breast malpositioning

TABLE OF CONTENTS/OUTLINE
1. Review of correlation between breast positioning and the effect of the compressed breast thickness 2. Review of the effects of varying breast thickness on radiation exposure for various acquisition techniques (e.g., CC, MLO, tomosynthesis) 3. Description of the effects of compression on image quality (e.g., why some subtle tumors are better visualized) 4. Present of clinical cases demonstrating potential effects on diagnosis due to breast malpositioning. Summary: Breast positioning varies breast thickness (compression) as well as density (spread out) therefore automatically changes acquisition parameters. It is imperative for reducing radiation exposure and achieving quality images. There are certain basic rules to follow for good positioning. This overview will help the radiologist understand the relationship between breast positioning, radiation exposure and image quality, and the effects on diagnosis by demonstrating these effects with phantom experiments and presenting a clinical case.

BRE139

Synthesize or Acquire? - Do Synthesized 2D Images from a DBT Data Set Improve Breast Cancer Detection? Benefits and Concerns from the Viewbox

Education Exhibits
Location: BR Community, Learning Center

Participants
Laurie R. Margolies MD (Presenter): Consultant, FUJIFILM Holdings Corporation Consultant, Konica Minolta Group
Janet R. Szabo MD: Consultant, Siemens AG Consultant, FUJIFILM Holdings Corporation Consultant, Konica Minolta Group
Emily B. Sonnenblick MD: Nothing to Disclose

TEACHING POINTS
To understand the role of synthesized images in digital breast tomosynthesis, their benefits and potential pitfalls compared to FFDM by using a case based interactive approach.

TABLE OF CONTENTS/OUTLINE
1. FFDM vs. C-view: the FDA mandate. When DBT was first approved dual exposure was mandated and patients received about double the radiation dose. Subsequently, the FDA approved the use of a synthesized 2D image. 2. Dose reduction with C-view; when synthesized 2D images replace acquired 2D images, the patient only recieves the dose of the tomosynthesis acquisition 3. C-view and masses: some masses are easily seen on FFDM, DBT and synthesized images, but some, however, are less conspicuous on synthesized images. This will be illustrated with examples of benign and malignant masses. 4.C-view and calcifications. Synthesized images show calcifications clearly and cases where calcifications were only seen prospectively on the synthesized image will be shown along with subsequent magnification views and pathology results. 5. C-view technical issues. Issues such as calcifications which are not seen on the synthesized view will be discussed. Examples of skin calcifications clearly seen on FFDM, but not on the synthesized image or DBT will illustrate the possibility that eliminating the FFDM may lead to missing some superficial abnormalities.

BRE140

The New BI-RADS for Mammography: A Pictorial Essay

Education Exhibits
Location: BR Community, Learning Center

Participants
Lorell Ruiz-Flores MD (Presenter): Nothing to Disclose
Karla A. Sepulveda MD: Nothing to Disclose
Tamara Ortiz-Perez MD: Nothing to Disclose
Alfred Beresford Watson MD, MPH: Stockholder, General Electric Company

TEACHING POINTS
Studies have shown that focused teaching about the BI-RADS lexicon leads to improved appropriate use of the lexicon. Mammographic images demonstrating the BI-RADS mammography lexicon characteristics will be displayed with the corresponding BI-RADS descriptor to promote appropriate use of the lexicon. This exhibit will: 1. Review the fifth edition of the ACR Breast Imaging Reporting and Data System for mammography via a pictorial essay. 2. Highlight the differences in the lexicon from prior editions. 3. Explain the new subdivision of BI-RADS category 4 according to percentage of likelihood of malignancy. 4. Discuss the different scenarios for which the new assessment-management uncoupling applies. 5. Consider the impact of eliminating BI-RADS category 3 from screening mammography.

TABLE OF CONTENTS/OUTLINE
Pictorial review of the updated BI-RADS lexicon for mammography with emphasis on differences from prior editions Breast composition Masses Califications Architectural distortion Asymmetries Location BI-RADS category 4 sub-divisions with pictorial examples Assessment -management uncoupling clinical scenarios Discussion of impact of eliminating BI-RADS category 3 in screening mammography Sample cases for self-evaluation
Tomosynthesis-detected Architectural Distortion: Management Algorithm with Imaging-Pathology Correlation

Education Exhibits
Location: BR Community, Learning Center
Certificate of Merit
Selected for RadioGraphics

Participants
Steven Y. Wang MD : Nothing to Disclose
Fattaneh Tavassoli : Nothing to Disclose
Melissa Angeline Durand MD (Presenter): Nothing to Disclose
Madhavi Raghu MD : Nothing to Disclose
Regina J. Hooley MD : Nothing to Disclose
Liane Elizabeth Philpotts MD : Nothing to Disclose

TEACHING POINTS

1. As tomosynthesis use becomes more widespread, appropriate management of tomosynthesis-detected architectural distortion will be needed.
2. Workup should be directed towards sampling the lesion, and usually involves the use of another modality such as US or MRI.
3. The pathology of lesions that present as tomosynthesis-detected architectural distortion is variable and includes benign etiologies such as radial scars and proliferative fibrocystic changes, as well as malignant invasive ductal and invasive lobular cancers.

TABLE OF CONTENTS/OUTLINE

I Architectural Distortions Detected by Tomosynthesis
   a. Appearance of architectural distortions
   b. Optimizing visualization of architectural distortions
II Management of Tomosynthesis-detected Architectural Distortion
   a. Ultrasound Correlation and Biopsy
      - Imaging and pathology correlation of benign and malignant cases
      - Morphologic features and histologic diagnoses of distortions that more consistently have an ultrasound correlate.
   b. MRI Correlation and Biopsy
      - Imaging and pathology correlation of benign and malignant cases
      - Morphologic features and histologic diagnoses of distortions that more consistently have an MRI correlate.
   c. Architectural distortions with no US or MRI correlate
      - Stereotactic Biopsy
      - Needle Localization
III Summary of Management Algorithm

Positron Emission Mammography: A Valued Molecular Imaging Exam for a Comprehensive Breast Center Program in a Community Hospital

Education Exhibits
Location: BR Community, Learning Center

Participants
Kathy J. Schilling Colletta MD (Presenter): Nothing to Disclose
Judy Kalinyak MD, PhD : Nothing to Disclose

TEACHING POINTS

High resolution breast PET, often referred to as Positron Emission Mammography (PEM), is a molecular imaging technology that has significant value in the evaluation of patients with both newly diagnosed breast cancer as well as those with a concern for recurrence. The tool offers the opportunity to personalize the imaging of each patient while maintaining the sensitivity of MRI in the local staging of invasive and non-invasive breast cancer. This educational exhibit will review the capabilities of PEM, i.e. sensitivity and specificity in comparison with other breast imaging modalities as well as provide practical experience on how this technology integrates in a comprehensive breast imaging center.

TABLE OF CONTENTS/OUTLINE

In this electronic educational exhibit we will:
1. Outline the current indications for PEM in breast cancer evaluation and management
2. Present and discuss the PEM imaging protocols
3. Provide a pictorial review of the use of PEM in imaging invasive and non-invasive breast cancer extent of disease
4. Provide correlation with other imaging modalities such as mammography, ultrasound and MRI
5. Provide a pictorial review of PEM guided breast biopsy

Added Value of Pre-operative Diffusion-weighted Imaging (DWI) and Apparent Diffusion Coefficient (ADC) Ratio in Predicting Axillary Lymph Node Status in Patients with Breast Cancer: Literature Review and Personal Experience

Education Exhibits
Location: BR Community, Learning Center

Participants
TEACHING POINTS

The application of DWI and ADC in pre-operative breast MRI might be a promising diagnostic tool for the differentiation of benign from metastatic axillary lymph nodes in patients with breast cancer.

TABLE OF CONTENTS/OUTLINE

1. The role of breast MRI in the assessment of axillary lymph nodes in breast cancer - morphologic criteria - cortical thickening, loss of fatty hilum, shape, size - enhancement - homogeneous, heterogeneous, rim-enhancement 2. The application of DWI and ADC in predicting axillary lymph nodes status - normal/reactive lymph node features - metastatic axillary lymph node features - the role of DWI and ADC in predicting lymph node status in malignant breast lesions - personal experience with case examples - diagnostic pitfalls - literature review on sensitivity and specificity of DWI and ADC in the assessment of lymph node status in patients with breast cancer
Participants
Alfonso Iglesias MD, PhD (Presenter): Nothing to Disclose
Mercedes Arias: Nothing to Disclose

TEACHING POINTS
To describe the technique of DWI
To examine different breast benign and malignant lesions that can present as false positives or false negatives in the sequence of DWI
To explain the possible cause of error based on pathological correlation

TABLE OF CONTENTS/OUTLINE
Technique of DWI Description How to quantify the ADC value in breast lesions on MRI Benign lesions that simulate malignancy Appearance on DWI and ADC map Morphology and enhancement pattern analysis Pathological characteristics Correlation between MRI and pathology to explain error in interpretation Malignant lesions that mimic benignancy Appearance on DWI and ADC map Morphology and enhancement pattern analysis Pathological characteristics Correlation between MRI and pathology to explain error in interpretation

BRE147

Imaging-Pathologic Correlation of Breast Cancer with Fusion Imaging between Readout-Segmented Echo-Planar Diffusion-weighted Imaging and 3T-DCE-MRI with 16 Channels Breast Coil

Education Exhibits
Location: BR Community, Learning Center

Participants
Hiroyuki Horikoshi MD (Presenter): Nothing to Disclose
Aya Okayama MD: Nothing to Disclose
Michiko Kobayashi MD, PhD: Nothing to Disclose
Takeshi Kawakami MD: Nothing to Disclose
Katsuya Maruyama: Nothing to Disclose

TEACHING POINTS
Diffusion-weighted imaging (DWI) using single-shot EPI can result in geometric distortions, image blurring, ghosting artifacts, and problems with fat suppression. The combination of readout-segmented echo-planar DWI (rs-DWI) and parallel imaging techniques permits the use of extremely short echo spacing independent of spatial resolution, thereby reducing the geometric distortions and image blurring. Fusion imaging between rs-DWI and DCE-MRI (rs-FDWI) in breast cancer patients is able to acquire the accurate fusion imaging and show both malignant tumors and anatomical information. The teaching points of this exhibit are: 1. to describe the readout-segmented echo-planar diffusion weighted imaging using parallel imaging technique with 16 channels breast coil at 3T. 2. to illustrate the fusion imaging technique between readout segmented diffusion-weighted imaging using and DCE-MRI (rs-FDWI). 3. to demonstrate the rs-FDWI-pathologic correlation of breast cancers.

TABLE OF CONTENTS/OUTLINE
The content organizations of this exhibit are: 1. Demonstration of the readout-segmented echo-planar diffusion-weighted imaging using parallel imaging technique with 16 channels breast coil at 3T. 2. Demonstration of the rs-FDWI-pathologic correlation of breast cancers.

BRE150

Kinetic Parametric Imaging of Breast Cancer using Dynamic Contrast-Enhanced MRI with Routine Clinical Protocols

Education Exhibits
Location: BR Community, Learning Center

Participants
Hiroko Satake MD (Presenter): Nothing to Disclose
Satoko Ishigaki MD: Nothing to Disclose
Mariko Kitano: Nothing to Disclose
Hisashi Kawai: Nothing to Disclose
Shinji Naganawa MD: Nothing to Disclose

TEACHING POINTS
The purposes of this exhibit are:
• To review the principles and techniques of parametric imaging based on model-free and model-based pharmacokinetic analyses on breast dynamic contrast-enhanced MRI (DCE-MRI).
• To discuss the clinical feasibility of kinetic parametric data extracted from breast DCE-MRI with high spatial but ordinary temporal resolution routine protocol, and present our experience with visualized color maps which characterized breast cancer angiogenesis.

TABLE OF CONTENTS/OUTLINE
Basic techniques of kinetic parametric imaging on breast DCE-MRI MRI protocol Qualitative analysis Semiquantitative analysis Quantitative pharmacokinetic modelling analysis Clinical applications of kinetic parametric imaging with routine breast DCE-MRI protocols Cancer detection and enhancement of angiogenesis in breast cancer Correlation with molecular subtypes of breast cancer Monitoring response of chemotherapy Discussions Feasibility and limitations

BRE151

MRI Findings of Complications after Surgical and Non-surgical Breast Interventions.

Education Exhibits
Location: BR Community, Learning Center
Participants
Anna Knobel MD (Presenter): Nothing to Disclose
Eva Guy Rodriguez MD : Nothing to Disclose
Kristin Colleen Byrne MD : Nothing to Disclose
Neal Francis Epstein MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review imaging changes on breast MRI after interventions such as biopsy, lumpectomy, mastectomy with reconstruction, breast conservation surgery, and radiation therapy. 2. To demonstrate the importance of recognizing benign post-therapeutic imaging findings to try to avoid additional imaging or biopsy and to recognize true recurrences and distinguish them from post radiation and post surgical changes. 3. To review the mammographic and ultrasound appearance of the same benign and malignant findings as seen on MRI.

TABLE OF CONTENTS/OUTLINE
Imaging appearance of post-therapeutic changes on MRI with ultrasound and mammographic correlation. Review imaging findings of infection, fluid collections, fat necrosis, scar, hematoma, seroma, implant rupture, implant gel leak, recurrence and radiation induced changes. Present cases of these benign and malignant post-therapeutic MRI findings with mammographic and ultrasound correlate in order to review the different imaging appearances.

BRE152

Potential Pitfalls of Dynamic Breast MRI: Key Imaging Findings for Making Correct Diagnosis

Education Exhibits
Location: BR Community, Learning Center

Participants
Maki Kiba (Presenter): Nothing to Disclose
Mariko Goto MD : Research Grant, Bayer AG
Eiichi Konishi : Nothing to Disclose
Kei Yamada MD : Research funded, DAIICHI SANKYO Group Research funded, Eisai Co, Ltd Research funded, FUJIFILM Holdings Corporation Research funded, Nihon Medi-Physics Co, Ltd Research funded, Koninklijke Philips NV Consultant, H. Lundbeck A/S Consultant, Olea Medical Speaker, Bayer AG Speaker, DAIICHI SANKYO Group Speaker, Eisai Co, Ltd Speaker, Mitsubishi Corporation Speaker, Nihon Medi-Physics Co, Ltd Speaker, Otsuka Holdings Co, Ltd Speaker, Koninklijke Philips NV Speaker, Siemens AG Speaker, sanofi-aventis Group Speaker, Takeda Pharmaceutical Company Limited Speaker, Terumo Corporation

TEACHING POINTS
1. To learn about the potential pitfalls of BI-RADS MRI in diagnosing malignant breast lesions on dynamic MRI. 2. To learn about the key imaging findings in correlation with pathologic findings to correctly diagnose these malignant breast lesions on dynamic MRI.

TABLE OF CONTENTS/OUTLINE
Contrast-enhanced breast MRI is known to have high sensitivity for detecting breast cancers and it has now become an essential modality for assessing breast lesions. Typical morphological appearance of breast cancers on dynamic MRI is now well established, and the Breast Imaging Reporting and Data System (BI-RADS) MRI demonstrates good correlation with the likelihood of malignancy. However, it is known that there are some malignant breast lesions which are difficult to be correctly diagnosed by using the BI-RADS MRI lexicon; for example, some of the breast cancers have similar morphology to benign lesions, some have poor enhancement, and there are other factors that may cause false negative results. In this article, we will review these malignant breast lesions that may morphologically mimic benign lesions and exhibit false negative results on dynamic MRI. In addition, we will perform the correlation between the imaging and pathological findings of these malignant lesions to avoid potential pitfalls on dynamic MRI.

BRE153

State Of The Art DWI In The Breast: Recommended Protocol

Education Exhibits
Location: BR Community, Learning Center
Certificate of Merit

Participants
Paul Martin Murphy MD, PhD : Nothing to Disclose
Rebecca Rakow-Penner MD, PhD : Nothing to Disclose
Jade De Guzman MD : Nothing to Disclose
Haydee Ojeda-Fournier MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. Describe the value added for breast diffusion imaging in breast cancer screening, staging, and treatment monitoring. 2. Explain the basics of diffusion weighted imaging in the context of breast imaging. 3. Recommend a protocol for breast diffusion imaging with optimal MRI scanning parameters. 4. Discuss the technical challenges of breast diffusion imaging and potential solutions.

TABLE OF CONTENTS/OUTLINE
1. Introduction; a) Why perform diffusion imaging in the breast; b) Describe basics of diffusion MRI and introduce the value of the Apparent Diffusion Coefficient, as measured in the breast; 2. Recommend diffusion imaging protocol as utilized at our institute; 3. Provide several examples of diffusion MRI maps of breast images in patient's with both normal breast tissue as well as pathology; 4. Discuss technical challenges of diffusion imaging in the breast, and possible fixes, a) Post procedural effects on the ADC, b) Relevant timing in using the ADC to provide early indication of treatment response, c) Distortion effects, and issues exacerbated by breast architecture 5. Conclusion - discussion of future developments and applications of breast diffusion imaging

BRE154
Staying Abreast of Breast MRI: A How-to Guide for Incorporating Breast Magnetic Resonance Imaging (MRI) into your Practice

Education Exhibits
Location: BR Community, Learning Center

Participants
Jessica Langr MD (Presenter): Nothing to Disclose
Mona Tarun Vakil MD : Nothing to Disclose
Kara-Lee Pool MD : Nothing to Disclose
Colin J. Wells MD : Nothing to Disclose
Melissa Marie Joines MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to provide an overview of breast Magnetic Resonance Imaging (MRI) and the accreditation process in order to assist clinicians and institutions incorporating breast MRI into their practices.

TABLE OF CONTENTS/OUTLINE
This exhibit will: (1) Review the indications for breast MRI (2) Provide an overview of the physics behind breast MRI, including examples of commonly encountered artifacts with both 1.5 and 3 Tesla magnets (3) Describe breast MRI at our institution, including our protocols and quality control measures (4) Discuss the MRI accreditation process with regards to image preparation and submission as per ACR guidelines (5) Include examples of how suboptimal quality MRI images may mask and/or mimic disease

BRE155
The 5th Edition BI-RADS MRI Lexicon: What is New?

Education Exhibits
Location: BR Community, Learning Center

Participants
Kareem Rahbar MD : Nothing to Disclose
Brandi Tamara Nicholson MD : Stockholder, Hologic, Inc
Heather Renee Peppard MD : Consultant, Siemens AG Research Grant, Hologic, Inc
Carrie Margaret Rochman MD : Nothing to Disclose
Jennifer A. Harvey MD (Presenter): Researcher, Hologic, Inc Researcher, VuCOMP, Inc Researcher, Volpara Solutions, Ltd Shareholder, Volpara Solutions, Ltd Shareholder, Hologic, Inc

TEACHING POINTS
The 5th edition of the Breast Imaging Reporting and Data System (BI-RADS) was published in December 2013. The MRI section of the lexicon has considerable changes compared with the prior BI-RADS lexicon. In this exhibit, the changes in parenchymal enhancement definitions and descriptors of foci, mass, and non-mass lesions will be reviewed. Example cases will be provided to allow the application of the new lexicon descriptors in a multiple choice fashion.

TABLE OF CONTENTS/OUTLINE
+ Understand the consolidation of MRI lexicon terms and how these relate back to the mammography and breast ultrasound lexicons,
+ Review and apply descriptors of amount of fibroglandular tissue and parenchymal enhancement
+ Review and apply new non-mass MRI lexicon descriptors to example cases
+ Review and apply descriptors of foci and mass lesions to example cases

BRE156
The Mischief-Makers; MRI Diagnosis of Luminal Breast Tumors after Neoadjuvant Chemotherapy with Pathological Correlation

Education Exhibits
Location: BR Community, Learning Center

Participants
Jimena Cubero Carralero (Presenter): Nothing to Disclose
Susan Gonzalez Cabestreros : Nothing to Disclose
Rosario Vazquez Carnero : Nothing to Disclose
Ana Isabel Montero Montero : Nothing to Disclose
Carmen Ortiz Ibanez : Nothing to Disclose
Juan Manuel Fernandez Gallardo : Nothing to Disclose

TEACHING POINTS
The accuracy of breast MRI predicting the presence of residual disease after neoadjuvant chemotherapy depends on breast cancer subtypes, with less sensitivity and specificity in luminal tumors.

There are several causes of inaccurate diagnosis when monitoring with MRI tumors response to neoadjuvant chemotherapy. Overestimation includes: lack of inflammation or vascularization and fragmentation of the tumor.

TABLE OF CONTENTS/OUTLINE
+ Brief review of the literature. + Parameters used in contrast-enhanced MRI to monitor response to neoadjuvant chemotherapy. + Illustration with cases of main pitfalls in post-chemotherapy MRI evaluation of luminal tumors with pathologic correlation. + Tips and tricks. + Conclusions.
BRE160

Breast Cancer Under 40: The Clinical Presentation and Spectrum of Ultrasound, Mammogram, and MRI Findings

Education Exhibits

Location: BR Community, Learning Center

Participants

Laurie R. Margolies MD (Presenter): Consultant, FUJIFILM Holdings Corporation Consultant, Konica Minolta Group
Janet R. Szabo MD: Consultant, Siemens AG Consultant, FUJIFILM Holdings Corporation Consultant, Konica Minolta Group
Emily B. Sonnenblick MD: Nothing to Disclose
Christina Weltz MD: Nothing to Disclose
Elisa Port MD: Nothing to Disclose
Paul Schmidt MD, PHD: Nothing to Disclose

TEACHING POINTS

Patients under 40 who present with breast signs and symptoms are often found to have benign disease, but breast cancers do occur in the under 40 population and it is important that these patients be imaged. The viewer of this exhibit will see many cancers in women under 40 and will learn that it is important to have a high degree of suspicion and promptly biopsy findings that do not meet strict BI-RADS 2 or 3 criteria. The viewer will also learn that it is important to educate our referring physicians so that imaging is ordered and not delayed because of patient age.

TABLE OF CONTENTS/OUTLINE

The cases will be presented in a quiz format. Key differential diagnostic points between findings that require biopsy and those that can be followed will be highlighted. The cases includes:

• Breast cancer in an under 30 year old patient presenting for high risk screening misinterpreted as a fibroadenoma.
• MRI demonstration of diffuse cancer in a patient in her 30's with an ultrasound read as equivocal.
• Mammogram and ultrasound images of an under 30 year old with bilateral cancer.
• Pregnancy associated breast cancer.

BRE161

CT and MRI Appearance of Gynecomastia, with Mammographic and Sonographic Correlation

Education Exhibits

Location: BR Community, Learning Center

Participants

Beatriu Reig MD, MPH (Presenter): Nothing to Disclose
Celin Chacko MD: Nothing to Disclose
Tova C. Koenigsberg MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to familiarize the viewer with the CT and MR appearance of gynecomastia, which is a benign and common entity that may be incidentally identified in a wide range of patients. The body imager should be aware of the various appearances of this entity and not confuse it for a malignant lesion. We will:

1. Review the clinical features of gynecomastia, including presentation and risk factors.
2. Review the mammographic and sonographic appearance of the three patterns of gynecomastia.
3. Demonstrate the CT and MRI appearance of gynecomastia, with correlation to mammographic appearance.
4. Note cases in which this incidentally imaged entity may be safely considered benign, and requires no further imaging.

TABLE OF CONTENTS/OUTLINE

• Clinical features of gynecomastia
  o Presentation
  o Risk factors
• Imaging atlas of gynecomastia
  o Mammographic appearance - Nodular, dendritic, diffuse patterns
  o Sonographic appearance - Pattern - Corresponding mammogram/ultrasound
  o MRI appearance - Features on T1- and T2-weighted imaging and contrast-enhanced imaging - Corresponding mammogram/ultrasound

BRE162

Current Concepts in Evaluation of Response to Neoadjuvant Chemotherapy in Breast Cancer

Education Exhibits

Location: BR Community, Learning Center

Cum Laude

Participants

Selin Carkaci MD (Presenter): Consultant, Hologic, Inc
Beatriz E. Adrada MD: Nothing to Disclose
Amado B. Del Rosario DO: Nothing to Disclose
Gary J. Whitman MD: Nothing to Disclose

TEACHING POINTS

• Monitoring response to treatment is a key element in the management of breast cancer.
• Assessing response to chemotherapy prior to surgery can provide prognostic information to help guide follow-up care.
• Breast imaging plays a role in evaluating tumor response and clinical decisions in the neoadjuvant setting.
• Breast MRI correlates more accurately with pathologic response when compared to clinical exam, ultrasound and mammography.
• It is important to know the limitations of imaging modalities as well as false positives and false negatives when using imaging to monitor response.
• Different histologic types of breast cancer respond to neoadjuvant chemotherapy to varying degrees.
• Imaging protocols for evaluation of response should be tailored based on the histology and imaging features of the primary breast cancer.
• Emerging technologies have the potential to provide specificity for assessing response to treatment.
TABLE OF CONTENTS/OUTLINE
• Introduction • Neoadjuvant chemotherapy • The Response Criteria in Solid Tumors (RECIST) • Comparison of imaging modalities to assess response to neoadjuvant chemotherapy • Challenges in assessing response: False negatives and false positives • Tumor response to neoadjuvant chemotherapy by histologic type • Emerging technologies and future directions • Conclusion

BRE163
Dual-energy CT of the Breasts for Evaluation of Silicone Implants with MRI and US Comparison

Education Exhibits
Location: BR Community, Learning Center

Participants
Katrina Nesta Glazebrook MBChB (Presenter): Nothing to Disclose
Shuai Leng PhD : Nothing to Disclose
Maria Shiung : Nothing to Disclose
Sandhya Pruthi : Nothing to Disclose
Robert T. Fazio MD, PhD : Nothing to Disclose
Katie Noella Jones MD : Nothing to Disclose
Cynthia H. McCollough PhD : Research Grant, Siemens AG

TEACHING POINTS
1. Dual-energy CT performed at 100 and 140 kV allows identification of silicone within breast implants and also extra-capsular silicone within the breast tissue and in axillary nodes with dedicated breast MRI as the reference standard.
2. CT can evaluate for collapsed silicone envelopes within the fibrous capsule seen with intracapsular rupture.
3. CT allows evaluation of level 1 and extra-axillary nodes which may not be well visualized on dedicated breast MRI.

TABLE OF CONTENTS/OUTLINE
A. Description of the different types of silicone implants B. Outline of physics of dual-energy CT for identification of silicone C. Comparison of DECT silicone specific images with gold standard MRI for evaluation of intra and extracapsular rupture of silicone implants. D. Examples of US evaluation of silicone implants and extracapsular silicone within the breasts and axillary nodes - snowstorm appearance - with DECT comparison. E. Review of recommendations of the FDA for follow-up of newly placed silicone implants.

BRE164
Evaluation of Blended Learning in Radiology: A National Program of Training and Re-training in Breast Imaging

Education Exhibits
Location: BR Community, Learning Center

Participants
Andres Vasquez MD (Presenter): Nothing to Disclose
Javier Andres Romero MD : Nothing to Disclose
Gloria Palazuelos MD : Nothing to Disclose
Bibiana Pinzon MD : Nothing to Disclose

Background
Breast cancer affects millions of women worldwide. Radiologists fulfill the main role of screening, diagnosing and following this illness, which underlines the need to be well prepared for these tasks. The training and re-training opportunities in breast imaging available for Colombian radiologists included until now a few rotations during residency as well as information during scientific meetings, and we believe these are not enough to train for such a relevant matter with as much impact for public health. Blended e-learning combines the positive aspects of on-site learning with the best of distance learning.

Evaluation
Our institution along with the Colombian Association of radiology, instituted a national 5-week long training and re-training program in breast imaging, based on a blended learning model with 2 weeks of individual study using Web 2.0 tools, followed by two full days of theoretical lessons delivered by experts in the subject and hands-on session of interpretation. During the following three weeks they continued the process in a Web 2.0 environment where they had the opportunity to participate in online forums with experts and other participants, revise theoretical contents and develop experience interpreting these images using a digital online bank of over 200 cases. The program was developed in 7 cities with 260 participants of different backgrounds and experience between 25 and 66 years of age. Pre-test and post-test where developed covering the theoretical learning objectives and interpretative skills. The pre-test mean was 19/50 and the post-test mean 42/50. A complete statistical analysis was developed.

Discussion
The training and re-training of radiologists is a challenge of medical education, which is why it is necessary to develop innovative programs that allow an adequate acquisition of skills and knowledge in specific relevant topics like breast imaging where the role of the radiologist is pivotal, bringing about benefits for patients and the health system as a whole.

Conclusion
Training programs that use a blended methodology can be very useful in medical education, being particularly significant in developing countries.

BRE165
Imaging of Uncommon Site Metastases from Breast Cancer: A Pictorial Review

Education Exhibits
**Participants**
- Masafumi Toguchi MD (Presenter): Nothing to Disclose
- Mitsuru Matsuki: Nothing to Disclose
- Tomoko Hyodo MD: Nothing to Disclose
- Takamichi Murakami MD, PhD: Nothing to Disclose
- Izumi Imaoka MD: Nothing to Disclose
- Kazunari Ishii MD: Nothing to Disclose
- Masakatsu Tsurusaki MD, PhD: Nothing to Disclose
- Seishi Kuman MD: Nothing to Disclose

**TEACHING POINTS**
1. CT, MR and PET images of uncommon site metastases from breast cancer.
2. Diagnostic imaging and differential diagnosis of uncommon site metastases from breast cancer.

**TABLE OF CONTENTS/OUTLINE**
We present the following uncommon site metastases from breast cancer, and discuss the diagnostic imaging and differential diagnosis.
1. Dura
2. Orbit
3. Pituitary gland
4. Bronchus
5. Brachial plexus
6. Gastrointestinal tract: Stomach, Colon
7. Abdominal lymph nodes
8. Female reproductive system: Uterus, Ovary
9. Others

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**BRE166**

**Imaging the Reconstructed Breast: Post-surgical Anatomy, Postoperative Processes, Complications, and Malignancy**

**Education Exhibits**
Location: BR Community, Learning Center

**Participants**
- Julie R. Sullivan MD (Presenter): Nothing to Disclose
- Carla Jean Shah MD: Nothing to Disclose
- Mary Beth Gonyo MD: Nothing to Disclose
- Kelly M. England MD: Nothing to Disclose
- Anubha Wadhwa MD: Nothing to Disclose

**TEACHING POINTS**
The purpose of this exhibit is to:
- Review reconstruction techniques currently available for patients undergoing mastectomy, with an emphasis on the expected post-surgical anatomy and its appearance on multimodality imaging, including mammography, ultrasound, and MRI.
- Discuss common benign postoperative processes in reconstructed patients.
- Examine other imaging findings post reconstruction and highlight features differentiating benign from malignant.

**TABLE OF CONTENTS/OUTLINE**
- Briefly review surgical methods for breast reconstruction
- Expected imaging appearance of postoperative anatomy
- Frequently encountered benign findings on imaging following reconstruction: edema, hematoma, seroma, fat necrosis, and fibrosis
- Malignant findings of recurrent cancer and post treatment sarcoma
- Use of multimodality imaging to distinguish between benign and malignant post reconstruction processes

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**BRE170**

**Understanding your Mammography Medical Audit: An Interactive Quiz Focusing on What Residents and Radiologists Need to Know to Improve their Mammography Practice**

**Education Exhibits**
Location: BR Community, Learning Center

**Participants**
- Rachel O. McEachern MD (Presenter): Nothing to Disclose
- Brandi Tamara Nicholson MD: Stockholder, Hologic, Inc
- Carrie Margaret Rochman MD: Researcher, Hologic, Inc Researcher, VuCOMP, Inc Researcher, Volpara Solutions, Ltd Shareholder, Siemens AG Research Grant, Hologic, Inc
- Heather Renee Peppard MD: Consultant, Siemens AG Research Grant, Hologic, Inc

**TEACHING POINTS**
The medical audit in mammography is an established method to evaluate mammographic quality and accuracy of interpretation under Mammography Quality Standard Act (MQSA).

**TABLE OF CONTENTS/OUTLINE**
- Review major components of standard performance measures, data collection and analysis involved in an individual mammography medical audit
- Discuss analysis of data utilizing case examples of sample radiologist data to address performance measures in 3 practical key components of screening mammography:
  1. Is the cancer detection rate optimal?
  2. Are these cancers identified within an acceptable range of recalls and biopsies (i.e. false positives)?
  3. Are a large proportion of these cancers identified when small and lymph node negative?
- Address potential improvement strategies using interactive example audit performance measures based allowing participants to better understand mammography audit information and implications for improvement

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**BRE171**

**Benign Breast Inflammatory Disease: Case-Based Review**
Participants
Fatima Regina Silva Reis MD: Nothing to Disclose
Luciano F. Chala MD: Nothing to Disclose
Tatiana Cardoso de Mello Tucunduva MD: Nothing to Disclose
Giselle Guedes Mello PhD: Nothing to Disclose
Nestor Barros: Nothing to Disclose
Marco Antonio Costenaro MD: Nothing to Disclose
Bruna Maria Thompson MD: Nothing to Disclose
Barbara Helou Bresciani MD: Nothing to Disclose
Andrea Maciel MD (Presenter): Nothing to Disclose

TEACHING POINTS
To review benign infectious and non-infectious inflammatory breast diseases. To learn about imaging, clinical and pathologic features of common and uncommon benign inflammatory breast conditions. To identify the differences and similarities in presentation of benign and malignant inflammatory breast conditions.

TABLE OF CONTENTS/OUTLINE
Brief classification of benign inflammatory breast disease. Epidemiology and clinical features of benign inflammatory breast conditions. Case-based review illustrating: - Imaging features and histological basis of benign inflammatory breast conditions including common and rare diseases like breast blastomycosis - Differences and similarities in presentation of benign and malignant inflammatory breast conditions Conclusion.

BRE172
Benign Mimics of Malignancy on Breast Imaging

Participants
Monique Marie Tyminski DO: Nothing to Disclose
Jade Watkins MD (Presenter): Nothing to Disclose
Erica Tyler Ghosh MD: Nothing to Disclose
Rebecca Hultman DO: Nothing to Disclose
Tom Stockl MD: Nothing to Disclose
Sue A. MacMaster MD: Nothing to Disclose

TEACHING POINTS
1. Demonstrate benign entities of the female breast that can have malignant imaging features. Imaging will include mammography, ultrasound, and MRI with pathology correlation. 2. Recognize that many benign lesions can mimic breast cancer and should be included in differential diagnoses. 3. Reinforce importance of radiology and pathology correlation for these lesions in an effort to obviate unnecessary surgical intervention.

TABLE OF CONTENTS/OUTLINE
Cases will be presented with clinical history, radiology and pathology imaging correlation, followed by a short discussion of the diagnosis and management for each entity. The following benign processes will be examined: Intraductal papilloma Papillomatosis Sclerosing adenosis Stromal Fibrosis Radial Scar Tubular adenoma Granular cell tumor Diabetic mastopathy Granulomatous mastitis Fat necrosis Fibroadenoma

BRE173
Breast and Axillary Lymph Node Response to Neoadjuvant Chemotherapy: How Radiologic-Pathologic Correlation Informs Interpretation

Participants
Rosa M. Lorente-Ramos MD, PhD (Presenter): Nothing to Disclose
Javier Azpeitia Arman MD: Nothing to Disclose
Teresa Rivera Garcia: Nothing to Disclose
Isabel Casado Farinas: Nothing to Disclose
Miguel Angel Lara Alvarez: Nothing to Disclose

TEACHING POINTS
1) Understand the basic pathological changes in advanced breast cancer and lymph nodes after neoadjuvant chemotherapy.
2) Correlate pathologic changes with imaging (MR, mammograms, US).
3) Learn an approach to the assessment of the postneoadjuvancy breast.

TABLE OF CONTENTS/OUTLINE
We present: 1-Pathologic description of the residual lesion at surgery with comparison with the pretreatment tumor biopsy. -Macroscopy. Size of tumor bed, and residual tumor. -Microscopy. Presence and size of infiltrating carcinoma, number of foci,Histologic Appearance and Tumor Grade, lymphovascular involvement, presence of DCIS, Miller Payne classification of response, margins, 2-Imaging findings in breasts of patients with advanced breast cancer undergoing neoadjuvant chemotherapy (NAC): mammograms, US and MR, dynamic contrast-enhanced and diffusion weighted imaging. -Tumor size, -Change in size, -Type of response: complete response, mass shrinkage, fragmentation.
3- Pathologic response in lymph nodes. -Number of nodes -Number of affected nodes -Extranodal involvement -Miller-paying system. Presence of metastases in nodes
Breast Diseases in Men: Is it Possible to Reliably Distinguish Benign from Malignant?

Education Exhibits
Location: BR Community, Learning Center

Participants
Christine U. Hyun MD (Presenter): Nothing to Disclose
Susan Spieller MD: Nothing to Disclose
Fataneh Ferra Sarlati MD: Nothing to Disclose
Adina Floarea Achiriloaie MD: Nothing to Disclose
Pradeep Badhwar MD: Nothing to Disclose
Nishant Mehta MD: Nothing to Disclose
Alex Chung Yi MD: Nothing to Disclose

TEACHING POINTS
Typically, there is less familiarity with breast imaging in men due to overall fewer numbers of male breast studies, whether from true decreased prevalence of disease, lack of screening guidelines, or less males seeking care. The imaging features of benign and malignant breast disease in men can demonstrate significant overlap. Therefore, greater familiarity with imaging features may help to ensure proper management. Because the imaging features of benign and malignant disease can demonstrate significant overlap, biopsy and/or tissue sampling is not unwarranted for any clinically suspicious lesion. The purpose of this exhibit is to expose radiologists to a series of pathology-proven cases that highlight and confirm that benign and malignant breast diseases in men display overlapping features. A secondary purpose is to familiarize radiologists with breast diseases that are uncommon in men.

TABLE OF CONTENTS/OUTLINE
The cases will be presented in quiz format. The radiologist will be able to choose which diagnosis they think best fits the case. Key imaging features will be highlighted in the discussion of each case. The list of cases includes:
- Abscess
- Granulomatous mastitis/abscess
- Gynecomastia
- True cyst
- Vascular malformation
- Invasive ductal and lobular carcinoma
- Papillary carcinoma
- Mixed ductal and apocrine carcinoma

Breast Inflammatory Carcinoma: A Radiopathological Pictorial Review and Diagnostic Work-up

Education Exhibits
Location: BR Community, Learning Center
Certificate of Merit

Participants
Rosa M. Lorente-Ramos MD, PhD (Presenter): Nothing to Disclose
Javier Azpeitia Arman MD: Nothing to Disclose
Isabel Casado Farinas: Nothing to Disclose
Teresa Rivera Garcia: Nothing to Disclose
Miguel Angel Lara Alvarez: Nothing to Disclose
Eva Cueva Perez: Nothing to Disclose

TEACHING POINTS
- To review clinical, and pathologic findings in inflammatory breast cancer.
- To illustrate imaging findings (mammogram, US, MR and CT) of cases from our series of inflammatory breast cancer, providing clinical images and pathologic correlation.
- To analyze the specific management of those lesions, including imaging and interventional procedures.
- To emphasize pitfalls, diagnostic difficulties and differential diagnosis.

TABLE OF CONTENTS/OUTLINE
We present:
- Clinical signs and symptoms.
- Pathology.
- Imaging findings Mammograms, US, MR, CT.
- Diagnostic work-up.
- Interventional procedures. Tips and tricks.

Breast Sarcomas: Mammographic, Sonographic and MRI Features

Education Exhibits
Location: BR Community, Learning Center
Certificate of Merit

Participants
TEACHING POINTS

To know the different types of breast sarcomas • To learn mammography, sonography and MRI appearances of breast sarcomas • To identify the differences and the similarities in the presentation between sarcomas and malignant epithelial tumors in imaging methods

TABLE OF CONTENTS/OUTLINE

• Definition of mesenchymal tumors and sarcomas • Frequency and epidemiology of breast sarcomas • Case-based review illustrating imaging features of different types of breast sarcomas • Differences and similarities in the presentation between sarcomas and malignant epithelial tumors in imaging methods • It was not a fibroadenoma? I thought it was mastitis!!!! Presentation of some catastrophic cases of delayed diagnosis of breast sarcomas in very young women. Lessons to learn • Conclusion

BRE181

Echogenic Breast Lesions: Be Worried or Not?

Education Exhibits
Location: BR Community, Learning Center

Participants
Flavia Beatriz Sarquis MD : Nothing to Disclose
Karina Pesce (Presenter): Nothing to Disclose
Bernardo Oscar Blejman MD : Nothing to Disclose
Fabiana Gisela Vega MD : Nothing to Disclose
Roxana Gerosa : Nothing to Disclose

TEACHING POINTS

1-To review the differential diagnosis of echogenic breast lesions 2-To show that physical examination and mammogram may help to elucidate the benign nature of lesions, and hence decrease the number of unnecessary biopsies 3-To discuss the management of echogenic breast lesion based on imaging features

TABLE OF CONTENTS/OUTLINE

1-Introduction 2- Define the concept of echogenic lesion on ultrasound 3- Review of ultrasound images of each of the clinical entities included Benign lesions: hematoma, complex seroma, silicone granuloma, fat necrosis, lipoma, angiolipoma, sebaceous or epidermal inclusion cyst, abscess, pseudoangiomatosus stromal hyperplasia, galactocele or lactating adenoma, ductal ectasia, apocrine metaplasia, Malignant lesions: invasive ductal carcinoma, Invasive lobular carcinoma, metastasis, lymphoma, angiosarcoma 4-Differentiation of malignant vs. benign echogenic lesion on ultrasound 5- Step-by-step to apply the BI-RADS classification 6-Conclusion

BRE182

Favorable Prognosis Triple Negative Breast Cancers—They DO Exist

Education Exhibits
Location: BR Community, Learning Center

Participants
Kelly Ann Hastings MD (Presenter): Nothing to Disclose
Sheryl Gillikin Jordan MD : Nothing to Disclose

TEACHING POINTS

1. Review the importance of immunohistochemistry (IHC) in breast cancer care algorithms focusing on triple negative breast cancer (TNBC). 2. Four recognized subtypes of favorable prognosis TNBC namely medullary, adenoid cystic, secretory, and acinic cell carcinomas. 3. Our single institution experience with these subtypes, presenting pathology, patient presentation, patient followup, and tumor prognosis. 4. Understanding how the nuances of these tumor types' associated features and care algorithms helps us as radiologist provide high quality patient care delivery - ie, the radiologist must be aware these cases are best handled as a distinct subgroup of otherwise poorer-prognosis TNBC prior to any discussion with the patient regarding her positive biopsy results.

TABLE OF CONTENTS/OUTLINE

Definition of the role of IHC in breast cancer care algorithms Definition of favorable prognosis triple negative breast cancer subtypes, including our institution's collated cases for each subtype Emphasis on the nuances of specific subtypes' associated features and oncologic care algorithms

BRE184

Giant Breast Masses: Differential Diagnosis with Multimodality and Histopathology Correlation

Education Exhibits
Location: BR Community, Learning Center

Participants
Elsa Maria Arribas MD : Nothing to Disclose
Monica Liwen Huang MD (Presenter): Nothing to Disclose
TEACHING POINTS

1. Giant (5 cm and larger) breast masses pose diagnostic challenges as their large size may not permit optimal imaging by mammography or ultrasound. Additional cross-sectional imaging modalities such as MRI and CT may help to fully image and further characterize these masses. 2. Clinical and imaging findings which may prompt the radiologist to suspect malignancy. 3. Treatment of these giant breast masses varies and may be complex, depending on the histopathology and size.

TABLE OF CONTENTS/OUTLINE


BRE186

Hashing out the PASH: Diagnostic Pearls & Pitfalls, Imaging Biomarkers, and Management of Pseudoangiomatous Stromal Hyperplasia (PASH)

Education Exhibits

Location: BR Community, Learning Center

Participants

Sirishma Kalli MD (Presenter): Nothing to Disclose
Michael Lanfranchi MD: Nothing to Disclose
Hoon Ji MD, PhD: Nothing to Disclose
Shital Saurin Makim MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To review the spectrum of imaging findings of pseudoangiomatous stromal hyperplasia (PASH) at mammography, ultrasound, and MR imaging with pathologic correlation. 2. To propose an algorithm for the management of core breast biopsies revealing PASH, as the current literature regarding management is sparse.

TABLE OF CONTENTS/OUTLINE

1. Background discussion of PASH including types (diffuse and tumorous/nodular), clinical presentation, hormonal factors, and histologic findings. 2. Depiction of the various imaging findings of PASH at mammography, ultrasound, and MR imaging with diagnostic pearls and pitfalls. 3. Proposed algorithm regarding the management of PASH when diagnosed by core biopsy.

BRE189

Imaging Breast and Axillary Findings that Warn of Systemic Diseases

Education Exhibits

Location: BR Community, Learning Center

Participants

Karina Pesce: Nothing to Disclose
Flavia Beatriz Sarquis MD (Presenter): Nothing to Disclose
Bernardo Oscar Blejman MD: Nothing to Disclose
Maria Jose Chico: Nothing to Disclose
Esperanza Casco Gomez: Nothing to Disclose
Graciela Fernandez Alonso: Nothing to Disclose
Chesi Donata: Nothing to Disclose

TEACHING POINTS

• To review systemic diseases that may affect the breast and axilla • To describe the imaging findings linked to systemic diseases. • To discuss the differential diagnosis • To emphasize pitfalls, diagnostic difficulties and differential diagnosis

TABLE OF CONTENTS/OUTLINE

• Introduction • Describe normal anatomy of breast and axilla. • Normal breast and axilla multimethod appearance • Possible differential diagnoses according to the anatomical structure that may be affected: skin, arterial and venous vessels, parenchyma, node lymph. • Clinical cases • Conclusion

BRE191

Internal Mammary Lymph Nodes in Breast Cancer

Education Exhibits

Location: BR Community, Learning Center

Selected for RadioGraphics

Participants

Ashley Robin Cahoon MD (Presenter): Nothing to Disclose
Benjamin David Smith MD: Nothing to Disclose
Wei Tse Yang MD: Researcher, Hologic, Inc

TEACHING POINTS

Describe the impact of internal mammary lymph node metastases on the staging, prognosis, and clinical management of breast cancer patients. Recognize the appearance of internal mammary lymph nodes in multiple modalities. Discuss mimics and
differential diagnoses of enlarged internal mammary chain nodes.

TABLE OF CONTENTS/OUTLINE

1. Role of internal mammary lymph node metastases in breast cancer staging.
2. Anatomy of the internal mammary lymph nodes.
3. Differential diagnosis of enlarged internal mammary lymph nodes.
4. Illustrative cases of internal mammary lymph node metastases in various imaging modalities including: ultrasound, CT, MRI, lymphoscintigraphy, and PET/CT.
5. Clinical evaluation and management, including sentinel lymph node biopsy of internal mammary nodes and radiation therapy.

BRE193

Male Breast Findings: The Unusual Suspects

Education Exhibits
Location: BR Community, Learning Center

Participants
Victoria Mango MD (Presenter): Nothing to Disclose
Richard S. Ha MD: Nothing to Disclose
Lauren C. Friedlander MD: Nothing to Disclose
Hanina Hibshoosh MD: Nothing to Disclose
Ralph Thomas Wynn MD: Nothing to Disclose

TEACHING POINTS
Male breast disease is uncommon and unusual cases create particular imaging and diagnostic challenges for the radiologist. We present 10 interesting male breast cases (5 benign and 5 malignant), teach associated radiologic findings, provide pathologic correlation and address appropriate management based on available literature. In this context we discuss techniques for imaging the male breast and review the differential diagnosis for benign and malignant male breast disease. Specific diagnoses taught include: invasive lobular carcinoma, mastitis with delayed malignancy diagnosis, axillary basaloid metaplastic breast carcinoma with basal cell carcinoma of the nipple, chronic lymphocytic leukemia/small lymphocytic lymphoma, prostate cancer metastasis, hemangioma, epidermal inclusion cyst, gynecomastia in a transgender patient, fat necrosis and a pilomatrixoma.

TABLE OF CONTENTS/OUTLINE
• Introduction
• Imaging the male breast: Approach and techniques
• Benign and Malignant disease: differential diagnosis
• 10 interesting male breast cases with:
  o Clinical History
  o Imaging with radiologic findings
  o Pathologic findings (available for 8 of 10 cases)
  o Management based on current literature review
• Summary/Take Home teaching points

BRE194

Malignant Breast Lesions that May Mimic Benign Tumors: “A Diagnostic Challenge in Breast Radiology”

Education Exhibits
Location: BR Community, Learning Center

Participants
Flavia Beatriz Sarquis MD (Presenter): Nothing to Disclose
Karina Pesce: Nothing to Disclose
Bernardo Oscar Blejman MD: Nothing to Disclose
Lucia Isabel Beccar Varela MD: Nothing to Disclose
Graciela Fernandez Alonso: Nothing to Disclose

TEACHING POINTS
1- Describe and illustrate the spectrum of malignant breast lesion mimicking benign conditions
2- Exhibit signs and radiological features of these entities using cases clinical and histopathologic correlation.
3- Discuss limitations and difficulties that arise in image interpretation.

TABLE OF CONTENTS/OUTLINE
1-Introduction
2-Breast Imaging Techniques
• Digital mammography
• Ultrasonography
• Color Doppler imaging
• MR Imaging
• Tomosynthesis
3- Malignant breast lesion that may mimic Benign conditions: Mucinous carcinoma, medullary carcinoma, triple negative breast cancer in BRCA 1, Squamous cell-type metaplastic breast carcinoma , metastatic, 4- Warning signs
5- Clinical cases
6- Conclusions

BRE195

Mammographic Finding of Eosinophilic Fascitis

Education Exhibits
Location: BR Community, Learning Center

Participants
Nara Pacheco Pereira MD (Presenter): Nothing to Disclose
Reine Fahed MD: Nothing to Disclose
Almir Bitencourt MD: Nothing to Disclose
Nagi Fouad Khouri MD: Nothing to Disclose

TEACHING POINTS
- To review the characteristics and describe the complex-symptoms of that rare disease: eosinophilic fasciitis.
- The purpose of this study is to report a rare case of eosinophilic fasciitis, which the findings on mammography have not been described in the
The purpose of our presentation is to illustrate the mammographic progression during a ten year follow up of that rare condition.

TABLE OF CONTENTS/OUTLINE

- Review eosinophilic fasciitis' (EF) complex symptoms.
- Review the etiology and pathogenesis of the disease.
- Illustrate a case report: 67-year-old patient with a history of breast cancer, treated by lumpectomy and radiation therapy, who developed diffuse fasciitis with eosinophilia.
- Illustrate the mammographic progression during a ten year follow up of that rare condition, which shows extensive coarse calcifications throughout the left breast moderately to markedly increasing, with many of them noted to be subcutaneous and dermal, and some of the calcifications breaking through the skin.

Summary: Our case illustrates a remarkable chronological association of the incipience of EF following lumpectomy and radiation therapy for carcinoma of the breast. The manifestations of EF on mammographic findings have not been described in the literature.

BRE196

Manifestation of Hematologic Diseases in the Breast: Multimodality Review with Pathologic Correlation

Education Exhibits
Location: BR Community, Learning Center

Participants
Monica Liwen Huang MD (Presenter): Nothing to Disclose
Flavia Postleman Monetto: Nothing to Disclose
Elsa Maria Arribas MD: Nothing to Disclose
Gaiane M. Rauch MD, PhD: Nothing to Disclose
Savitri Krishnamurthy MD: Nothing to Disclose
Beatriz E. Adrada MD: Nothing to Disclose

TEACHING POINTS

1) Review of the different hematologic diseases that may present secondarily in the breast, such as lymphoma, leukemia, multiple myeloma (plasmacytoma), and amyloidosis and their appearance on different imaging modalities (mammography, sonography, and MRI).
2) Integration of clinical history with imaging findings assist the radiologist in diagnosing lesions that may represent secondary manifestations of hematologic diseases in the breast.
3) Imaging features of the hematologic diseases in the breast may help the radiologist distinguish these disease processes from other primary breast lesions or malignancies.
4) Varying types of tissue samples are required for the diagnosis of the different hematologic diseases in the breast.

TABLE OF CONTENTS/OUTLINE

1) Classification of hematologic diseases and incidence of secondary breast involvement.
2) Biopsy techniques and types of tissue samples needed for cytology, flow cytometry, histopathology, and receptor studies to diagnose hematologic diseases manifesting secondarily in the breast.
3) Case presentations of hematologic diseases in the breast, including patient demographics and clinical presentation, multimodality imaging features, cytology and histopathology correlation, and treatment.

BRE197

Mucinous Breast Carcinoma: Mammographic, Sonographic and MRI Findings and its Histological Correlation

Education Exhibits
Location: BR Community, Learning Center

Participants
Laura Paul Ferrer MD (Presenter): Nothing to Disclose
Neus Torra: Nothing to Disclose
Elsa Perez MD: Nothing to Disclose
Josep Pont MD, PhD: Nothing to Disclose
Nicolas Romero Florez MD: Nothing to Disclose
Salvador Pedraza MD, PhD: Research Consultant, H. Lundbeck A/S
Francesc Tuca Rodriguez: Nothing to Disclose
Amparo Villar: Nothing to Disclose

TEACHING POINTS

To describe the most common mammographic, sonographic and MRI findings of mucinous tumours of the breast.

To show the intimate relation between the radiological features and the underlying histological composition of these lesions through a bibliographic revision and a retrospective study of cases diagnosed in our centre between 2009-2013.

TABLE OF CONTENTS/OUTLINE

Mucinous or colloid carcinoma is a distinct histological subtype of infiltrating carcinoma, which represents 7% of total breast cancers and typically affects postmenopausal women being the prevalence of 7% in women aged over 75 and near 1% of women under 35 years old. Those are slow-growing tumors with with lower taxes of axillary metastases and a better prognosis than the ill-defined histological subtype Mucinous carcinoma lesions typically present small size- rounded shape cells surrounded by a variable amount of mucin. In relation to the percentage of mucin there are two histological forms that we can consider: 'Pure' and 'Mixo' form. A good knowledge about the most common radiological findings, the correlation between the different techniques and a good understanding of the underlying histological features could allow us to assess the degree of aggressiveness related with the mucin content of the different lesions and to predict the behaviour of this lesions.

BRE198

Multi-methods Radiological Appearance of Gynecomastia

Education Exhibits
Location: BR Community, Learning Center
**Participants**

- Karina Pesce (Presenter): Nothing to Disclose
- Flavia Beatriz Sarquis MD: Nothing to Disclose
- Carlos Mariano Lamattina MD: Nothing to Disclose
- Bernardo Oscar Bleijman MD: Nothing to Disclose
- Silvia Giusti: Nothing to Disclose

**TEACHING POINTS**

- To acknowledge the different types of gynecomastia, and the multimodality radiological appearance.
- To describe the etiological base of the disease.
- To Discuss the utility of the different image techniques on the study of the gynecomastia, with special approach of three-dimensional tomosynthesis.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction  
   - Etiology:  
     - A) Physiologic: a) neonatal b) puberty b) aging  
     - B) Pathologic: a) decreased production/action of androgens b) increased estrogen production c) systemic illness d) drugs e) idiopathic.  
   3. Clinical classification of different types of gynecomastia (schematic drawing and pictures of clinical cases)  
   4. Mammographic breast images, ultrasounds, and three-dimensional tomosynthesis of the three phases of gynecomastia; examples with different cases  
   5. Clinical cases  
   7. Conclusions

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**BRE199**

**Multimodality Imaging Appearance of Noncalcified Ductal Carcinoma in Situ**

**Education Exhibits**

**Location:** BR Community, Learning Center

**Participants**

- Juliana Rosenblat MD (Presenter): Nothing to Disclose
- Suzanne McElligott MD: Nothing to Disclose
- Monica Majmundar Sheth MD: Nothing to Disclose

**TEACHING POINTS**

1. For diagnosis of noncalcified ductal carcinoma in situ (DCIS), the finding of pseudomicrocysts on ultrasound and utilization of color flow and Doppler are important in helping a radiologist to determine when to biopsy.  
2. Noncalcified DCIS should be included in the differential of suspicious enhancing masses or nonmass enhancement in patients where DCIS is not seen mammographically. Additionally, MRI is a useful adjunct in evaluating extent of disease and determining surgical management.

**TABLE OF CONTENTS/OUTLINE**

- Introduction  
  - Purpose  
  - Discuss multimodality imaging features of noncalcified DCIS  
  - Imaging Findings  
  - Mammography  
- Distortion  
  - Mass / focal asymmetry  
  - Occult  
  - Ultrasound  
  - Mass  
  - Irregular shape  
  - Microlobulated margins  
  - Complex echotextures  
- Pseudomicrocystic - clustered microcysts - MRI - Nonmass enhancement - Mass - Focus - Kinetics - Role of MRI in determining extent of disease and surgical planning  
- Conclusion  
- It is important for the radiologist to be aware of the various imaging features of noncalcified DCIS in order to optimize technique and guide patient management.

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**BRE201**

**Not Your Average Man: Biopsy or Not These Male Breast Lesions?**

**Education Exhibits**

**Location:** BR Community, Learning Center

**Participants**

- Sadia Choudhary MD (Presenter): Nothing to Disclose
- Soume Daulat Foshee MD: Nothing to Disclose
- Pramod Kumar Gupta MD: Nothing to Disclose

**TEACHING POINTS**

The aim of this presentation is to:  
1. Briefly discuss the anatomic and imaging appearance of the male breast and its differences from the female breast.  
2. Test the viewer's knowledge of classic appearance of male breast lesions that should not be biopsied and lesions that should be biopsied through a series of cases.  
3. Utilize these cases to teach mammographic and sonographic characteristics of male breast lesions that render them benign, equivocal, or malignant.

**TABLE OF CONTENTS/OUTLINE**

Anatomy of the male breast and differences between male and female breasts. Mammographic and sonographic appearances of the normal male breast. Series of cases of benign and malignant male breast lesions asking the viewer if they would biopsy or not biopsy in each situation. Cases will include: Dendritic and nodular gynecomastia, pseudogynecomastia, hemATOMA, fibroadenoma, myofibroblastoma, subareolar abscess, invasive ductal carcinoma, angiolipoma, sebaceous cyst, primary papillary carcinoma, breast schwannoma, and intramammary lymph nodes. Relevant clinical history and followup findings will be provided. Through these cases, the viewer will learn differential diagnoses of various male breast lesions and learn strategies to distinguish benign from malignant and equivocal lesions.

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**BRE202**

**Papillary Lesions: From Duct to Diagnosis**

**Education Exhibits**

**Location:** BR Community, Learning Center

**Participants**

- Aditi Dhakar Modi MD (Presenter): Nothing to Disclose
- Paul Friedman DO: Nothing to Disclose

**TEACHING POINTS**
The purpose of this exhibit is to: 1) Highlight the clinical significance and common presentations of papillary lesions. 2) Address the spectrum and pathophysiology of papillary lesions ranging from benign papillomas to papillary cancer. 3) Demonstrate the appearances of papillary lesions on various modalities ranging from ductograms to MRI.

TABLE OF CONTENTS/OUTLINE
1) Describe the clinical presentation of papillary lesions and the role of radiological workup. 2) Elaborate on the pathological distinction between papillary lesions and the prognostic implications. 3) Discuss the advantages and disadvantages of the available imaging options. 4) Present the characteristic appearances of papillary lesions on various modalities including ductography, mammography, ultrasound and MRI. 5) Provide examples of papillary lesion mimics such as ductal carcinoma in situ and duct ectasia.

BRE203
Phyllodes Tumor of the Breast: Imaging Update with a Focus on Histopathologic Correlation of Core Biopsy and Surgical Pathology

Education Exhibits
Location: BR Community, Learning Center

Certificate of Merit

Participants
Erica Leigh Martin-Macintosh MD (Presenter): Nothing to Disclose
Robert T. Fazzio MD, PhD : Nothing to Disclose
Katrina Nesta Glazebrook MBChB : Nothing to Disclose
Katie Noella Jones MD : Nothing to Disclose
Edwin Onkendi : Nothing to Disclose
Rafael E. Jimenez MD, PhD : Nothing to Disclose
Tina Hieken : Nothing to Disclose

TEACHING POINTS
The purpose of this educational exhibit is to review the imaging features of 50 independent cases of Phyllodes tumor (PT) with clinical presentation, core biopsy, surgical, and pathologic correlation. Major teaching points include:

1. PT are rare fibroepithelial neoplasms of the breast.
2. Aside from interval growth, PT are often difficult to differentiate from a fibroadenoma using conventional breast imaging techniques and histologic core needle biopsy.
3. Accurate characterization and diagnosis of PT during breast imaging evaluation is essential for surgical planning purposes given the potential for malignance and recurrence.

TABLE OF CONTENTS/OUTLINE
- Review the demographics and clinical presentation of PT.
- Illustrate cases of PT with clinical and histopathology correlation.
- Demonstrate multimodality imaging features of PT, with a focus on the readily available breast imaging techniques including mammography, ultrasound, and MR.
- Compare/contrast imaging features of PT with potential mimickers.
- Report outcomes data of core needle biopsy correlation with surgical pathology.

BRE204
Phyllodes Tumors of the Breast: Tips in Radiologic Diagnosis

Education Exhibits
Location: BR Community, Learning Center

Participants
Hye-Won Kim MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. To review of characteristics of phyllodes tumors
2. To differentiate phyllodes tumors from fibroadenomas on clinical and radiological features
3. To explain the suggestive findings of malignant phyllodes tumor on diagnostic images

TABLE OF CONTENTS/OUTLINE
1. What is phyllodes tumor?
2. Differentiation of phyllodes tumors from fibroadenomas on MG, US and MRI
3. Characteristic imaging finding of phyllodes tumors according to histologic grade
4. How can we predict malignant phyllodes tumors on diagnostic imaging?
5. Sample case

BRE205
Pregnancy-associated Breast Cancer: Imaging Findings and What Should Radiologists Know

Education Exhibits
Location: BR Community, Learning Center
Participants
Hyo Soon Lim MD : Nothing to Disclose
Seo Yeon Park : Nothing to Disclose
Suk Hee Heo MD : Nothing to Disclose
Jin Woong Kim MD : Nothing to Disclose
Sang Soo Shin MD : Nothing to Disclose
Hyun Ju Seon MD (Presenter): Nothing to Disclose
Jin Gyo Park : Nothing to Disclose

TEACHING POINTS
1. To understand the physiologic change of the breast during pregnancy and lactation.
2. To overview the clinical presentations, pathologic and radiologic findings of pregnancy-associated breast cancer.
3. To demonstrate the management guidelines of the breast disease during pregnancy and lactation.

TABLE OF CONTENTS/OUTLINE
A. Definition of pregnancy-associated breast cancer.
B. Physiologic changes of breast during pregnancy and lactation.
C. Clinical manifestation.
D. Diagnostic approach.
E. Imaging findings of pregnancy-associated breast cancer.
   1. Mammography
   2. US
   3. MRI
   4. Other imaging modalities.
F. Management of pregnancy-associated breast cancer.

BRE206
Primary Lymphoma of the Breast: Multimodality Features with Pathologic Correlation and Management Review

Education Exhibits
Location: BR Community, Learning Center

Participants
Monica Liwen Huang MD (Presenter): Nothing to Disclose
Flavia Posleman Monetto : Nothing to Disclose
Elsa Maria Arribas MD : Nothing to Disclose
Gaiane M. Rauch MD, PhD : Nothing to Disclose
Savitri Krishnamurthy MD : Nothing to Disclose
Beatriz E. Adrada MD : Nothing to Disclose

TEACHING POINTS
1) The classification system of lymphoma and the diagnostic criteria for primary lymphoma of the breast.
2) Imaging features of primary breast lymphoma on mammography, sonography, and MRI (with PET CT correlation) and features which prompt the radiologists to include this disease entity in their differential diagnosis.
3) Biopsy techniques utilized to obtain the necessary tissue material for the diagnosis of lymphoma of the breast, with review of cytology, flow cytometry, and histopathology findings, as well as receptor studies.
4) Management and prognosis of primary lymphoma of the breast are complex.

TABLE OF CONTENTS/OUTLINE
1) Classification of lymphoma.
2) Diagnostic criteria for primary lymphoma of the breast.
3) Patient demographics and clinical presentation.
4) Mammographic, sonographic, and MRI features, with PET/CT correlation.
5) Biopsy techniques necessary for diagnosis of lymphoma in the breast.
6) Cytology, flow cytometry, and histopathology findings with receptor analysis.
7) Management and prognosis of primary breast lymphoma.

BRE207
Puzzling Breast Lesions with Papillary Growth: A Rad-Path Correlation

Education Exhibits
Location: BR Community, Learning Center

Participants
Camila Junqueira de Andrade D Avila MD (Presenter): Nothing to Disclose
Ariel Barreto Nogueira : Nothing to Disclose
Bruna Maria Thompson MD : Nothing to Disclose
Luciano F. Chala MD : Nothing to Disclose
Su Jin Kim MD : Nothing to Disclose
Marcelo Giannotti MD : Nothing to Disclose
Nestor Barros : Nothing to Disclose

TEACHING POINTS
1. To review benign and malignant lesions with papillary growth.
2. To correlate imaging features of breast lesions with papillary growth with their histological basis.
3. To understand the current controversies and management of lesions with benign papillary growth.

TABLE OF CONTENTS/OUTLINE
What is papillary growth? Breast lesions with papillary growth: definition and types based on WHO classification.
Case Based Review illustrating:
- Imaging features of breast lesions with papillary growth with their histological basis.
- Current controversies about management of lesions with benign papillary growth diagnosed on percutaneous biopsies.
- Advantages and disadvantages of different types of percutaneous biopsy in these lesions.
- Which is the best option? What is the potential impact on clinical management?

BRE209
Sclerosing Adenosis versus Cancer in Sclerosing Adenosis of the Breast: Radiographic-pathologic Correlations

Education Exhibits
Participants
Hiroshi Nakahara MD (Presenter): Nothing to Disclose
Yukiko Yamaguchi: Nothing to Disclose
Mayumi Funagayama: Nothing to Disclose
Takashi Yamamoto: Nothing to Disclose
Yorio Maeda: Nothing to Disclose
Hidemi Furusawa MD: Nothing to Disclose
Kansei Komaki: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the MMG, US and MRI findings of sclerosing adenosis (SA) and cancer in sclerosing adenosis (CASA). 2. To reveal the pathological findings of above lesions. 3. To discuss the relationship between the image and the pathology.

TABLE OF CONTENTS/OUTLINE
Content Organization: 1. Image of SA 2. Image of CASA 3. Histological findings of above lesions 4. Difference of the image between SA and CASA 5. Histological background of image difference Summary: The major teaching points of this exhibit are: 1. Distortion is more commonly found in CASA than SA. 2. Distortion is basically reflected by radial sclerosing lesion of stroma. 3. Distortion is often found on MMG than US or MRI. 4. Fast type dynamic pattern in contrast enhanced MRI is more frequently found in CASA than SA.

BRE210
The Breast Biopsy Shows Predominately Fat, Now What? Managing Radiology Pathology Concordance

Education Exhibits
Location: BR Community, Learning Center

Participants
Amanda Jeanne Beer MD (Presenter): Nothing to Disclose
Cherie Paquette MD: Nothing to Disclose
Kristen Atkins MD: Nothing to Disclose
Heather Renee Peppard MD: Consultant, Siemens AG Research Grant, Hologic, Inc
Carrie Margaret Rochman MD: Nothing to Disclose
Jennifer A. Harvey MD: Researcher, Hologic, Inc Researcher, VuCOMP, Inc Researcher, Volpara Solutions, Ltd Shareholder, Volpara Solutions, Ltd Shareholder, Hologic, Inc
Brandi Tamara Nicholson MD: Stockholder, Hologic, Inc

TEACHING POINTS
The purpose of this exhibit is:
1. Show how to best determine concordance after biopsy demonstrates predominately benign fatty tissue.
2. Provide tools to improve communication between Radiologists and Pathologists to prevent radiology pathology discordance in breast lesions undergoing biopsy.
3. Discuss lesions that have a classic radiologic appearance but overlapping pathologic findings such as lipoma, angioliopma, and hamartoma.
4. Review recommendations for management, specifically on to excise or accept as benign concordant, after radiology pathology concordance is determined.

TABLE OF CONTENTS/OUTLINE
Present cases of breast lesions which can have predominately fat on histology Discordant breast biopsy showing fat Lipoma Angioliopma Fat necrosis versus invasive carcinoma Hamartoma versus fibroadenoma Review imaging and pathology findings in a case-based format with discussion of significant mimickers Discuss how to best determine concordance with focus on the following: Communication between radiology and pathology Confidence in accuracy of biopsy Histology interpretation by pathologist Image review with pathology results by radiologist Summarize recommendations for improved teamwork between Radiologist and Pathologist

BRE211
The Great Mimicker: Multimodality Case Series of Lymphoma in the Breast

Education Exhibits
Location: BR Community, Learning Center

Participants
Ilana Kafer MD (Presenter): Nothing to Disclose
Patrick Kobes DO: Nothing to Disclose
Monica Majmundar Sheth MD: Nothing to Disclose
Suzanne McElligott MD: Nothing to Disclose

TEACHING POINTS
1. Lymphoma in the breast can have multiple imaging presentations and is important to include in differential for single or multiple unilateral and bilateral masses, skin thickening and parenchymal edema, bilateral axillary adenopathy
2. Post treatment imaging-PET CT and/or dedicated breast imaging can evaluate response to therapy and guide future management
3. Review the difference between primary and secondary breast lymphoma

TABLE OF CONTENTS/OUTLINE
1. Introduction to Lymphoma II. Imaging features a. Mammography b. Sonography c. MRI d. PET/CT III. Differential IV. How
can imaging guide management (diagnosis and follow-up after treatment) V. Conclusion: Review of primary and secondary lymphoma of the breast showing findings on mammography, ultrasound, breast MRI, and PET CT. Cases will summarize the key imaging findings that lead to a diagnosis of lymphoma and demonstrate imaging follow-up after treatment.

### BRE212

**The Hormonal Breast: A Comprehensive Anatomical and Imaging Review**

*Education Exhibits*

**Location:** BR Community, Learning Center

#### Participants

- Nina Woldenberg MD (Presenter): Nothing to Disclose
- Melissa Marie Joines MD: Nothing to Disclose

#### Teaching Points

1. Understand how hormonal manipulation affects the prepubertal to post-menopausal breast with anatomical and imaging correlation.
2. Understand the physiology and imaging features of breast conditions and neoplasms associated with endogenous or exogenous hormones.
3. Hormonal influences on the male breast with case examples.

#### Table of Contents/Outline

- Comprehensive anatomical and imaging review of the hormonal breast including: 1. Normal breast development/Tanner stages.
- Hormonal influences on the breast during menses, pregnancy, and lactation.
- Hormonal changes during perimenopause and menopause.
- Breast conditions associated with hormones including breast pain, cysts, fibroadenomas, and malignancies, as well as pregnancy associated cancers and benign masses.
- Understanding endogenous/exogenous hormonal influences on the male breast.

### BRE213

**The Male Breast: Masses, Malignancies and More**

*Education Exhibits*

**Location:** BR Community, Learning Center

#### Participants

- Monique Marie Tyminski DO (Presenter): Nothing to Disclose
- Rebecca Hultman DO: Nothing to Disclose
- Jade Watkins MD: Nothing to Disclose
- Thomas Stockl MD: Nothing to Disclose
- Sue A. MacMaster MD: Nothing to Disclose
- Rebecca Hultman DO: Nothing to Disclose
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Present cases of fibrous and spindle breast lesions undergoing image guided biopsy

1. Misdiagnosed sclerosed fibroadenoma as malignancy
2. Sarcomatoid carcinoma
3. Pseudoangiomatous stromal hyperplasia (PASH)
4. Lymphocytic mastopathy
5. Myoepithelial proliferation

Review imaging and pathology findings in a case-based format with discussion of significant mimickers

Discuss how to best determine concordance following biopsy with focus on the following:

1. Communication between radiology and pathology
2. Confidence in accuracy of biopsy
3. Histology interpretation by pathologist
4. Image review with pathology results by radiologist

Summarize recommendations for improved teamwork between Radiologist and Pathologist as well as management of the breast lesions

**BRE215**

**The Sternum—A New Review Area in the Imaging of Breast Carcinoma**

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

Lucy Jane Wilding, MBBS, FRCR (Presenter): Nothing to Disclose
Ying Chen, MBBS: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is to illustrate the appearances of metastatic disease to the sternum in breast carcinoma. Increasingly we are finding bony disease involving the sternum following invasive breast carcinoma, often as a solitary site of secondary disease. We will demonstrate the range of appearances of lytic and sclerotic bony metastases on Computed Tomography. Cases will also include metastases detected on dynamic breast Magnetic Resonance Imaging. Nuclear medicine examples will include uptake on bone scan as well as subtle uptake on PET scan, occult on other forms of imaging. Histological correlation is provided in cases of isolated disease where core biopsy or fine needle aspiration cytology was obtained. The importance of reviewing this possibly overlooked area on routine staging and surveillance imaging is emphasized.

**TABLE OF CONTENTS/OUTLINE**

- The incidence and pathophysiology of sternal metastatic disease in breast carcinoma
- Appearance of sternal metastases on ultrasound, CT, MRI, NM bone scan and PET imaging
- Histological correlation following image guided sampling
- The importance of the sternum as a review area

**BRE216**

**Unusual Suspects: Spectrum of Extramammary Malignant Neoplasms in the Breast with Radiologic-Pathologic Correlation**

*Education Exhibits*

*Location: BR Community, Learning Center*

Certificate of Merit

**Participants**

Sirishma Kalli, MD (Presenter): Nothing to Disclose
Michael Lanfranchi, MD: Nothing to Disclose
Andrew Alexander, MD: Nothing to Disclose
Shital Saurin Makim, MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: 1. To discuss the spectrum of extramammary malignant lesions that can localize to the breast including lymphoma, melanoma, ovarian carcinoma, neuroendocrine tumors, and sarcomas, as the currently literature regarding this topic is sparse. 2. To depict imaging appearances of a variety extramammary breast neoplasms on multiple imaging modalities including mammography, ultrasound, MR, and PET/CT. 3. To correlate radiologic imaging of extramammary breast neoplasms with pathologic diagnoses.

**TABLE OF CONTENTS/OUTLINE**

1. Background information including incidence of extramammary malignant neoplasms that can localize to the breast
2. A review of specific types of extramammary malignant neoplasms that may be identified by breast imaging including their clinical features
3. Present case-based, multimodality depiction of a variety of extramammary malignant neoplasms including, melanoma, lymphoma, gastric adenocarcinoma, small cell carcinoma, angiosarcoma, and other rare entities
4. Correlation of each case with pathologic diagnoses

**BRE217**

**When All Else Fails Examine The Patient: Clinical Correlates Of Breast Imaging**

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

Quinn Colin Meisinger, MD: Nothing to Disclose
Gregory Sean Bernstein, MD: Nothing to Disclose
Jade De Guzman, MD: Nothing to Disclose
TEACHING POINTS

Many radiologists are attracted to breast imaging because it maintains contact with patients. However, some radiologists who are not involved in breast imaging routinely may be apprehensive about clinically evaluating patients. In breast imaging, it is often necessary to visually examine the patient, and to perform breast clinical exams. To provide clinical photograph correlates to common and some unusual patient clinical presentations; Suggest an algorithm to correlate clinical findings to breast imaging diagnosis; Specifically discuss the management and differential considerations of the inflamed breast; Suggest appropriate referral for patients with negative imaging and persistent clinical findings.

TABLE OF CONTENTS/OUTLINE

Introduction; Clinical appearance and imaging correlates of: Malignancy, infection, nipple discharge, breast reconstruction, radiation changes, post procedural changes, male breast cancer, Paget’s disease, locally advanced breast cancer and more; Conclusion

BRE218

When Malignancy in the Breast is not Breast Cancer

Education Exhibits
Location: BR Community, Learning Center

Participants
Kirsten Stafford MBCh, MRCP (Presenter): Nothing to Disclose
Roma Patel MBBS, FRCR: Nothing to Disclose
Tamara Surius MBBS: Nothing to Disclose
Dylan Rame Tsukagoshi MBBS: Nothing to Disclose
Brian Joseph Holloway MBCh: Nothing to Disclose
Anmol A. Malhotra MBBS: Nothing to Disclose

TEACHING POINTS

The incidence of metastases to the breast is low, but has been reported and may be the first sign of malignancy. With increased screening across the world, more patients may present with cancer diagnosed on breast imaging as the primary modality. Furthermore, patients living with a non breast primary malignancy may present with palpable lumps and metastases should be considered. The aim of this exhibit is to raise awareness of the types of malignancy that most commonly metastasize to the breast and to highlight features that may distinguish between them.

TABLE OF CONTENTS/OUTLINE

When masses present in the breast, there are sometimes imaging characteristics which are atypical for breast cancer, yet still suggest malignancy. We present a review of different types of metastases with imaging and histopathological correlation. We have examples of metastases from various modalities: ultrasound, mammography, CT and MRI. Our cases of metastases to the breast include: 1. Melanoma 2. Lymphoma 3. Neuroendocrine tumours 4. Paraganglioma

BRE220

Are Irregular Hypoechoic Breast Masses on Ultrasound Always Malignancies?

Education Exhibits
Location: BR Community, Learning Center

Certificate of Merit

Participants
Yoe Ree Kim MD (Presenter): Nothing to Disclose
Hye-Won Kim MD: Nothing to Disclose

TEACHING POINTS

Irregular hypoechoic masses in breast do not always indicate malignancies. These lesions were assessed as BI-RADS Category 4a-to-4c suspicious malignancy on ultrasonography, resulting in US-guide biopsy. 1. There were many kinds of benign or borderline breast diseases representing irregular hypoechoic masses that can mimic carcinoma on ultrasonography. 2. Careful US examination, history taking, and biopsy could help to differentiate them from malignancies.

TABLE OF CONTENTS/OUTLINE

Benign or borderline breast lesions into 4 groups - Iatrogenic or trauma-related breast lesions Foreign body reaction Fat necrosis Fibrotic scar - Proliferative disease - Benign breast tumors - Inflammation Abscess Idiopathic granulomatous lobular mastitis Diabetic mastopathy Sclerosing adenosis Apocrine metaplasia Fibrocystic change Intraductal papilloma Fibroadenoma

BRE222

Breast Elastography: How We Do It

Education Exhibits
Location: BR Community, Learning Center

Certificate of Merit

Participants
Christina Gkali MD (Presenter): Nothing to Disclose
Athanasios N. Chalazonitis MD, MPH: Nothing to Disclose
Zoi Antoniou BMedSc: Nothing to Disclose
Andromachi Zourla: Nothing to Disclose
Eleni Feida: Nothing to Disclose
TEACHING POINTS

1. To review the technique of both Strain Elastography (SE) and Acoustic Radiation Force Impulse Imaging (ARFI). 2. To suggest an appropriate breast SE and ARFI imaging examination protocol. 3. To demonstrate the elastographic imaging findings in benign and malignant breast lesions. 4. To review the potential elastographic pitfalls. 5. To suggest an appropriate reviewing method.

TABLE OF CONTENTS/OUTLINE

Both benign and malignant breast lesions were examined with SE and ARFI imaging in more than 50 consenting patients and can be displayed in details as a pictorial essay. All cases were paired with cytological or/and histological confirmation. Both SE and ARFI imaging were performed in benign and malignant breast lesions in order to depict the hardness of the examined lesion. SE provides qualitative assessment of the tissue hardness. Strain ratio consist a quantification of this qualitative type of elastography. ARFI imaging is divided into two types: a) Virtual Touch Tissue Imaging (VTI) which provides the relative stiffness in qualitative way in the selected region of interest on a gray scale image and b) Virtual Touch Tissue Quantification (VTQ) which expresses the shear wave speed in solid materials as numeric values and describes quantitatively the hardness of tissue.

BRE223

Breast Ultrasound BI-RADS 5th Edition Lexicon: What's New and How Should We Use It?

Education Exhibits

Location: BR Community, Learning Center

Participants

Emily Lorraine Sedgwick MD (Presenter): Nothing to Disclose
Sarah Louise Moorhead MD : Nothing to Disclose
Tamara Ortiz-Perez MD : Nothing to Disclose
Lilian O. Ebuoma MD : Nothing to Disclose

TEACHING POINTS

Teaching Points: Provide a pictoral review of the ultrasound lexicon in the BI-RADS 5th Edition, with emphasis on the changes in the lexicon, to promote appropriate use of the lexicon.

TABLE OF CONTENTS/OUTLINE

Studies have shown that focused teaching about the BI-RADS lexicon leads to improved appropriate use of the lexicon. Ultrasound images demonstrating the lexicon characteristics will be displayed with the corresponding BI-RADS descriptors. Images depicting the new BI-RADS descriptors (e.g. tissue composition, complex cystic and solid echo pattern) will be shown. A quiz will be provided following the instructive slides to reinforce the appropriate use of the BI-RADS lexicon.

BRE224

Cavernous Hemangioma of the Breast: Percutaneous Biopsy is not Always Necessary

Education Exhibits

Location: BR Community, Learning Center

Participants

Erika Magdalena Meisen MD (Presenter): Nothing to Disclose
Maria Florencia Andraca : Nothing to Disclose
Laura Soledad Muscillo MD : Nothing to Disclose
María Emilia Diaz : Nothing to Disclose
Florence Pia Sojo : Nothing to Disclose
Eduardo Pablo Eyheremendy MD : Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: The objective of this paper is to describe the clinical and imaging features of cavernous hemangiomas, emphasizing those that allow it to differentiate themselves from angiosarcoma and other breast lesions. The major teaching points of this exhibit are: 1 - Nodules of solid appearance, usually hypo or hyperechoic and slightly heterogeneous. 2 - Classified as cavernous and capillary depending on the size of the vessels. Mixed are more common than pure capillaries. 3 - Usually are extraparenchymal (subcutaneous tissue) while angiosarcomas usually are intraparenchymal. 4 - Unlike angiosarcoma, hemangioma show no flow on color doppler study. The flow inside the vascular structures is too slow to be demonstrated. 5-In mammograms, appears as a circumscribed, round, oval or lobulated, well-defined and high density lesion.

TABLE OF CONTENTS/OUTLINE

Cavernous hemangiomas are benign vascular tumors, usually located in the subcutaneous tissue. Classically, the diagnosis of cavernous hemangioma in adults was percutaneous biopsy, since it could be mistaken for a low-grade angiosarcoma (malignant lesion). However, there are imaging features of cavernous hemangiomas that allow us to differentiate them from angiosarcomas, avoiding unnecessary biopsies.

BRE225

Childhood Hemangiomas in the Breast

Education Exhibits

Location: BR Community, Learning Center

Participants

Maria Florencia Andraca (Presenter): Nothing to Disclose
Erika Magdalena Meisen MD : Nothing to Disclose
Laura Soledad Muscillo MD : Nothing to Disclose
Maria Emilia Diaz : Nothing to Disclose
Florencia Pia Sojo : Nothing to Disclose
Eduardo Pablo Eyheremendy MD : Nothing to Disclose

TEACHING POINTS
The aim of this paper is to describe the clinical and imaging characteristics of childhood hemangiomas in the breast. The major teaching points of this exhibit are:
1. Solid nodules with benign clinical features.
2. Ultrasonography they may be echogenic or slightly heterogeneous.
3. They have positive doppler flow in color doppler study, which is the fundamental pillar of this diagnostic entity.

TABLE OF CONTENTS/OUTLINE
The childhood capillary hemangiomas are benign vascular tumors that appear in the first months of life and are characterized by an initial proliferative phase and a later phase of regression. They are unusual lesions that may be located in both the breast parenchyma and the subcutaneous tissues surrounding the gland. The most important feature is their tendency to regression. Lesions appear in the first weeks of life, grow for a few months and from the first year of life initiate a regression process leading to the total disappearance of the lesion in 95% of cases. There are ultrasound signs that force us to think about this entity, both in 2D and color doppler study, which correlate with histopathological findings. Treatment is expectant in the first place, unlike breast hemangiomas in adults, in which excision is recommended to avoid being confused with an underlying low-grade angiosarcoma, which invades the subcutaneous tissue.

BRE226
Common Errors in Breast Ultrasound

Education Exhibits
Location: BR Community, Learning Center

Participants
Romuald Ferre (Presenter): Nothing to Disclose
Shaza Alsharif MD : Nothing to Disclose
Melanie Theriault MD : Nothing to Disclose
Valerie Blouin MD : Nothing to Disclose
Martine Pare RT : Nothing to Disclose
Benoit Delphin Mesurolle MD : Nothing to Disclose

TEACHING POINTS
The goals of the exhibits are: 1. To present and discuss the common errors encountered in breast US 2. Provide tips to limit the errors.

TABLE OF CONTENTS/OUTLINE
Four scenarios that seem relevant in daily practice will be exposed: 1. Misinterpretation of "benign" appearing lesions (cancers displaying benign features: oval shape, circumscribed margins, hyperechoic echotexture) 2. Inadequate correlations between US / mammogram and US / physical exam 3. Value of a negative breast US 4. Underuse of available US settings particularly in interventional procedures 5. Misleading elastography (technique and results) US is an essential tool for breast imagers. However, challenging situations can lead to misdiagnoses. Through various examples, practical tips and evidence-based algorithms will be proposed in this exhibit for better management of such situations in daily practice.

BRE227
Lessons to Learn in Breast Ultrasound: A Case Based Review. Acceptable and Unacceptable Mistakes

Education Exhibits
Location: BR Community, Learning Center

Participants
Irai Santana Oliveira MD (Presenter): Nothing to Disclose
Flavio Spinola Castro MD : Nothing to Disclose
Barbara Helou Bresciani MD : Nothing to Disclose
Luciano F. Chala MD : Nothing to Disclose
Vera Christina Camargo de Siqueira Ferreira MD : Nothing to Disclose
Nestor Barros : Nothing to Disclose

TEACHING POINTS
• To acknowledge the importance of ultrasound in breast imaging daily practice: may be problem solving, may outrule malignity, may detect subtle suspicious features • To understand ultrasound is an operator-depandant method: optimal scanning technique and accurate use of available resources is key for an appropriate examination and correct results • To accurately correlate ultrasound with other methods (mammography, MRI, CT): importance of positioning, anatomic landmarks and particular features of the lesion • To learn which mistakes are acceptable and how to avoid the unacceptable ones

TABLE OF CONTENTS/OUTLINE
• Breast ultrasound: background and importance in lesion characterization and assessment • Ultrasound technique: equipment, parameters and resources • Ultrasound technique: illustrative cases • Multimodality correlation: what must be regarded for an accurate correlation • Multimodality correlation: illustrative cases • Acceptable and unacceptable mistakes: a case-based review • Conclusion

BRE228
Non-mass Lesion on Breast Ultrasound: Appearance and Significance Radiologists Should Know

Education Exhibits
Location: BR Community, Learning Center
Participants
Youichi Machida MD, PhD (Presenter): Nothing to Disclose
Mitsuhiko Tozaki MD, PhD: Nothing to Disclose
Akiko Shimauchi MD: Nothing to Disclose
Tamiko Yoshida: Nothing to Disclose
Yoshhide Kanemaki: Nothing to Disclose

TEACHING POINTS
1. It is important to recognize "Ultrasound non-mass lesions (U-NML)" on breast ultrasound (US), which will become essential with increase in use of automated breast ultrasound (ABUS) imaging. 2. To detect and count suspicious features of U-NML helps interpreters assess possibility of malignancy.

TABLE OF CONTENTS/OUTLINE
Breast US is reported to detect incremental cancers that are negative on mammography, especially in women with dense breasts. ABUS enables radiologists to evaluate the breast comprehensively using three-dimensional sectional views, in a similar way to MRI. With a rising number of ABUS exams, it will become increasingly important to appreciate US lesions that would be observed as non-mass enhancements on MRI. Radiologists will be able to appreciate and evaluate "U-NML" properly after viewing this exhibit containing following topics; 1. U-NML in comparison with mammographic and MRI findings, as well as pathology results: what kind of lesions can appear as non-mass? 2. Categorization of U-NML based on scores of suspicious features.

BRE229
Retro-areolar Lesions in Breast Ultrasound: Pearls and Pitfalls
Education Exhibits
Location: BR Community, Learning Center
Selected for RadioGraphics

Participants
Romuald Ferre (Presenter): Nothing to Disclose
Martine Pare RT: Nothing to Disclose
Lisa Smith: Nothing to Disclose
Shaza Alsharif MD: Nothing to Disclose
Melanie Thenault MD: Nothing to Disclose
Ann Elizabeth Aldis MD: Nothing to Disclose
Benoit Delphin Mesurolle MD: Nothing to Disclose
Pierre-Alain Goumot: Nothing to Disclose

TEACHING POINTS
The goals of the exhibit are: 1. To present and discuss the contributing factors in missed retro-areolar cancers on ultrasound 2. To describe technical challenges, and propose management tips 3. To review the spectrum of retro-areolar lesions

TABLE OF CONTENTS/OUTLINE
1. Technical challenges of retro-areolar lesions: due to lesion position, lesion size 2. Management tips for challenging lesions: frequency, Doppler, elastography 3. Radio-pathologic correlation examples with management recommendations 4. False negatives: how to identify and prevent them US is an essential tool of the breast imager yet the technique remains challenging and imperfect to explore retro-areolar lesions. Challenges include technical considerations related to scanning adequately. Through various examples using Doppler, elastography, this exhibit will offer practical tips to the radiologists as well as propose evidence-based algorithms for the diagnosis of retro-areolar lesions.

BRE230
Right at the Surface: Skin and Superficial Lesions of the Breast
Education Exhibits
Location: BR Community, Learning Center

Participants
Megan Jenkins Kalambo MD (Presenter): Nothing to Disclose
Savitri Krishnamurthy MD: Nothing to Disclose
Sarah DeSnyder MD: Nothing to Disclose
Madeleine Duvic MD: Nothing to Disclose
Victor G. Preto MD, PhD: Nothing to Disclose
Gary J. Whitman MD: Nothing to Disclose

TEACHING POINTS
Accurate classification and description of skin and superficial lesions of the breast will aid the radiologist in distinguishing benign from suspicious imaging findings that warrant biopsy. In this presentation, we will provide a systematic approach to the evaluation of skin and superficial lesions of the breast on mammography and ultrasound and discuss distinctive imaging features of superficial breast lesions and indications for biopsy.

TABLE OF CONTENTS/OUTLINE
We will present a pictorial essay of our experience with superficial breast lesions at our institution, including management of challenging cases. Knowledge of the imaging features of superficial breast and skin lesions helps to guide appropriate management that includes annual mammography for benign lesions or biopsy for suspicious lesions. 1) Techniques that aid in identifying skin/superficial lesions. 2) Imaging features that aid in distinguishing benign superficial lesions from lesions that warrant biopsy. 3) Appropriate differential diagnoses for benign and malignant superficial lesions Top Differentials: Benign: epidermal inclusion cyst, nevus, hemangioma. Iatrogenic: scar, keloid Malignancy: breast cancer with direct skin involvement, angiosarcoma, metastases Hereditary: neurofibromatosis, steatocystoma multiplex
BRE231

Role of Contrast Enhanced Ultrasound and Shear Wave Elastography for Assessment of Treatment Response to Neoadjuvant Chemotherapy in Breast Cancer – Preliminary Results

Education Exhibits
Location: BR Community, Learning Center

Participants
Brenna Ann Talkin Chalmers MD (Presenter): Nothing to Disclose
Linda Hovanessian-Larsen MD: Nothing to Disclose
Bhushan Desai MBBS, MS: Nothing to Disclose
Darryl Hwang PhD: Nothing to Disclose
Samantha Delapena: Nothing to Disclose
Sandy Chia-En Lee MD: Nothing to Disclose
Edward G. Grant MD: Research Grant, Bracco Group Research Grant, General Electric Company Medical Advisory Board, Nuance Communications, Inc

TEACHING POINTS
1. To understand the basics of contrast enhanced ultrasound (CEUS) and Shear Wave Elastography (SWE). 2. To investigate the role of CEUS and SWE as a potential response assessment biomarker to neoadjuvant chemotherapy (NAC) in breast cancer by evaluating changes in tumor size, perfusion characteristics, and tissue stiffness before (baseline) and 2-3 weeks post-NAC initiation. 3. To assess the agreement between CEUS and SWE based classification rule and pathologically determined treatment response. 4. To determine the agreement between different imaging modalities (including conventional US, MRI, SWE). 5. To illustrate pictorial cases where CEUS and SWE are useful for therapy monitoring of breast cancer patients on NAC.

TABLE OF CONTENTS/OUTLINE
I. Background and Significance II. Literature review III. Limitations of conventional imaging modalities IV. Clinical utility of CEUS and SWE V. Technical note: Imaging data acquisition methodology (qualitative and quantitative) VI. Evaluating treatment response using different imaging modalities VII. Clinical case examples of studies done at our institution

BRE232

Scary Images: Lipofilling Appearances during Breast Cancer Follow-up Ultrasound

Education Exhibits
Location: BR Community, Learning Center

Participants
Daniel Claudio Mysler MD (Presenter): Nothing to Disclose
Andres Kohan MD: Fellowship funded, Koninklijke Philips NV
Mora Amat: Nothing to Disclose
fernando farache: Nothing to Disclose
veronica fabiano: Nothing to Disclose
Ricardo D. Garcia-Monaco MD, PhD: Research Consultant, Siemens AG Research Consultant, BTG International Ltd
federico colo: Nothing to Disclose

TEACHING POINTS
To review ultrasound imaging findings secondary to lipofilling To understand the impact this technique has on the adequate handling of patients with history of breast cancer To provide a decision tree upon ultrasound findings during the breast oncological control in patients that had a lipofilling treatment

TABLE OF CONTENTS/OUTLINE
* Procedure: description of the lipofilling technique
* Clinical Findings: during physical examination
* Pathophysiology: Histopathologic findings, cascade of fat necrosis
* Ultrasound findings: review the different changes that happen in the breast and their visualization in ultrasound.
* Tips and practical tricks: which associated ultrasound findings are suspicious for recurrent breast cancer and which ones discard it
* Radiologic decision-tree

BRE233

The Breast Imager’s Approach to Non-mammary Masses in the Axilla and Chest Wall during Ultrasound: Scanning Technique, Clues to Origin, and Further Management

Education Exhibits
Location: BR Community, Learning Center

Selected for RadioGraphics

Participants
Matthew Cole Oliff MD (Presenter): Nothing to Disclose
Catherine Streeto Giess MD: Nothing to Disclose
Sughra Raza MD: Consultant, Seno Medical Instruments, Inc
Robyn L. Birdwell MD: Nothing to Disclose

TEACHING POINTS
1. To review the anatomy of the chest wall and axilla and to describe optimal ultrasound scanning techniques. 2. To present examples of non-mammary masses encountered during breast and axillary ultrasound with mammographic, CT, and/or MRI correlation. 3. To outline imaging clues to the origin of non-mammary masses and to describe management strategies.

TABLE OF CONTENTS/OUTLINE
1. Review the anatomy of the axilla and chest wall and review the differential diagnosis of lesions in these regions. 2. Demonstrate focal ultrasound scanning techniques of the axilla to enable the breast imager to properly localize a lesion within the sometimes disorienting region of the axilla. 3. Present cases of ultrasound evident non-mammary masses with mammographic, CT, and/or MRI correlation. 4. Describe clues and pitfalls in the diagnosis of non-mammary masses of the axilla and chest wall. 5. Review management strategies if a mass is thought to be non-mammary in origin.

**BRE234**

**The "Other" Second-Look Ultrasound: Tips and Tricks for the Sonographic Work-up of Architectural Distortions Detected on Tomosynthesis**

*Education Exhibits*

*Location: BR Community, Learning Center*

Certificate of Merit

Selected for RadioGraphics

**Participants**

Mailan Melissa Cao MD (Presenter): Nothing to Disclose
Fan Yang MD, PhD: Nothing to Disclose
Heather I. Frimmer MD: Nothing to Disclose

**TEACHING POINTS**

This exhibit will teach participants: - subtle signs of architectural distortion on ultrasound, - troubleshooting techniques in hard-to-find lesions, - benefits and limitations of advanced ultrasound modes such as harmonics, spectral compound imaging, and other automated image optimization tools in the characterization of architectural distortion, - optimal techniques for ultrasound-guided biopsy of architectural distortion.

**TABLE OF CONTENTS/OUTLINE**

1. Indications for ultrasound in the work-up of architectural distortion detected with tomosynthesis 2. Sonographic imaging findings of architectural distortion with tomosynthesis correlation 3. Troubleshooting Techniques: using the parenchymal pattern seen on tomosynthesis to localize the lesion repositioning the patient imaging behind the nipple using advanced ultrasound modes such as harmonics, spectral compound imaging, and power Doppler 4. Techniques for successful ultrasound-guided biopsy of architectural distortion

**BRE236**

**Tumor Phylloides: The Great Ghost**

*Education Exhibits*

*Location: BR Community, Learning Center*

**Participants**

Maria Florencia Andraca (Presenter): Nothing to Disclose
Erika Magdalena Meisen MD: Nothing to Disclose
Laura Soledad Muscillo MD: Nothing to Disclose
Maria Emilia Diaz: Nothing to Disclose
Florencia Pia Sojo: Nothing to Disclose
Eduardo Pablo Eyheremendy MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: 1- Describe the clinical and imaging characteristics of tumors phylloides, emphasizing those that allow differentiation of fibroadenoma, the main differential diagnosis. 2- Correlate these findings with histopathological diagnosis. The major teaching points of this exhibit are: 1 - Solid nodules with benign clinical features, which usually appear in women aged 40-50 years, with rapid growth. 2 - On mammograms, appear as a well-defined lesion, round, oval or lobulated, circumscribed and with soft tissue density. 3 - Ultrasonography may be heterogeneous with anechoic areas inside. 4 - They can show positive doppler flow in color doppler study.

**TABLE OF CONTENTS/OUTLINE**

The phylloides tumors represent a heterogeneous group of biphasic neoplasms composed of stromal and epithelial components, which may be benign, borderline or malignant. They are unusual tumors constituting from 0.3 to 0.9% of all mammary tumors. The average age of onset is around 40-50 years old. There are ultrasound signs that force us to think about this entity, both in 2D and color doppler study, which correlate with histopathological findings. Definitive diagnosis is histopathological, and full resection with free margins is the main treatment of these lesions.

**CAE002-b**

**F-18 FDG PET/CT and MRI In the Diagnosis and Management of Cardiac Sarcoidosis**

*Education Exhibits*

*Location: CA Community, Learning Center*

**Participants**

Richard Anthony R. Coulden MD (Presenter): Nothing to Disclose
Emer Sonnex: Nothing to Disclose
Hefin Jones FRCP: Nothing to Disclose
Indrajit Das MBBS, MRCP: Nothing to Disclose
Jonathan Thomas Abele MD: Nothing to Disclose

**TEACHING POINTS**

In patients with established non-cardiac sarcoidosis, both FDG PET/CT and cardiac MRI can be used to diagnose cardiac involvement. We will learn how and why: 1. FDG PET/CT identifies active disease and can be used in both diagnosis and management. Serial PET allows assessment of response to immunosuppressive treatment. 2. Cardiac MRI identifies myocardial
edema and scar. It has proven value in diagnosis but its role in monitoring disease in response to treatment is unclear. 3. Cardiac MRI provides additional value in assessment of ventricular volumes and function and maybe a helpful surrogate in monitoring treatment response. 4. FDG PET/CT and MRI are complementary techniques.

**TABLE OF CONTENTS/OUTLINE**

**CAE004-b**

**Dynamic Myocardial Perfusion Imaging by 3rd Generation Dual-Source CT**

*Education Exhibits*
*Location: CA Community, Learning Center*

**Participants**
- Marisa Marjolein Lubbers MD (Presenter): Nothing to Disclose
- Adriaan Coenen MD: Nothing to Disclose
- Akira Kurata: Nothing to Disclose
- Marcel L. Dijkshoorn RT: Consultant, Siemens AG
- Koen Nieman MD, PhD: Speakers Bureau, Siemens AG Speakers Bureau, Toshiba Corporation Research Grant, Bayer AG Research Grant, General Electric Company Research Grant, Bayer AG Research Grant, Siemens AG Speakers Bureau Siemens AG

**TEACHING POINTS**
After attending this educational presentation the participant should: 1. Have an understanding of the physiological background of dynamic myocardial perfusion CT and the quantification of absolute myocardial blood flow. 2. Be able to perform a myocardial CT perfusion scan, including patient preparation, scan protocol and adenosine stress infusion protocol and post-processing. 3. Be able to analyze and evaluate myocardial perfusion images and calculate the absolute myocardial bloodflow.

**TABLE OF CONTENTS/OUTLINE**

**CAE005-b**


*Education Exhibits*
*Location: CA Community, Learning Center*

**Participants**
- Rachel Charis Brook MBBS, MA: Nothing to Disclose
- Ausami Abbas MBBS (Presenter): Nothing to Disclose
- Cheryl Main MBBS: Nothing to Disclose
- Charles Robert Peebles MBBS: Nothing to Disclose
- Stephen Harden MRCS, FRCR: Nothing to Disclose
- James Stuart Shambrook MBBS: Nothing to Disclose

**TEACHING POINTS**
The aim of this education exhibit is to provide the reader with a comprehensive understanding of: 1. The major historical variations in surgical techniques and post-surgical anatomy seen on MRI and CT in patients with a Fontan circulation 2. How and why standard CTPA techniques must be adapted to appropriately image patients with a Fontan circulation 3. The potential complications associated with Fontan circulation and imaging findings.

**TABLE OF CONTENTS/OUTLINE**

**CAE006-b**

**The Role Of CT and MRI In The Diagnosis and Evaluation Of Cardiac Shunts**

*Education Exhibits*
*Location: CA Community, Learning Center*

**Participants**
- Ausami Abbas MBBS (Presenter): Nothing to Disclose
- Rachel Charis Brook MBBS, MA: Nothing to Disclose
- Cheryl Main MBBS: Nothing to Disclose
- James Stuart Shambrook MBBS: Nothing to Disclose
- Charles Robert Peebles MBBS: Nothing to Disclose
- Stephen Harden MRCS, FRCR: Nothing to Disclose

**TEACHING POINTS**
The aim of this presentation is to educate the reader on: 1. The role of cardiac MRI (CMR) and CT in the diagnosis and differentiation of intra- and extra-cardiac shunts. 2. To illustrate how CMR can evaluate the functional significance of cardiac shunts. 3. To demonstrate the major complications associated with cardiac shunts.

**TABLE OF CONTENTS/OUTLINE**

1. Demonstrate the key CMR and CT features of the common intra-cardiac shunts including: - Ostium premium, ostium secundum and sinus venosus (superior and inferior) types of atrial septal defect - Ventricular Septal Defects - Atrioventricular septal defects - Coronary sinus defects
2. Demonstrate the CMR and CT features of the common extra-cardiac shunts including: - Patent ductus arteriosus - Partial anomalous pulmonary venous drainage - Scimitar syndrome - Pulmonary arteriovenous malformations - Coronary artery fistulae
3. Demonstrate the common pattern of cardiac chamber enlargement associated with the different types of cardiac shunts.
4. Demonstrate how phase contrast MRI sequences can be used to quantify the functional significance of both intra and extra-cardiac shunts. 5. The major complications that can occur secondary to cardiac shunts including: - Paradoxical embolic events - Pulmonary Hypertension - Eisenmenger's syndrome

**CAE008-b**

**Clinical CT Cardiac Structural Anatomy Reconstructed within the Cardiac Contour: Cardiac Skeleton and Inferior Pyramidal Space**

**Education Exhibits**

**Location:** CA Community, Learning Center

**Participants**

Shumpei Mori (Presenter): Nothing to Disclose
Tomofumi Takaya: Nothing to Disclose
Tatsuya Nishii MD: Nothing to Disclose
Atsushi K. Kono MD, PhD: Nothing to Disclose
Tatsuro Ito MD: Nothing to Disclose
Sachiko Takamine: Nothing to Disclose
Sei Fujiwara: Nothing to Disclose
Kazuro Sugimura MD, PhD: Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAIICHI SANKYO Group
Ken-Ichi Hirata: Nothing to Disclose

**TEACHING POINTS**

Profound anatomical knowledge about the three-dimensional orientation of cardiac skeleton, including interatrial septum (IAS), interventricular septum (IVS), and each valvular annulus is important to perform safe interventions. The inferior pyramidal space is the extracardiac fibro-adipose tissue extending between the atrial and ventricular musculatures. Many important structures are concentrated around or inside the inferior pyramidal space. The aims of the presentation are: 1. To demonstrate a series of clinical structural images of the IAS, IVS, each valvular annulus, and inferior pyramidal space reconstructed in combination with the cardiac contour using multidetector computed tomography; and 2. To discuss the clinical implications of findings based on accumulated insights made by pioneers.

**TABLE OF CONTENTS/OUTLINE**


**CAE009-b**

**Clinical CT Cardiac Structural Anatomy Reconstructed within the Cardiac Contour: Ventricular Outflow Tract**

**Education Exhibits**

**Location:** CA Community, Learning Center

**Participants**

Shumpei Mori (Presenter): Nothing to Disclose
Tomofumi Takaya: Nothing to Disclose
Tatsuya Nishii MD: Nothing to Disclose
Atsushi K. Kono MD, PhD: Nothing to Disclose
Tatsuro Ito MD: Nothing to Disclose
Sachiko Takamine: Nothing to Disclose
Sei Fujiwara: Nothing to Disclose
Kazuro Sugimura MD, PhD: Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAIICHI SANKYO Group
Ken-Ichi Hirata: Nothing to Disclose

**TEACHING POINTS**

The right and left ventricular outflow tracts are common sites of idiopathic ventricular arrhythmia. Although three-dimensional (3D) anatomical accuracy to recognize the exact site of the catheter position is integral, the fluoroscopic definition of the anatomy around outflow tract is variable and 3D anatomical recognition within the cardiac contour seems difficult because of the morphological complexity. The aims of this presentation are: 1. To visualize the clinical structural image of the outflow tract in combination with the cardiac contour using multidetector computed tomography; and 2. To discuss the clinical implications of findings based on insights made by pioneers.

**TABLE OF CONTENTS/OUTLINE**

Intervalvular Fibrosa (MAIVF).

Education Exhibits

Location: CA Community, Learning Center

Participants

Francisco García-Morales MD (Presenter): Nothing to Disclose
Pramod Kumar Gupta MD: Nothing to Disclose
Samir Kulkarni MD: Nothing to Disclose

TEACHING POINTS

Pseudoaneurysm in the region of space spanning between the mitral valve and aortic valve, the mitral aortic intervalvular fibrosa (MAIVF) is a rare complication and its radiographic recognition is important to guide patient’s management. The purpose of this exhibit is: To illustrate the anatomy of the mitral-aortic intervalvular fibrosa (MAIVF) particularly with MDCT and MRI and the correlation with transeophageal and transthoracic echocardiography. To review the pathophysiology and causative factors in the formation of pseudoaneurysms of MAIVF. To recognize the imaging features of the pseudoaneurysms of the MAIVF and be able to recognize potentially lethal complications including compression of the coronary arteries, tamponade and fistulous tracts.

TABLE OF CONTENTS/OUTLINE

1. MDCT and MRI anatomy of the MAIVF
2. Pathophysiology and causative factors in the formation of Pseudoaneurysms of MAIVF, including endocarditis, post cardiac valve surgery, trauma.
3. Illustrated examples with
   a) MDCT, gated acquisitions, multiplanar reconstructions including cardiac planes.
   b) Cardiac MRI with contrast
   c) Supplementation with TTE and TEE images.
4. Mimics and pitfalls
5. Role of Imaging findings that support conservative imaging surveillance or surgical intervention.

CAE012-b

Mimickers of Cardiac Tumors: How to Recognize the Pretender

Education Exhibits

Location: CA Community, Learning Center

Selected for RadioGraphics

Participants

Luba Frank MD (Presenter): Nothing to Disclose
Jadranka Stojanovska MD, MS: Nothing to Disclose
Dharshan Raj Vummidi MRCP, FRCR: Nothing to Disclose
Gisela Christa Mueller MD: Nothing to Disclose

TEACHING POINTS

1. To present common and uncommon conditions mimicking cardiac tumors. 2. To address diagnostic challenges based on case by case presentation. 3. To discuss imaging features of mimickers and cardiac tumors to avoid pitfalls.

TABLE OF CONTENTS/OUTLINE

1. Introduction: Diagnostic challenges in imaging of cardiac tumors (MR, CT, echocardiography, and conventional angiography).
2. MR imaging of cardiac tumors: How we do it.
4. Road to correct diagnosis: How to avoid pitfalls.

CAE100

Coronary Artery Anomalies: What Do They Look Like on CCTA?

Education Exhibits

Location: CA Community, Learning Center

Participants

Gilat Grunau MD, PhD (Presenter): Nothing to Disclose
Philipp Blanke MD: Nothing to Disclose
Rekha Raju: Nothing to Disclose
Bruce Precious MD: Nothing to Disclose
Cameron John Hague MD: Nothing to Disclose
Jennifer Deryn Ellis MD: Nothing to Disclose
Jonathon Avrom Leipsic MD: Speakers Bureau, General Electric Company Speakers Bureau, Edwards Lifesciences Corporation Consultant, Heartflow, Inc Consultant, Circle Cardiovascular Imaging Inc

TEACHING POINTS

Congenital coronary arteries anomalies are a rare and very diverse group of disorders, with variable manifestation and outcomes. The use of CCTA allows accurate depiction of these anomalies. The purpose of this exhibit is: 1. To review the normal coronary anatomy. 2. Describe incidence and anatomy of coronary anomalies such as: a. Anomalous origin of coronary arteries including: Anomalous origin of the coronary artery from the pulmonary artery, single coronary artery and multiple ostia b. Anomalies of coronary artery course c. Anomalies of coronary artery termination. 3. To discuss the clinical presentation,
treatment and prognosis of such anomalies. To discuss the role of stress testing (SPECT and stress CMR) in evaluating ischemia and guiding management.

TABLE OF CONTENTS/OUTLINE
1. Review of normal coronary anatomy 2. Illustration of coronary artery anomalies using sample cases with CCTA images. Clinical presentation of various anomalies and diagnostic workup, including the role of stress testing 4. Prognosis and management of these anomalies, including discussion on the role of ancillary testing such as SPECT and stress CMR.

CAE101
CT-based Fractional Flow Reserve (CT-FFR) — Review of Basic Theory and How to Do

Education Exhibits
Location: CA Community, Learning Center

Participants
Jihoon Kweon PhD (Presenter): Nothing to Disclose
Dong Hyun Yang MD : Nothing to Disclose
Young-Hak Kim : Nothing to Disclose
Joon-Won Kang MD : Nothing to Disclose
Tae-Hwan Lim MD, PhD : Nothing to Disclose
Namkug Kim PhD : Stockholder, Coreline Soft, Inc

TEACHING POINTS
1. We will review a basic theory of CT-FFR focused on three dimensional modeling of coronary three and computational fluid dynamics. 2. We will provide various cases of CT-FFR with correlation with CT angiography, invasive angiography, and FFR.

TABLE OF CONTENTS/OUTLINE

CAE102
CT-based Myocardial Ischemia Evaluation: Quantitative Angiography, Myocardial Perfusion, and CT-FFR

Education Exhibits
Location: CA Community, Learning Center

Participants
Hyun Jung Koo MD (Presenter): Nothing to Disclose
Dong Hyun Yang MD : Nothing to Disclose
Joon-Won Kang MD : Nothing to Disclose
Tae-Hwan Lim MD, PhD : Nothing to Disclose

TEACHING POINTS
- Non-invasive prediction of myocardial ischemia has been important issue to determine whether revascularization therapy performs or not in patient with stable coronary artery disease. - Quantitative coronary CT angiography, myocardial CT perfusion, and CT-based fractional flow reserve (FFR) are emerging methods for evaluation of myocardial ischemia. - In this exhibition, we will present current status, analysis methods, and pitfalls of each technique

TABLE OF CONTENTS/OUTLINE

CAE103
Dilated Coronary Arteries: Review of Multimodality Imaging and Management

Education Exhibits
Location: CA Community, Learning Center

Participants
Varaha Tammisetty MD (Presenter): Nothing to Disclose
Daniel Ocazionez MD : Nothing to Disclose
Girish S. Shroff MD : Nothing to Disclose
Rajeev Fernando MD : Nothing to Disclose
Catalin Loghin MD : Nothing to Disclose
TEACHING POINTS

1. To review the definition, etiology and pathophysiology of coronary artery dilation, aneurysm, ectasia.
2. To illustrate multimodality imaging including anatomic appearance on Coronary CTA, Coronary Catheter angiogram and functional imaging to assess perfusion and coronary flow reserve prior to management.
3. To discuss complications and individualized approach to management.

TABLE OF CONTENTS/OUTLINE

1. Definition of coronary artery dilation/aneurysm
2. Etiology and pathophysiology
3. Typical Imaging appearances on multiple modalities including anatomic appearance on Coronary CTA, Coronary Catheter angiogram and role of functional imaging to assess perfusion and coronary flow reserve prior to management.
4. Cases per etiology including Atherosclerosis, Congenital, Inflammatory disorders including Kawasaki disease, Takayasu's arteritis, Connective tissue disorders, Infectious, drug-related, traumatic and iatrogenic.
5. Complications
6. Individualized approach to management.

CAE106

MRI in Myocardial Infarction: Ischemia-reperfusion Injury — Imaging Endpoints with Prognostic Value

Education Exhibits
Location: CA Community, Learning Center

Participants
Marta Rodriguez Alvarez (Presenter): Nothing to Disclose
M Carmen Saborido MD: Nothing to Disclose
Beatriz Baltar Nieto MD: Nothing to Disclose
Pablo Pazos: Nothing to Disclose
Amadeo Arango MD: Nothing to Disclose
Ana Maria Alfonso: Nothing to Disclose

TEACHING POINTS

We describe and review CMRI features in myocardial infarction. Evaluate CMRI endpoints with clinical and prognostic implication, focusing on ischemia-reperfusion injury.

TABLE OF CONTENTS/OUTLINE

We review MRI findings of myocardial infarction, specially focusing on patients with AMI and reperfusion therapy. We evaluate area at risk, infarct size, salvaged myocardium and reperfusion injury and assess cardiac function and volumes. T2* CMR detected hemorrhage. Infarct size and myocardial salvage are surrogate endpoints for mortality in the setting of myocardial infarction. Regions of no enhancement or maintained perfusion defects were areas of no-reflow, MO/hemorrhage. First-pass and early gadolinium enhancement techniques are more sensitive than LGE. We detected MO in patients with transmural infarcts or an affection of at least 75% of wall thickness. MRI is the best imaging technique to detect the presence of hemorrhage. Infarct size, transmural infarction and persistent MO are strong predictors of adverse post-infarct remodeling over other clinical parameters. MRI is especially adequate to study and follow up myocardial infarcts and its potential complications.

CAE109

4D Flow MRI — Spring into the Future of Congenital Heart Imaging

Education Exhibits
Location: CA Community, Learning Center

Participants
Raluca Gabriela Saru MD (Presenter): Nothing to Disclose
Koen Nieman MD, PhD: Speakers Bureau, Siemens AG Speakers Bureau, Toshiba Corporation Research Grant, Bayer AG Research Grant, General Electric Company Research Grant, General Electric Company Research Grant, Bayer AG Research Grant, Siemens AG Speakers Bureau Siemens AG
Gabriel P. Krestin MD, PhD: Consultant, General Electric Company Research Grant, General Electric Company Research Grant, Bayer AG Research Grant, Siemens AG Speakers Bureau Siemens AG
Mohamed Ouhlous MD, PhD: Nothing to Disclose
Shreyas Shreenivas Vasanawala MD, PhD: Research collaboration, General Electric Company Stockholder, Morpheus Imaging, Inc
Albert Hsiao MD, PhD: Founder, Morpheus Imaging, Inc Consultant, Morpheus Imaging, Inc

TEACHING POINTS

• Become familiar with 4D Flow - how is it performed, what equipment is required, and what are the advantages and disadvantages; • Diagnostic pitfalls. • Example uses in congenital heart disease.

TABLE OF CONTENTS/OUTLINE

1. What is four dimensional 4D Flow? 2. When is it suitable to perform 4D Flow? 3. Acquisition protocols. 4. How should we approach 4D images - Processing and quantification. 5. Pitfalls and challenging situations. 6. Case examples - clinical cases scanned with 4D Flow (normal heart and different congenital heart pathologies).

CAE110

Advanced Cardiac Magnetic Resonance Imaging and Treatment Techniques for Right Ventricular Outflow Tract Reconstruction

Education Exhibits
Location: CA Community, Learning Center

Participants
Shobhit Madan MD, MPH (Presenter): Nothing to Disclose
Arush Kalra MBBS, MS: Nothing to Disclose
Sameh Tadros MD, MSc: Nothing to Disclose
TEACHING POINTS
A 70° curvature is observed in post-Right Ventricular Outflow Tract Reconstruction (RVOTR) patients leading to a malfunctional tri-leaflet biologic homograft. We demonstrate a novel polytetrafluoroethylene (PTFE) bi-valve conduit for optimal performance in a 70° post RVOTR curvature setting. PTFE is a bio-inert material superior to conventional biologic options with minimal risk of calcium deposition, thrombosis, and immune based rejection.

TABLE OF CONTENTS/OUTLINE

**Pathophysiology**
Congenital pulmonary artery (PA) stenosis occurs either in isolation or associated with other congenital heart diseases such as Tetralogy of Fallot, Truncus Arterios, pulmonary atresia and Transposition of Great Vessels

**Advanced Cardiac MRI**
Advanced cardiovascular magnetic resonance imaging (cMRI) and magnetic resonance angiography (MRA) techniques with 3-dimensional and 4-dimensional image reconstructions can precisely quantify blood flow, velocity, valvular insufficiency and cardiac function required for timely patient management

**Advanced Treatment**
We discuss advanced treatment strategies of RVOTR and clinical advantages of PTFE bi-valved conduit compared to tri-leaflet homograft

**Future directions**
Prospective cMRI study in patients undergoing RVOTR at our institution will establish future treatment standards

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**CAE111**

All About DORV: Double Outlet of Right Ventricle Imaging on MSCT— Spectrum of Appearances with Special Emphasis on Usefulness of 3 D Volume Rendered Imaging

**Education Exhibits**
Location: CA Community, Learning Center

**Participants**
Yashpal Rana MD (Presenter): Nothing to Disclose
MEGHA SHETH: Nothing to Disclose
Dinesh Patel MD, DMRE: Nothing to Disclose
S. Patel: Nothing to Disclose
Rajendra Naginbhai Solanki MD: Nothing to Disclose
Brijesh Kaushikshamnagar Gajjar MD: Nothing to Disclose
Ruchit Bhupendrrakumar Patel MBBS: Nothing to Disclose

**TEACHING POINTS**
1. Understanding spectrum of DORV and associated types of ventricular septal defect (VSD)
2. MSCT appearances of DORV spectrum with special emphasis of usefulness of 3 D Volume Rendered Imaging in pre surgical evaluation

**TABLE OF CONTENTS/OUTLINE**

1. Review of bicuspid aortic valve (BAV): Anatomy of leaflet fusion
2. Epidemiology
3. Associated abnormalities and associated syndromes Imaging features
4. Ascending aortic aneurysm
5. Current theories of aneurysm pathogenesis in the setting of BAV
6. Imaging features Management and surveillance in patients with BAV
7. Aortic coarctation
8. Anatomy and pathogenesis in the setting of BAV
9. Epidemiology Imaging features Management and surveillance in patients with BAV
10. Hypoplastic left heart syndrome
11. Shone’s complex
12. Turner syndrome
13. Williams syndrome
14. VSD and ASD

**CAE113**

Bicuspid Aortopathy: Beyond the Aortic Valve

**Education Exhibits**
Location: CA Community, Learning Center

**Participants**
Tami J. Bang MD (Presenter): Nothing to Disclose
Jonathan Allen Phelan DO: Nothing to Disclose
Daniel Ocazionez MD: Nothing to Disclose
Carlos S. Restrepo MD: Nothing to Disclose
Daniel Vargas MD: Nothing to Disclose

**TEACHING POINTS**
1. Revisit the natural history of bicuspid aortic valve (BAV)
2. Familiarize the radiologist with the phenotypic spectrum of aortopathy and other anomalies associated with BAV
3. Discuss the role of imaging in the evaluation and management of these anomalies.

**TABLE OF CONTENTS/OUTLINE**

1. Review of bicuspid aortic valve (BAV): Anatomy of leaflet fusion
2. Epidemiology Associated abnormalities and associated syndromes Imaging features
3. Ascending aortic aneurysm Current theories of aneurysm pathogenesis in the setting of BAV
4. Imaging features Management and surveillance in patients with BAV
5. Aortic coarctation
6. Anatomy and pathogenesis in the setting of BAV
7. Epidemiology Imaging features Management and surveillance in patients with BAV
8. Hypoplastic left heart syndrome
9. Shone’s complex
10. Turner syndrome
11. Williams syndrome
12. VSD and ASD

**CAE114**

Cardiovascular Magnetic Resonance Evaluation of Ventricular Strain in Pediatric and Congenital Heart Disease

**Education Exhibits**
Location: CA Community, Learning Center
Participants

Jimmy C. Lu MD (Presenter): Nothing to Disclose
Adam L. Dorfman MD : Nothing to Disclose
Maryam Ghandi Mahani MD : Nothing to Disclose
Prachi P. Agarwal MD : Nothing to Disclose

TEACHING POINTS

1. To illustrate how strain, a measure of myocardial deformation, can quantify regional and global ventricular dysfunction and dyssynchrony.
2. To describe methods of strain measurement on cardiac magnetic resonance imaging.
3. To understand the literature on decreased strain as an early indicator of clinical outcomes in multiple cohorts of pediatric and congenital heart disease.

TABLE OF CONTENTS/OUTLINE


CAE115

Eisenmenger’s Syndrome: A Review of the Imaging Features of Underlying Congenital Heart Disease and Pulmonary Hypertension

Education Exhibits

Location: CA Community, Learning Center

Participants

Dheeraj Giri MBBS (Presenter): Nothing to Disclose
Sumit Gupta PhD, FRCR : Nothing to Disclose
Prajakta Abhay Pinglay MRCP, FRCR : Nothing to Disclose
Aparna Deshpande MBBS : Nothing to Disclose

TEACHING POINTS

1. Eisenmenger's syndrome occurs due to irreversible chronic pulmonary hypertension which results in right to left shunt flow across a non-restrictive septal defect. 2. Septal defects may be associated with different congenital cardiac conditions. 3. Cardiac MRI is a crucial imaging tool in addition to echocardiogram and invasive angiogram. 4. Cardiac MRI is used to assess shunt fraction as well as biventricular function and volumes. 5. Parenchymal lung changes related to pulmonary hypertension and anatomy of congenital heart disease can be well demonstrated on CT.

TABLE OF CONTENTS/OUTLINE

1. An introduction to Eisenmenger's syndrome and the associated congenital cardiac conditions. 2. A brief description of the investigations and management options. 3. An overview of the different imaging modalities used to investigate Eisenmenger's syndrome with a focus on cardiac MRI and CT. 4. Demonstration of MR and CT imaging findings in the underlying congenital conditions including Criss-Cross heart. 5. Illustration of parenchymal CT chest findings in patients with pulmonary hypertension.

CAE116

"Exploring Beyond the Expected Four:" Role of Multislice-CT in Imaging of Tetralogy of Fallot.

Education Exhibits

Location: CA Community, Learning Center

Certificate of Merit

Participants

Vijay Krishnan MD (Presenter): Nothing to Disclose
Thirumurthi Krishnaswamy MBBS : Nothing to Disclose
Dinesh Dattatraya Chinchure FRCR : Nothing to Disclose
Thankewari Thirumurthi MBBS : Nothing to Disclose
Kabilan Chokkappan MBBS, MD : Nothing to Disclose
Manickam Subramanian MD,FRCR : Nothing to Disclose

TEACHING POINTS

In addition to the four basic components of tetralogy of Fallot (TOF), multislice computed tomography (CT) can be used to assess other cardiac findings and associated anomalies in patients with TOF that are beyond the reach of echocardiogram (ECHO). The purpose of this poster is, - To illustrate various findings and associated cardiac anomalies with multislice CT imaging in patients with TOF. - To describe the role of multislice CT in pre and post operative assessment of patients with TOF.

TABLE OF CONTENTS/OUTLINE

CAE117
Heterotaxy Syndrome: Evaluation on Multidetector CT (MDCT) Angiography — A Comprehensive Review of Associated Anomalies Radiologist Must Know

Education Exhibits
Location: CA Community, Learning Center

Participants
Amit Kumar Verma MBBS, MD (Presenter): Nothing to Disclose
Sonali Sethi MBBS, MD: Nothing to Disclose
Richa Yadav MBBS, DMRD: Nothing to Disclose
Satbir Singh MBBS, MD: Nothing to Disclose
Ashok Kumar Sharma MD: Nothing to Disclose
Poonam Narang MBBS, MD: Nothing to Disclose

TEACHING POINTS
• Heterotaxy syndrome is a complex conglomeration of cardiac and extra-cardiac anomalies. • It comprises of situs ambiguous with right or left isomerism. • Knowledge of complex cardiac anomalies along with associated vascular and non-vascular thoracic and extra-thoracic anomalies is crucial for radiology reporting in surgeon’s interest. • Multidetector CT angiography with radiation dose optimization can confidently define most of the cardiac and extra-cardiac anomalies.

TABLE OF CONTENTS/OUTLINE
• Embryological development of heart. • Definition of terms associated with situs anomalies • What does heterotaxy stand for? • Role of CTA in imaging of heterotaxy syndrome; protocol and techniques for dose optimization • Role of MDCT angiography vis a vis MRI • Spectrum of anomalies associated in heterotaxy syndrome: o Cardiac o Extra-cardiac thoracic (Vascular / Non vascular) o Extra-thoracic • CTA report of complex cardiac anomaly: what a surgeon is looking for?

CAE118
Imaging Cardiovascular Manifestations of Genetic Syndromes: A Pictorial Review

Education Exhibits
Location: CA Community, Learning Center

Participants
Vasant Garg MD: Nothing to Disclose
Ravi Ashwath MD: Nothing to Disclose
Prabhakar Rajiah MD, FRCR (Presenter): Institutional Research Grant, Koninklijke Philips NV

TEACHING POINTS
1. To discuss the cardiovascular manifestations of genetic syndromes and malformations. 2. To understand the role of CT and MRI in the evaluation of these abnormalities. 3. To recognize the clinical implications of the cardiovascular abnormalities.

TABLE OF CONTENTS/OUTLINE
- Genetics of syndromes affecting cardiovascular system - Cardiovascular manifestations of these syndromes - Role of MRI and CT in the evaluation of cardiovascular complications of malformations and syndromes. -Description of the features, imaging findings and management of the following syndromes along with illustrations: Downs Marfan Ehler-Danlos Loeys-Dietz Williams-Beuren Noonan Turner DiGeorge Osler Rendu Weber Holt Ellis Van Creveld Kearns Sayre Alagille Von Recklinghausen Cogan

CAE119
MDCT Angiography for Evaluation of Imaging Spectrum of Anomalous Pulmonary Venous Connection (APVC) on 256 Slice Dual-source Scanner: Imaging Revisited

Education Exhibits
Location: CA Community, Learning Center

Participants
Sonali Sethi MBBS, MD (Presenter): Nothing to Disclose
Sunil Kumar Puri MD: Nothing to Disclose
Amit Kumar Verma MBBS, MD: Nothing to Disclose
Pallavi Aga MBBS, MD: Nothing to Disclose
Richa Yadav MBBS, DMRD: Nothing to Disclose
Poonam Narang MBBS, MD: Nothing to Disclose

TEACHING POINTS
1. Anomalous pulmonary venous connections are rare anomalies of pulmonary venous drainage which includes partial and total anomalous pulmonary venous connection. 2. If the common pulmonary vein fails to connect to the splanchnic plexus and / or a splanchnic plexus communication with a cardinal or umbilicovitelline vein persists, some type of TAPVC or PAPVC will occur. 3. Clinical presentation varies from asymptomatic to incompatibility with life. 4. Proper knowledge about anomalies, imaging technique and what a surgeon needs from a radiologist can improve the outcome.

TABLE OF CONTENTS/OUTLINE
1. Anomalous pulmonary venous connections are rare anomalies of pulmonary venous drainage which includes partial and total anomalous pulmonary venous connection. 2. If the common pulmonary vein fails to connect to the splanchnic plexus and / or a splanchnic plexus communication with a cardinal or umbilicovitelline vein persists, some type of TAPVC or PAPVC will occur. 3. Clinical presentation varies from asymptomatic to incompatibility with life. 4. Proper knowledge about anomalies, imaging technique and what a surgeon needs from a radiologist can improve the outcome.

CAE120
PE or not PE: Challenges in Assessment of Thrombi and Pulmonary Embolism (PE) in Patients with Fontan Procedure

Participants
Soudabeh Fazeli Dehkordy: Nothing to Disclose
Maryam Ghadimi Mahani MD (Presenter): Nothing to Disclose
Prachi P. Agarwal MD: Nothing to Disclose
Cynthia Karfias Rigsby MD: Nothing to Disclose
Robyn Wright BA, ARRT: Nothing to Disclose
Jimmy C. Lu MD: Nothing to Disclose
Adam L. Dorfman MD: Nothing to Disclose
Rajesh Krishnamurthy MD: Research support, Koninklijke Philips NV Travel support, Koninklijke Philips NV

TEACHING POINTS
1. To describe Fontan pathway and inherent challenges in optimal pulmonary arterial opacification on CT 2. To illustrate common pitfalls in the diagnosis of pulmonary embolism and Fontan pathway thrombosis 3. To describe CT protocols aimed at providing optimal scan quality

TABLE OF CONTENTS/OUTLINE
1. Introduction 2. Staged surgical approach to Fontan procedure 3. Etiology of pulmonary arterial embolism and thrombosis in patients with Fontan palliation 4. Challenges in optimizing pulmonary arterial enhancement in these patients, (e.g. unopacified blood, timing) 5. Illustrate with case examples common pitfalls in the diagnosis of thrombi and pulmonary arterial emboli 6. Suggested techniques for obtaining optimal scans for evaluation of thrombi along the Fontan pathway and for pulmonary embolism detection. 7. Conclusion

Comprehensive Analysis of Benign Cardiac Masses: Pathology, Imaging Appearance Spectrum on MRI with CT Correlation and Differential Diagnoses

Participants
Benjamin David Lack MD (Presenter): Nothing to Disclose
Giorgios Constantine Bis: Nothing to Disclose
Kostaki G. Bis MD: Nothing to Disclose
Michael Gallagher MD: Nothing to Disclose
Francis Shannon: Nothing to Disclose
Thomas-Evangelos G. Vrachliotis MD, PhD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. Explain how to distinguish benign cardiac neoplasms from 'pseudo masses' and malignant cardiac neoplasms. 2. Review the spectrum of imaging characteristics of benign cardiac neoplasms on CT and MRI. 3. Discuss key imaging characteristics, pathologic features, lesion location, and epidemiological factors to arrive at an appropriate differential diagnosis. 'pseudo mass'- non neoplastic lesions, normal anatomy, or normal variant anatomy which may be confused for cardiac neoplasms.

TABLE OF CONTENTS/OUTLINE
I. Epidemiology of benign cardiac masses II. Common normal anatomy, variant anatomy, and artifacts which may be confused for a cardiac masses (CT/MRI artifacts, papillary muscles, pectinate muscles, Q-tip ridge, crista terminalis) III. Lesions which may mimic cardiac neoplasms (thrombus, lipomatous hypertrophy of the interatrial septum, loculated pericardial collections, pericardial cysts, aneurysms and pseudoaneurysms) IV. Distinguishing benign from malignant cardiac neoplasms V. CT and MRI imaging of benign cardiac neoplasms (myxoma, lipoma, cardiac fibroma, papillary fibroelastoma, rhabdomyoma, paraganglioma, hemangioma, struma cordis, teratoma)

Comprehensive Clinical and Imaging Analysis in Pulmonary Artery Sarcoma

Participants
Xin Pu (Presenter): Nothing to Disclose
Xiaoyong Huang: Nothing to Disclose
Biao Lu MD: Nothing to Disclose
Zhanming Fan: Nothing to Disclose

PURPOSE
To summarize the clinical and imaging characteristics of pulmonary artery sarcoma (PAS).

METHOD AND MATERIALS
Nine patients with PAS were enrolled during November 2001 to November 2012 in our hospital. The patients' data of clinical manifestation, lab test and imaging findings were analyzed retrospectively. All patients were confirmed by surgical biopsy.

RESULTS
The median age of PAS patients was 43 years old (32~67y). The clinical symptoms were unspecific, including chest distress, chest pain or syncope. The D-Dimer was normal in seven patients. LDH was elevated in six patients. Seven patients were misdiagnosed as a pulmonary embolism, and were treated with failed thrombolytic therapy. Nine patients underwent pulmonary CT angiography. Pulmonary cavity filling defects were detected in eight patients, and lobulated filling defects were bulged outward with sharp edges. One patient was found the filling defect growth along the vessel wall. The main pulmonary artery and bilateral pulmonary arteries all involved were found in six patients, and two of them were found the right pulmonary arteries occluded by the lesions. Only right pulmonary artery involved was found in one patient. Bilateral pulmonary arteries involved were in two patients. The lesions were contrast enhanced heterogeneously in all 9 patients. Metastases were detected in three patients.

CONCLUSION

PAS is a rare disease that can be presented in various clinical symptoms. Pulmonary CT angiography is an important modality to find PAS. In summary, a patient with a normal D-Dimer and ineffective anticoagulation therapy, even pre-diagnosed as pulmonary embolism, PAS should be suspected. Especially PAS should be heightened if the occupied lesion is a lobulated filling defect and obviously non-homogeneous enhanced in pulmonary CT angiography.

CLINICAL RELEVANCE/APPLICATION

Pulmonary CT Angiography is very important in the diagnose of pulmonary artery sarcoma, especially in the differential diagnosis of the PAS and Pulmonary embolism.

CAE127

MR Imaging Evaluation of Cardiac Sarcomas: Review of Our Experience

Education Exhibits

Location: CA Community, Learning Center

Participants
Rosa Maria Ruiz Peralbo MD (Presenter): Nothing to Disclose
Miguel Pastrana MD: Speakers bureau, Alexion Pharmaceuticals, Inc
Miguel Angel Caver MO: Nothing to Disclose
Marta Alfageme: Nothing to Disclose
Javier Segovia MD: Nothing to Disclose
Concepcion Gonzalez MD, PhD: Nothing to Disclose

TEACHING POINTS

1. Recognize cardiac MR as an important technique in the evaluation of cardiac sarcoma, very rare tumor with a poor prognosis that affects young patients, so requires knowledge of the radiological behavior of this lethal entity.
2. Identify cardiac MR as an advance in the study of this tumor, classically evaluated by echocardiography, for its excellent contrast resolution and multiplanar ability, allowing a functional and morphological analysis in the same study.

TABLE OF CONTENTS/OUTLINE

Sixty-three cardiac masses evaluated by cardiac MR were reviewed retrospectively since April 2006 until March 2014. Histopathological data were checked: six primary cardiac sarcomas were diagnosed. Results were contrasted with previous publications. Data were analyzed: pathologic subtypes (3 angiosarcomas, 1 myxofibrosarcoma, 1 rhabdomyosarcoma and 1 leiomyosarcoma); age; sex; oncological antecedents; metastasis; administered treatments; recurrences; median survival and relevant radiological imaging cardiac MR: localization, infiltration, morphologic features, signal intensity. Cardiac MR contributes to diagnosis of cardiac sarcomas helping to improve the characterization and local extension and is a very useful tool in planning a complex and controversial treatment and thus may prolong very poor survival of these patients.

CAE128

Secondary Cardiac Masses: What's New?

Education Exhibits

Location: CA Community, Learning Center

Participants
Beatriz Rodriguez Fisac (Presenter): Nothing to Disclose
Ana Belen Marin Quiles MD : Nothing to Disclose
Maria Mercedes Rodriguez : Nothing to Disclose
Diego Mauricio Angulo Henao MD : Nothing to Disclose
Sandra Liliana Barrero : Nothing to Disclose
Laura Vidal : Nothing to Disclose

TEACHING POINTS

1. To review the location of the secondary cardiac masses and its spreading routes. 2. To correlate the findings in different imaging techniques such as multidetector computed tomography (MDCT), magnetic resonance (MR) and 2- [fluorine18] fluoro-2-deoxy-D-glucose positron emission tomography / computed tomography (FDG PET/CT). 3. To emphasize the usefulness of FDG PET/CT in the diagnosis of intracavitary metastases and the assesment of extranodal lymphoma. 4. Summary

TABLE OF CONTENTS/OUTLINE

1. Pathophysiology of secondary cardiac masses - Cardiac metastases from both usual and unusual primary neoplasm - Spreading routes - Cardiac location of secondary masses 2. Imaging findings - MDCT - MR - FDG PET/CT 3. Indications 4. Summary

CAE130

Beyond Volumes and Function: Tissue Characterization in Non-ischemic Cardiomyopathies by Cardiac Magnetic Resonance Imaging
Participants
Celia Pamela Corona-Villalobos MD (Presenter): Nothing to Disclose
Linda Chi Hang Chu MD: Nothing to Disclose
Kristin Porter MD, PhD: Stockholder, Pfizer Inc
Yan Zhang MD, PhD: Nothing to Disclose
Neda Rastegar MD: Nothing to Disclose
Ihab R. Kamel MD, PhD: Nothing to Disclose
Stefan L. Zimmerman MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to describe, beyond volumes and function, emerging imaging techniques and their potential diagnostic and prognostic significance in non-ischemic cardiomyopathies by cardiac magnetic resonance (CMR) imaging.

TABLE OF CONTENTS/OUTLINE
1. Review the most common clinical presentation, and imaging findings in patients with non-ischemic cardiomyopathies including • Hypertrophic Cardiomyopathy (HCM) • Amyloidosis • Dilated cardiomyopathy • Arrhythmogenic right ventricular Cardiomyopathy (ARVD) • Myocarditis • Tako-tsubo Cardiomyopathy • Sarcoidosis • Iron overload Cardiomyopathy 2 Introduce novel MRI techniques for evaluation of non-ischemic cardiomyopathies including 4D flow phase contrast imaging, T1 mapping, T2 and T2* mapping and explain their potential significance in patient management. Outline Cardiac MR-imaging is commonly utilized in the diagnosis and prognosis of patients with non-ischemic cardiomyopathies. This exhibit provides a review of emerging imaging techniques and explains their potential utility in the clinical setting.

CAE131
Cardiac Complications of Treatment in Oncology Patients: An Imaging Review

Education Exhibits
Location: CA Community, Learning Center

Participants
Nandini Meyersohn MD (Presenter): Nothing to Disclose
Tomas Neilan MD: Nothing to Disclose
Sanjeev Francis MD: Nothing to Disclose
Brian Burns Ghoshhajra MD: Nothing to Disclose

TEACHING POINTS
1. Discuss the range of cardiac complications related to oncologic treatment including chemotherapeutic agents and radiotherapy. 2. Describe the imaging modalities used to identify cardiac complications of oncologic therapy including cardiac CT, cardiac MR, nuclear medicine studies, and cardiac ultrasound. 3. Identify characteristic imaging findings of complications of oncologic therapy on cardiac CT and cardiac MR.

TABLE OF CONTENTS/OUTLINE
1. Mechanism of cardiac complications from chemotherapeutic agents and radiotherapy 2. Epidemiology and prognosis of oncology patients with cardiac complications 3. Review of imaging findings a. Primary emphasis on cardiac CT and cardiac MR b. Correlation with findings on nuclear medicine studies and cardiac ultrasound 4. Multiple sample cases 5. Areas of current exploration and summary

CAE134
How to Diagnose Patients Who Present with Heart Failure without Coronary Artery Stenosis: Using Cardiac MRI — Minimum Essentials for Radiologists

Education Exhibits
Location: CA Community, Learning Center

Participants
Fumiko Kimura MD, PhD (Presenter): Stockholder, JMS Co, Ltd Research Grant, DAIICHI SANKYO Group Research Grant, Bayer AG Research Grant, Eisai Co, Ltd
Takamoto Nakajima MD: Nothing to Disclose
Masahiro Takahashi MD: Nothing to Disclose
Toshiko Hoshi MD: Nothing to Disclose
Shintaro Nakano MD: Nothing to Disclose
Shigetoshi Nishimura MD, PhD: Nothing to Disclose

TEACHING POINTS
Recently, cardiac magnetic resonance (CMR) is frequently performed for patients who present with heart failure without coronary artery disease because it is mandatory to identify the underlying etiology of the heart failure. The purpose of this exhibit is 1. To review CMR imaging and underlying pathophysiological findings in patients with heart failure and without coronary artery stenosis. 2. To learn how to identify etiology underlying heart failure using our decision charts with CMR. To learn characteristic CMR findings that should not be missed to reach diagnosis

TABLE OF CONTENTS/OUTLINE
1. Imaging techniques of T2-weighted images and late gadolinium enhancement (LGE) 2. Pitfalls of T2-weighted images and LGE 3. Review of imaging findings in primary and secondary cardiomyopathies, including dilated cardiomyopathy, hypertrophic...
cardiomyopathy, myocarditis, Takotsubo cardiomyopathy, hypertensive heart disease, Loeffer's endocarditis, cardiac sarcoidosis, amyloidosis, and drug-induced cardiomyopathy. 4. Decision tree using CMR findings 5. Differential diagnosis using LGE pattern

**CAE135**

**Hypertrophic Cardiomyopathy from A to Z: Genetics, Pathophysiology, Imaging and Management**

*Education Exhibits*

*Location: CA Community, Learning Center*

Selected for RadioGraphics

**Participants**

- Ameya Jagadish Baxi MBBS DMRD (Presenter): Nothing to Disclose
- Carlos S. Restrepo MD: Nothing to Disclose
- Michael James McCarthy MD: Nothing to Disclose
- Daniel Vargas MD: Nothing to Disclose
- Daniel Ocazionez MD: Nothing to Disclose
- Horacio Murillo MD PhD: Nothing to Disclose
- Rashmi S. Katre: Nothing to Disclose

**TEACHING POINTS**

1. To study patterns of myocardial involvement in hypertrophy cardiomyopathy (HCM) 2. To review genetics, pathophysiology and imaging findings in HCM

**TABLE OF CONTENTS/OUTLINE**

HCM is a genetic cardiac disease caused by dominant mutations in sarcomere genes with remarkable heterogeneity. It causes diffuse or segmental left ventricular hypertrophy with stiffened walls and abnormal valve function. Patients can be asymptomatic or develop symptoms such as chest pain, shortness of breath, fainting, palpitation and sudden death. Noninvasive imaging plays pivotal role in detecting HCM and understanding its pathophysiology. Echocardiography is the most widely used modality for initial evaluation. But is limited by poor window and interobserver variation. MDCT offers high-quality multiplanar reconstructions and be used in patients with pacemakers. Radiation exposure and use of iodinated contrast are its shortcomings. It cannot depict areas of fibrosis. MRI offers multiplanar imaging, gradient analysis and assess distribution of LV hypertrophy and gives unparalleled tissue characterization thus accurately depicting areas of fibrosis manifesting as delayed enhancement. It is the imaging modality of choice for patients considered for alcohol ablation. Radiologists should be familiar with the imaging appearances of HCM and understand clinical significance.

**CAE136**

**MR Imaging of Cardiac Sarcoidosis: Spectrum of Imaging Findings and Differential Diagnosis**

*Education Exhibits*

*Location: CA Community, Learning Center*

**Participants**

- Tomohiro Komada (Presenter): Nothing to Disclose
- Kojiro Suzuki MD: Nothing to Disclose
- Hisashi Kawai: Nothing to Disclose
- Shinji Naganawa MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is:

1. To review enhanced site in delayed contrast enhanced MR images of cardiac sarcoidosis
2. To learn the difference between cardiac sarcoidosis and other cardiac diseases, such as ischemic cardiac disease, hypertrophic cardiomyopathy and pulmonary hypertension in cardiac MR images

**TABLE OF CONTENTS/OUTLINE**

Pathophysiology of cardiac sarcoidosis Diagnostic criteria for cardiac sarcoidosis Review of delayed enhanced MR images of cardiac sarcoidosis of 8 patients The segment and layer of myocardial delayed enhancement were evaluated using 17-segment model of left ventricle. Sample cases The findings of cardiac MR images in other cardiac diseases, such as ischemic cardiac disease, hypertrophic cardiomyopathy and pulmonary hypertension

**CAE138**

**Post-mortem Imaging Findings in Deaths Due to Pericardial Tamponade Caused by Hemopericardium: How to use Post-mortem Imaging Evidence for the Assessment of a Critical Forensic Diagnosis**

*Education Exhibits*

*Location: CA Community, Learning Center*

**Participants**

- Laura Filograna MD (Presenter): Nothing to Disclose
- Lorenzo Bonomo MD: Nothing to Disclose
- Michael J. Thali MD: Nothing to Disclose

**TEACHING POINTS**

The purposes of this exhibit are: 1. To discuss the challenging forensic diagnosis of pericardial tamponade in presence of the autopsy evidence of hemopericardium. 2. To illustrate post-mortem imaging findings of pericardial tamponade due to
hemopericardium. To assess the possibility of using post-mortem imaging evidence for the assessment of the post-mortem diagnosis of pericardial tamponade due to hemopericardium.

**TABLE OF CONTENTS/OUTLINE**


**CAE139**

Takotsubo Cardiomyopathy: Assessment with Cardiac MRI and MDCT

*Education Exhibits*

*Location: CA Community, Learning Center*

*Certificate of Merit*

**Participants**

Yeonah Kang (Presenter): Nothing to Disclose  
Yeo Goon Kim MD: Nothing to Disclose  
Jeong A Kim MD: Nothing to Disclose  
Eun Ju Chun: Nothing to Disclose  
Sang Il Choi MD: Nothing to Disclose

**TEACHING POINTS**

1. Cardiac MRI and MDCT can provide useful informations in the evaluation of regional wall motion abnormalities, different patterns of LV ballooning, and right ventricular (RV) involvement. CMR is a unique tool for further evaluating and characterizing in patients with suspected Takotsubo cardiomyopathy.  
2. Cardiac MRI and MDCT may be useful to promptly distinguish Takotsubo cardiomyopathy from other acute cardiothoracic diseases including acute coronary syndrome.

**TABLE OF CONTENTS/OUTLINE**


**CAE140**

The Challenge of Non-compaction Ventricular Myocardium Diagnosis by MRI

*Education Exhibits*

*Location: CA Community, Learning Center*

**Participants**

Carolina Sander Reiser (Presenter): Nothing to Disclose  
Jose de Arimateia Batista Araujo Filho: Nothing to Disclose  
Antonio Fernando Lins de Paiva: Nothing to Disclose  
Vera Maria Cury Salemi: Nothing to Disclose  
Marcelo Dantas Tavares de Melo: Nothing to Disclose  
Lea Maria Macruz Ferreira Detarchi: Nothing to Disclose  
Cesar Higa Nomura MD: Nothing to Disclose  
Jose Rodrigues Parga MD: Nothing to Disclose  
Luis Francisco Rodrigues Avela Phil: Nothing to Disclose  
Thais Pinheiro Lima MD: Nothing to Disclose  
Gabriela Liberato: Nothing to Disclose  
Ariane Binoti Pacheco: Nothing to Disclose  
Marcus Picoral Pinto: Nothing to Disclose  
Debora Yuri Moura Nakamura: Nothing to Disclose  
Jacob Sessim Filho: Nothing to Disclose  
Antonides Nascimento Assuncao: Nothing to Disclose  
Ismar Aguilar Marques Filho: Nothing to Disclose  
Renata Avila Cintra: Nothing to Disclose  
Simone Sena Costa: Nothing to Disclose  
Rodrigo Caruso Chate MD: Nothing to Disclose  
Carlos Eduardo Rochitte: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibition is: - Review the pathogenesis of myocardial non-compaction - Review it’s epidemiological importance - Review diagnostic criteria - Review cardiac MRI criteria and findings (typical and associated)

**TABLE OF CONTENTS/OUTLINE**

Introduction: what is non-compaction myocardium? Epidemiology: how prevalent is this disease? Pathophysiology: explain the phenotypes, explain de pathology and what is implicated in the manifestation of this rare congenital cardiomyopathy Clinical findings: briefly describe clinical criteria Cardiac MRI findings: demonstrate imaging findings and criteria for the diagnoses of myocardial non-compaction (ratio of trabeculated/compacted myocardium) and associated findings (mainly intracardiac thrombus) Differential Diagnosis: how can we differentiate myocardial non-compaction from other myocardiopathies at cardiac MRI images

**CAE141**

The Challenging Diagnosis of Arrhythmogenic Right Ventricular Cardiomyopathy/Dysplasia with Cardiac MRI: Findings, Mimics and Differences between Old and New Task Force Criteria

*Education Exhibits*

*Location: CA Community, Learning Center*
Participants
Giuseppe Mamone MD (Presenter): Nothing to Disclose
Gianluca Marrone MD : Nothing to Disclose
Giovanni Gentile : Nothing to Disclose
Settimo Caruso : Nothing to Disclose
Francesca Crino : Nothing to Disclose
Angelo Luca MD : Nothing to Disclose

TEACHING POINTS
1) To know technical features for performing a suitable examination. 2) To learn old and new task force criteria for diagnosis. 3) To learn imaging findings of disease with application of the criteria.

TABLE OF CONTENTS/OUTLINE
Purpose/Aim The aim of this exhibit is to provide a diagnostic overview of arrhythmogenic right ventricular cardiomyopathy/dysplasia using cardiac-MRI, with explanation of findings, mimics and differences between old and new task force criteria. Content Organization: a) Introduction to Arrhythmogenic Right Ventricular Cardiomyopathy/Dysplasia. b) Clinical presentation of the disease. c) Role of cardiac-MRI and contraindications. d) Technical features for performing a suitable examination. e) Overview of old and new task force criteria for diagnosis. f) Imaging findings of disease. g) Diseases mimicking ARVC/D. h) Conclusions.

CAE143
Calcification in and around the Heart: Radiographic Features and Differential Diagnosis

Education Exhibits
Location: CA Community, Learning Center

Participants
Ameya Jagadish Baxi MBBS, DMRD (Presenter): Nothing to Disclose
Carlos S. Restrepo MD : Nothing to Disclose
Michael James McCarthy MD : Nothing to Disclose
Amy Laura Mumbower MD : Nothing to Disclose
Horacio Murillo MD, PhD : Nothing to Disclose
Daniel Ocazionez MD : Nothing to Disclose
Daniel Vargas MD : Nothing to Disclose
Vijayanand Kelkeri DMRD : Nothing to Disclose

TEACHING POINTS
1. To study the different entities causing calcification in and around the heart 2. To discuss the pathophysiology and differential diagnosis and role of MDCT in evaluating these calcifications with emphasis on clinical outcome

TABLE OF CONTENTS/OUTLINE
Cardiac calcification is a common finding and it has important clinical implication. Accumulation of calcium in coronary arteries, may predict future risk of an ischemic event and can be measured on MDCT. Likewise, calcification of left ventricular wall may indicate prior myocardial infarction. Though aortic valve calcification is related with aging, it can also indicate hemodynamically significant aortic stenosis. Mitral annular calcification is generally can be incidental or associated with mitral regurgitation or stenosis. Pericardial calcification may be secondary to infection, constrictive pericarditis, postsurgical changes, trauma, and myocardial infarction or idiopathic. Calcification of the pulmonary valve occurs is rare. Tricuspid valve calcification is rare and most frequently is caused by rheumatic valve disease and infective endocarditis. Calcifications are also seen in intracardiac thrombus or neoplasm like myxoma or sarcomas. Recognition and characterization these calcifications is important, and may impact patient care.

CAE144
Cardiac MRI for the Diagnosis and Monitoring of Cardiac Involvements in Rheumatic Diseases

Education Exhibits
Location: CA Community, Learning Center

Participants
Yasuyuki Kobayashi MD, PhD (Presenter): Nothing to Disclose
Hitomi Kobayashi MD : Nothing to Disclose
Masaharu Hirano MD : Nothing to Disclose
Yukihisa Ogawa : Nothing to Disclose
Isamu Yokoe : Nothing to Disclose
Yasuo Nakajima MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the clinical cardiac involvements and typical pathophysiological findings in rheumatic diseases. 2. To demonstrate cardiac MRI findings in the patients of rheumatic diseases with and without cardiac symptoms. 3. To discuss the role of cardiac MRI to monitor the biological drug therapy in rheumatic diseases.

TABLE OF CONTENTS/OUTLINE

CAE145
Causes of Left Ventricular Diastolic Dysfunction through the Lens of Imaging

Education Exhibits
Location: CA Community, Learning Center
Certificate of Merit

Participants
Ayman Hamdy Gaballah MD, FRCR (Presenter): Nothing to Disclose
Jadranka Stojanovska MD, MS: Nothing to Disclose
Eman Sabah Mahdi MD, MBChB: Nothing to Disclose
Giseia Christa Mueller MD: Nothing to Disclose
Luba Frank MD: Nothing to Disclose
Smita Patel MBBS: Nothing to Disclose
Troy LaBounty MD, FACC: Nothing to Disclose

TEACHING POINTS
To review the classification, clinical and imaging features of conditions leading to left ventricular (LV) diastolic dysfunction. To review cardiac imaging techniques (CT/MRI/echocardiography) used to evaluate patients with LV diastolic dysfunction. To discuss the clinical potential of cardiovascular imaging in diagnosing these patients.

TABLE OF CONTENTS/OUTLINE
Spectrum of causes of LV diastolic dysfunction presented as clinical cases. 1. Causes can be classified into common and uncommon diseases: I. Common: • Cardiac Ischemia • Hypertension • Aging • Obesity • Aortic stenosis II. Uncommon: • Infiltrative and Non-infiltrative myocardial disorders. • Pericardial disorders. 2. CT/MRI/echocardiography evaluation (protocols, imaging findings, and recent advances) will be discussed. Cardiac MRI and echocardiography are complimentary imaging modalities and are important tools for evaluation of LV diastolic dysfunction, providing assessment of myocardial morphology, function, flow velocity and tissue composition that guides clinical management. CT is considered imaging modality of choice for non-invasive delineation of coronary arteries.

CAE146

Don’t Forget the Heart! Test Your Ability to Identify Cardiac Findings on Non-gated CT

Education Exhibits
Location: CA Community, Learning Center

Participants
Abigail Victoria Berniker MD (Presenter): Nothing to Disclose
Justin Edward Mackey MD: Nothing to Disclose
Öleg Teyteboym MD: Nothing to Disclose

TEACHING POINTS
1. Many important cardiac findings can be detected on non-gated CT studies, however radiologists often overlook the heart on non-gated exams. 2. Adapting a simple systematic search pattern can help radiologists miss fewer cardiac findings on non-gated CT

TABLE OF CONTENTS/OUTLINE
Goals This exhibit aims to: Highlight a simple yet comprehensive search pattern to help radiologists identify cardiac findings on non-gated CT Review the spectrum of important cardiac findings on non-gated CT through a fun, interactive, case-based quiz Background/ Search pattern overview ("from the inside out") • Valves • Chambers • Myocardium • Vessels • Pericardium Interactive Case-Based Quiz • Aneurysm/pseudoaneurysm • Myocardium • Cardiomyopathy • Infections • Mass • Vessels • Coronary anomalies • Pericardium • Fluid Tamponade

CAE147

Essentials of Quality Metrics for an Emergency Department Coronary CTA Program at a Tertiary Medical Center: Efficiency in Registry Maintenance

Education Exhibits
Location: CA Community, Learning Center

Participants
Harshna Vinodbhai Vadvala MD (Presenter): Nothing to Disclose
Brian Burns Ghoshhajra MD: Nothing to Disclose
Udo Hoffmann MD: Nothing to Disclose

TEACHING POINTS
Clinical implementation of coronary CT angiography (CCTA) must be carefully managed to safely evaluate low to intermediate risk emergency department (ED) patients with chest pain. In this process we learned: • Maintaining a dedicated registry • Ensuring appropriate patient selection by referring physicians • Maintaining accuracy of CCTA interpretations • Limiting radiation exposures as well as length of stay to a reasonable level • Feedback spreads awareness and improves the service quality

TABLE OF CONTENTS/OUTLINE
In our registry we recorded variables, querying it at minimum 45 days: • Patient characteristics - age, gender, risk facts for calculating Framingham risk score and TIMI score • Scan parameters - acquisition method, heart rate, radiation dose (mSv), tube potential, and CCTA result including calcium score • Results of other downstream testing such as Invasive Coronary Angiography (ICA), Single photon emission computed tomography myocardial perfusion imaging (SPECT MPI), exercise tolerating test (ETT) and echocardiography • Disposition location plan (ED, observation unit, admission) and disposition time (ED to scanner room, CCTA reporting time, report to discharge time and total length of stay)

CAE148

Imaging of Heart Transplantation
Participants
Sumit Karia MBBS,FRCR : Nothing to Disclose
Edward Thomas Barden MRCP, FRCR : Nothing to Disclose
Katharine Tweed FRCR (Presenter): Nothing to Disclose

TEACHING POINTS
1. Illustrate important factors in pre-operative planning and utility of imaging to problem solve and risk stratify. 2. Delineate normal post-operative anatomy using multidetector computed tomography (MDCT). 3. Illustrate complications of cardiac transplant using combined multi-modality approach.

TABLE OF CONTENTS/OUTLINE

Incidental Cardiac Findings on Non-gated Computed Tomography: Pearls and Pitfalls.

Participants
Kathleen E. Carey MD (Presenter): Nothing to Disclose

TEACHING POINTS
PURPOSE/AIM: 1. Present a representative spectrum of incidental cardiovascular findings that are increasingly demonstrated on non-cardiac computed tomography. 2. Discuss potential/artifactual mimics of true pathology that can lead to unnecessary workup. 3. Present some practical tips for differentiating true cardiac pathology, and discuss appropriate "next steps" for some of the more common findings.


Not Everything Is Thrombus! Multimodality Imaging of Intracardiac Normal Variants: A Common Source of Pitfalls

Participants
Rafael Andres Vicens-Rodriguez MD (Presenter): Nothing to Disclose
Juan Carlos Lopez-Mattei MD : Nothing to Disclose
Arun C. Nachiappan MD : Nothing to Disclose
Dipan Shah MD : Nothing to Disclose

TEACHING POINTS
1. To review the development, location, function and multimodality imaging appearance of normal intracardiac anatomic variants. 2. To discuss the main imaging differences between normal intracardiac anatomical variants and pathology

TABLE OF CONTENTS/OUTLINE
The following outline will be done for each of the following intracardiac normal anatomical variants: Chiari network Eustachian Valve Crista terminalis Right ventricular prominent trabeculations. Moderator band False tendon in the LV Atypical papillary muscles Atrial septal aneurysm Lipomatous hypertrophy of the atrial septum Lamb's excrescence Embryological development and function. Multimodality imaging and cine clips, including echocardiography, computed tomography and magnetic resonance imaging. Table/Summary. Conclusion and References.

Rapid kV Switching Dual Energy Cardiac CT: What Can We Newly Know?

Participants
Yasutoshi Ohta MD (Presenter): Nothing to Disclose
Shinichiro Kitao : Nothing to Disclose
Hiroto Yunaga : Nothing to Disclose
Toshio Ide Ogawa MD : Nothing to Disclose
TEACHING POINTS

The purpose of this exhibit is: 1. To review the fundamentals of rapid kV switching cardiac dual energy CT (DECT) by comparison of other type of DECT. 2. To know what we can know newly from rapid kV switching cardiac DECT by comparison to conventional polychromatic CT.

TABLE OF CONTENTS/OUTLINE

Table of Contents/Outline: Fundamentals of rapid kV switching cardiac CT A. Theoretical of dual energy X-ray imaging B. Spectral imaging C. Features of DECT Review of dual energy images on cardiac CT (by comparison to conventional polychromatic CT) A. Coronary artery imaging B. Myocardial imaging (ischemic/non-ischemic) C. Plaque imaging D. Others Conclusion/summary: Cardiac radiologists unfamiliar with DECT and physicians-in-training will be able to obtain: 1) a better understanding of fundamentals of rapid kV switching cardiac DECT, 2) the knowledge of clinical usages in cardiac imaging, 3) the characteristic findings of cardiac disease evaluated using rapid kV switching DECT.

CAE153


Education Exhibits
Location: CA Community, Learning Center

Cum Laude

Participants

Yoshie Kurita MD (Presenter): Nothing to Disclose
Kakuya Kitagawa MD, PhD: Nothing to Disclose
Mio Uno MD: Nothing to Disclose
Yoshitaka Goto MD: Nothing to Disclose
Masaki Ishida MD, PhD: Nothing to Disclose
Hajime Sakuma MD: Research Grant, Siemens AG Research Grant, Koninklijke Philips NV Research Grant, General Electric Company Research Grant, Bayer AG Research Grant, Guerbet SA

TEACHING POINTS

1. To learn how to measure myocardial extracellular volume using CT. 2. To become familiar with clinical significance of myocardial extracellular volume. 3. To understand advantages and technical challenges of CT measurement of myocardial extracellular volume.

TABLE OF CONTENTS/OUTLINE


CAE154

What Cardiac Imaging Can Add to the Etiologic Diagnosis in Survivor to Sudden Cardiac Death

Education Exhibits
Location: CA Community, Learning Center

Participants

Diego Mauricio Angulo Henao MD (Presenter): Nothing to Disclose
Beatriz Rodriguez Fisac: Nothing to Disclose
Maria Riera Sagrera: Nothing to Disclose
Mercedes Rodriguez MD: Nothing to Disclose
Melisa Guadalupe Tito Mollo MD: Nothing to Disclose
Fernando Macaya Ten MD: Nothing to Disclose

TEACHING POINTS

Sudden cardiac death (SCD) refers to the sudden cessation of cardiac activity with hemodynamic collapse, typically due to a sustained ventricular arrhythmia. This event occurs in up to 90 percent of patients with structural heart disease. It is essential that all survivors of SCD undergo a complete cardiac examination to determine the nature and extent of underlying heart disease. The standard evaluation includes: electrocardiogram, coronary angiography and echocardiography. Initial study of survivor to SDC helps to define most appropriate medical management. Cardiac magnetic resonance imaging is indicated for selected patients in whom a diagnosis is uncertain after the standard evaluation. The objective of this presentation is to analyze what cardiac imaging can add to the etiologic diagnosis of SCD on the basis of our own experience and literature review.

TABLE OF CONTENTS/OUTLINE


CAE155

A Review of Pre- and Post-transcaval TAVR CT Imaging: What the Radiologist Needs to Know

Education Exhibits
Location: CA Community, Learning Center

Participants

Shehbaz Shaikh MD (Presenter): Nothing to Disclose
TEACHING POINTS

The purpose of this exhibit is: 1. To review a novel approach in performing transarterial aortic valve replacement (TAVR) by obtaining aortic access via direct puncture of the IVC, followed by closure of the aortocaval tract with off-label use of a commercially available PDA or VSD closure device. 2. To review the indications, contraindications, early appearances, and complications associated with this new procedure. 3. To describe a step-wise approach for the radiologist to interpret pre/post-procedural imaging, including specific pre-procedural planning measurements.

TABLE OF CONTENTS/OUTLINE


CAE156

CT Imaging of Complications Associated with Surgical Left-ventricular Assist Devices

Education Exhibits
Location: CA Community, Learning Center

Participants

Girish S. Shroff MD (Presenter): Nothing to Disclose
Daniel Ocazionez MD : Nothing to Disclose
Bindu Akkanti : Nothing to Disclose
Pushpender Gupta MBBS : Nothing to Disclose
Arun C. Nachiappan MD : Nothing to Disclose
Varaha Tammisetti MD : Nothing to Disclose
Daniel Vargas MD : Nothing to Disclose
David Paul Katz, MD : Nothing to Disclose
Emma Cathryn Ferguson MD : Nothing to Disclose
Sandra Alice Ann Oldham MD : Nothing to Disclose
Jayeshkumar Patel : Nothing to Disclose
Manish K. Patel : Nothing to Disclose
Igor Gregoric : Nothing to Disclose

TEACHING POINTS

At the conclusion of this exhibit, participants will be able to confidently review CTs in patients with surgical left ventricular assist devices (LVADs) In this exhibit, we will: Review the normal imaging appearances of surgical left ventricular assist devices Review complications associated with surgical left ventricular assist devices with emphasis on CT imaging of complications

TABLE OF CONTENTS/OUTLINE

Review normal imaging and positioning of surgical left ventricular assist devices (HeartMate 2 and HeartWare) Review complications of surgical LVADs with emphasis on CT imaging: device malpositioning, pocket hemorrhage, pocket and cannula infection, cannula kinking, cannula thrombosis, drive line infection, pericardial hematoma, and complications related to anticoagulation (eg, CNS, GI, and retroperitoneal hemorrhage)

CAE157

Heartbreak: Advanced Cardiac Devices Used to Monitor, Support, and Repair the Heart

Education Exhibits
Location: CA Community, Learning Center

Participants

Anna Shlionsky Bader MD : Nothing to Disclose
Eric M. Bader : Nothing to Disclose
Laura Louise Avery MD : Nothing to Disclose
Jeffrey Michael Levsky MD, PhD : Nothing to Disclose
Meir Hillel Scheinfeld MD, PhD (Presenter): Nothing to Disclose

TEACHING POINTS

To correctly identify these advanced cardiac devices. To understand indications for these advanced cardiac devices and how they are placed. To recognize complications and abnormal positioning of these advanced cardiac devices.

TABLE OF CONTENTS/OUTLINE

The following devices will be discussed:
- Nonvalvular structural devices:
  - Amplatzer PFO/ASD closure device
  - Starflex PFO/ASD closure device
  - Watchman left atrial appendage occluder
  - Lariat left atrial appendage closure device
  - Heartnet ventricular restraint device

Cardiac conduction and monitoring:
- MRI conditional pacemaker
- Left atrial pressure sensor
- Implantable loop recorder
- LifeVest wearable defibrillator
Cardiac assist devices:
- Intraaortic balloon pump
- Thoratech IVAD
- Heartmate II LVAD
- Heartware LVAD
- Impella device

Valvular devices:
- Transcatheter Aortic Valve Replacement
- Mitral valve-in-valve
- MitraClip device

For each device the following topics will be discussed or demonstrated using imaging:
- Indications for placement.
- How the device is placed. Cine clip of placement will be included for devices which are placed using imaging guidance.
- Case(s) of the device normally positioned.
- Case(s) of the device malpositioned, when available.

**CAE158**

**Shock through the Heart: Review of Common and Uncommon Pacemaker/Implantable Cardioverter-Defibrillators Systems**

*Education Exhibits*

*Location: CA Community, Learning Center*

**Participants**

Ahmed El-Sherief MD (Presenter): Nothing to Disclose  
Bruce Larry Wilkoff MD: Advisor, Medtronic, Inc Advisor, St. Jude Medical, Inc Advisor, The Spectranetics Corporation  
Rahul Dinkar Renapurkar MD: Nothing to Disclose  
Michael A. Bolen MD: Nothing to Disclose  
Joseph Thomas Azok MD: Nothing to Disclose  
Jason K. Lempel MD: Nothing to Disclose  
Ruchi Yadav MD: Nothing to Disclose  
Charles T. Lau MD: Nothing to Disclose

**TEACHING POINTS**

1. Recognize and correctly describe common and uncommon Pacemaker/Implantable Cardioverter-Defibrillators Systems  
2. Understand the role of radiographic imaging following placement of Pacemaker/Implantable Cardioverter-Defibrillators Systems

**TABLE OF CONTENTS/OUTLINE**


**CAE159**

**Cardiovascular Applications of Spectral Detector CT**

*Education Exhibits*

*Location: CA Community, Learning Center*

**Participants**

Majid Chalian MD: Nothing to Disclose  
Andrew Sher MD: Research Grant, Koninklijke Philips NV  
David L. Wilson PhD: Co-owner, BioInVision Inc Research Grant, Koninklijke Philips NV  
Hiram Bezerra: Nothing to Disclose  
Prabhakar Rajiah MD, FRCR (Presenter): Institutional Research Grant, Koninklijke Philips NV

**TEACHING POINTS**

1) Spectral detector CT recent introduction to dual layer technology imaging. 2) This technology potentially offers advantages due to spatial and temporal registration and improved beam hardening correction due to projection domain technique. 3) The retrospective availability of spectral data enables several cardiovascular applications using this novel technology.

**TABLE OF CONTENTS/OUTLINE**

- Spectral detector CT using dual-layer detector technology - Physics - Phantom studies in cardiovascular imaging - Advantages of spectral detector technology - Cardiovascular applications of spectral CT with illustrations o Myocardial perfusion imaging- Qualitative and quantitative analysis o Atherosclerotic plaque characterization o Generating optimal virtual monoenergetic image for luminal depiction in coronary arteries o Virtual calcium scoring from CTA o Decreased calcium blooming artifact using monoenergetic high keV images o Metal artifact reduction with monoenergetic images - Pacemakers, sternal wires, clips, and stents o Contrast boosting using low keV images - reducing contrast dose, salvage suboptimal studies o Virtual non-contrast images - shortening examination times and saving radiation dose - Limitations and pitfalls

**CAE160**

**Effective Ways of Using Iterative Reconstruction Algorithms at Cardiac CT**

*Education Exhibits*

*Location: CA Community, Learning Center*

**Participants**

Seitaro Oda MD (Presenter): Nothing to Disclose  
Daisuke Utsunomiya MD: Nothing to Disclose  
Hideaki Yuki MD: Nothing to Disclose
TEACHING POINTS

1. Iterative reconstruction algorithms for CT are now widely used in clinical examinations. We demonstrate their effectiveness at cardiac CT. 2. There are various effective techniques to use iterative reconstruction algorithms for cardiac CT. They can improve the image quality and diagnostic performance, and reduce the radiation exposure and contrast material dose.

TABLE OF CONTENTS/OUTLINE

1. Principles of iterative reconstruction algorithms
   - First-generation iterative reconstruction
   - Hybrid iterative reconstruction
   - Full iterative reconstruction
2. Combined use with low tube-current techniques
   - Reduction in the radiation dose
   - Protocol optimization
3. Combined use with low tube-voltage techniques
   - Reduction in radiation exposure and contrast material dose
   - Protocol optimization
4. Combined use with a high-resolution kernel
   - Improved coronary in-stent visualization
5. Application in patients with various conditions
   - Obese patients
   - Pediatric patients
   - Patients with renal dysfunction
   - Patients with difficult venous access

CAE161

How to Perform A Successful Subtraction Coronary Computed Tomography Angiography

Education Exhibits
Location: CA Community, Learning Center

Participants
Makoto Amanuma MD (Presenter): Nothing to Disclose
Takeshi Kondo: Nothing to Disclose
Tomonari Sano: Nothing to Disclose
Tomoya Takayanagi: Nothing to Disclose
Takako Sekine: Nothing to Disclose
Shinichi Takase: Nothing to Disclose
Hideyuki Matsutani: Nothing to Disclose

TEACHING POINTS

1) Subtraction coronary computed tomography angiography (Sub-CCTA) is a novel technique to overcome the difficulties in evaluating coronary artery lumen with high-grade calcification or metallic stents. 2) While the procedure is performed with the dedicated software, acquiring high quality original images without motion is most important. 3) The higher the calcium score, the more difficult to obtain perfect subtracted images. 4) Various factors affect the subtraction of metallic stent including its material, size, and accompanying calcifications.

TABLE OF CONTENTS/OUTLINE

1. How to perform Sub-CCTA (a) Basic principle (b) Patient preparation (c) Actual procedures (d) Tips for successful procedure 2. Factors affecting successfulness of Sub-CCTA (a) Heart rate and acquisition methods (b) Image reconstruction methods (full data reconstruction vs. half data reconstruction) (c) Calcium score (d) Material and size of stents 3. Diagnostic capability 4. Clinical Cases

CAE162

Impact of 320-slice Area Detector CT with Iterative Reconstruction in Cardiac Imaging

Education Exhibits
Location: CA Community, Learning Center

Participants
Yasuyuki Kobayashi MD, PhD (Presenter): Nothing to Disclose
Kihel Yoneyama: Nothing to Disclose
Kazuhiro Nozu MD: Nothing to Disclose
Sou Oode MD: Nothing to Disclose
Yasuo Nakajima MD: Nothing to Disclose

TEACHING POINTS

The major teaching points of this exhibit are: 1. Radiologist should know paradigm shift caused by low-dose non-helical volume scanning using area detector CT with iterative reconstruction in cardiology. 2. Iterative reconstruction is pivotal in dynamic cardiac functional assessment using area detector CT. 3. Dynamic functional assessment has great clinical impacts in cardiac imaging.

TABLE OF CONTENTS/OUTLINE

Principle and Techniques of Non-helical Volume Scan Using Area Detector CT - Problems of Helical scan - Benefits of Volume Scan Using Area Detector CT free of Helical Scan - Physics Properties of Helical Scan and Non-helical Scan - Paradigm Shift Caused by Low-dose Non-helical Volume Scan with Iterative Reconstruction - Clinical Impacts of Area Detector CT with Iterative Reconstruction in Cardiac Imaging - Super Low Dose Cardiac CT - Patients with Arrhythmia - Adult Patients Incapable of Breath Holding - Pediatrics: No sedation, Respiration - Subtraction Coronary CT Angiography for the Evaluation of Severely Calcified Lesions - Dynamic Myocardial Perfusion CT with Pharmacological Stress - Quantitative Functional Assessment (Cardiac Motion) - Valvular Assessment - Others
CAE163

Novel Quantitative Imaging Techniques for Non-contrast Enhanced Cardiac MRI

Education Exhibits
Location: CA Community, Learning Center

Participants
Seitaro Oda MD (Presenter): Nothing to Disclose
Daisuke Utsunomiya MD : Nothing to Disclose
Kosuke Morita : Nothing to Disclose
Hideaki Yuki MD : Nothing to Disclose
Tomohiro Namimoto MD : Nothing to Disclose
Takeshi Nakaura MD : Nothing to Disclose
Yasuyuki Yamashita MD : Consultant, DAIICHI SANKYO Group

TEACHING POINTS
1. Cardiac MRI is a valuable non-invasive diagnostic tool that yields detailed images of the beating heart and facilitates accurate and reproducible quantification. We demonstrate recent advances in non-contrast-enhanced cardiac MRI.
2. Various effective MRI techniques that do not require contrast materials are available for the quantification of cardiac function.

TABLE OF CONTENTS/OUTLINE
1. Current status of cardiac MRI in clinical practice
2. T1 mapping - Principles of T1 mapping - Application in patients with ischemic heart disease - Application in patients with non-ischemic cardiomyopathy
3. Myocardial strain - Principles of myocardial strain - Application in patients with ischemic heart disease - Application in patients with non-ischemic cardiomyopathy
4. Diffusion-weighted imaging - Using low b-factors - Using high b-factors - Cardiac diffusion tensor imaging
5. Phase-contrast imaging - Basics of phase-contrast imaging - Quantification of cardiac function
6. Assessment of diastolic function
7. Assessment of right ventricular function

CAE164

Parametric Mapping: An Emerging Tool for Myocardial Tissue Characterization

Education Exhibits
Location: CA Community, Learning Center

Participants
Ana Capelastegui MD (Presenter): Nothing to Disclose
Elena Astigarra Aguirre MD : Nothing to Disclose
Teresa Salinas : Nothing to Disclose
Jose Juan Onaindia : Nothing to Disclose
Sonia Velasco : Nothing to Disclose
Rafael Coronado-Santos : Employee, Siemens AG

TEACHING POINTS
1. To review the technical basis of myocardial parametric mapping.
2. To explain how to employ the sequences and how to obtain information from T1, T2 and T2* maps of myocardium.
3. To illustrate their applications in clinical practice.
4. To discuss strengths and limitations of this emerging technique.

TABLE OF CONTENTS/OUTLINE
The following issues will be discussed and illustrated for each of the parametric maps of myocardium (T1, T2 and T2*):
• Technical basis: exploring magnetic relaxation properties of myocardium.
• Sequences employed to obtain the parametric maps.
• Technical tips to ensure an optimal study.
• Interpretation of parametric maps and integration in the cardiac magnetic resonance protocol.
• Underlying myocardial abnormalities that alter the relaxation values.
• Reference values of T1, T2 and T2* in normal and abnormal conditions.
• Clinical applications: patients that may benefit from these techniques and clinical relevance in diagnosis, prognosis and follow-up of the pathologies.
• Present status of the technique (strengths and limitations) and future directions.

CAE165

The Transition to Quantitative Cardiac Imaging: Navigating Quantitative Maps—Where Do We Stand and Where Do We Go from Here?

Education Exhibits
Location: CA Community, Learning Center

Participants
Jad Marwan Bou Ayache MD (Presenter): Nothing to Disclose
Marcos Paulo Ferreira Botelho MD : Nothing to Disclose
James Christopher Carr MD : Research Grant, Astellas Group Research support, Siemens AG Speaker, Siemens AG Advisory Board, Guerbet SA
Benjamin Freed : Nothing to Disclose
Oisin Jude Flanagan MBBS, MRCP : Nothing to Disclose
Daniel Lee : Research funded, CardiacAssist, Inc Spouse, Employee, Takeda Pharmaceutical Company Limited
Jeremy Douglas Collins MD : Consultant, B. Braun Melsungen AG

TEACHING POINTS
1. Review the techniques for in vivo myocardial T1 and T2 quantitative imaging.
2. Summarize literature supporting the clinical utility of quantitative myocardial T1 and T2 imaging.
3. Review of clinical cases illustrating the clinical benefit of integrating quantitative T1 and T2 imaging into cardiac MRI protocols.

TABLE OF CONTENTS/OUTLINE
1. The need for quantitative imaging to supplement qualitative MRI examination.
2. T1 parametric mapping a) History and
1. The need for quantitative imaging to supplement qualitative MRI examination. 2. T1 parametric mapping a) History and Background, highlighting the pitfalls of quantitative approaches on conventional delayed enhancement imaging sequences. b) Physical principles c) Review different pulse sequences for quantitative T1 imaging. d) Summarize the literature supporting the clinical utility of quantitative T1 imaging at cardiac MRI. 3. T2 parametric mapping a) History and Background, highlighting the pitfalls of qualitative interpretation of T2 weighted dark blood imaging. b) Physical principles c) Review different approaches for quantitative T2 imaging. d) Summarize the literature supporting the clinical utility of quantitative T2 imaging at cardiac MRI. 4. Case examples a) T2 quantitative imaging: myocarditis, vasculitis, infarction, takotsubo cardiomyopathy, and heart transplant rejection. b) T1 quantitative imaging : amyloidosis, scleroderma, endomyocardial fibroelastosis, thrombus, and HCM.

CAE166

Aortic Dissection—Telling What Needs To Be Told

Education Exhibits
Location: CA Community, Learning Center

Participants
Veenita Kamble DMRD : Nothing to Disclose
Barkha Keswani MD [Presenter]: Nothing to Disclose
Ravi Ramakantan MD : Nothing to Disclose
Vidyadhar Lad MChir : Nothing to Disclose
Abhijit A. Raut MD : Nothing to Disclose
Sharad Maheshwari MD : Nothing to Disclose
Tejas Harish Kapadia MBBS : Nothing to Disclose
Jigar Aiya MBBS, DMRD : Nothing to Disclose
Himani Vinayak Patel : Nothing to Disclose

TEACHING POINTS
A dedicated CT protocol is mandatory to optimally assess the aorta and its branches including coronaries. Stepwise assessment of aortic dissection by a simple imaging check-list / questionnaire contributes to hasten and help surgical planning.

TABLE OF CONTENTS/OUTLINE

CAE167

Multidetector CT Angiography (MDCTA) on 256 Slice Dual-source CT Scanner for Evaluation of Developmental Anomalies of Thoracic Aorta: Imaging Revisted

Education Exhibits
Location: CA Community, Learning Center

Participants
Amit Kumar Verma MBBS, MD (Presenter): Nothing to Disclose
Richa Yadav MBBS, DMRD : Nothing to Disclose
Sonali Sethi MBBS, MD : Nothing to Disclose
Sunil Kumar Puri MD : Nothing to Disclose
Vandana Goel MBBS, MD : Nothing to Disclose
Poonam Narang MBBS, MD : Nothing to Disclose

TEACHING POINTS
• Aortic-annulus anomalies, anomalous arch, anomalous branches and vascular loops can present with various vascular and non-vascular symptoms causing significant morbidity. • Obstructive aortic anomalies can lead to differential blood pressure, cyanosis and even sudden cardiac compromise. • MDCTA with optimised imaging technique and radiation dose reduction is one of the most important diagnostic modality giving 3D visualization of abnormal anatomy. • Proper knowledge about anomalies, imaging technique and what a surgeon needs from a radiologist can improve the outcome.

TABLE OF CONTENTS/OUTLINE
• Embryological development of aorta • Optimised CTA technique for evaluation of major thoracic vasculature • Anomalies of aortic annulus and ascending aorta • Obstructive aortic anomalies • Aortic arch anomalies • Anomalous arch branches • Vascular loops • What to look beyond aorta...?

CAE169

The Radiology Resident's Guide to the Evaluation of Aortic Disease: A Case-based Interactive Tutorial

Education Exhibits
Location: CA Community, Learning Center

Participants
Jesus Humberto Burboa Noriega MD (Presenter): Nothing to Disclose
Luis Burboa Noriega MD : Nothing to Disclose
Sergio A. Criales Vera MD : Nothing to Disclose

TEACHING POINTS
Purpose / aim: after the exhibit the viewer should be able to: 1. Recognize the radiologic features of the acute aortic syndrome.
2. Identify potential complications related to aortic aneurysms. 3. Describe the imaging findings associated with aortic coarctation, Takayasu's arteritis and Leriche syndrome.

**TABLE OF CONTENTS/OUTLINE**

The cases and teaching points will be presented in a quiz format for the viewer to solve. The list of cases includes: 1. Acute aortic syndrome (dissection, intramural hematoma and penetrating atherosclerotic ulcer) 2. Aortic aneurysm 3. Aortic coarctation 4. Takayasu's arteritis 5. Leriche syndrome Key points referring to the pathogenesis, clinical presentation, treatment, prognosis, complications and differential diagnosis will also be displayed.

**CAE170**

*Acquired Cardiac Valvular Disease: For the General Radiologist—Emphasis on Chest Radiograph and CT Findings*

*Education Exhibits*

*Location: CA Community, Learning Center*

*Selected for RadioGraphics*

**Participants**

Mark M. Hammer MD (Presenter): Nothing to Disclose
Kareem Mawad MD: Nothing to Disclose
Fernando R. Gutierrez MD: Nothing to Disclose
Sanjeev Bhalla MD: Nothing to Disclose

**TEACHING POINTS**

1. Understand the physiology of valvular stenosis and regurgitation, especially as it applies to cardiac chamber size and myocardial remodeling over time.
2. Review the manifestations of the most common acquired cardiac valvular pathologies (specifically, aortic, mitral, and tricuspid disease) on the chest radiograph and on routine CT.
3. Review abnormalities of the valves themselves, such as calcification and vegetations, that can be seen on routine CT examinations and their significance.

**TABLE OF CONTENTS/OUTLINE**


**CAE171**

*Low-dose, Automated TAVR Guidance 3rd Generation Dual-source CT*

*Education Exhibits*

*Location: CA Community, Learning Center*

**Participants**

Raluca Gabriela Saru MD (Presenter): Nothing to Disclose
Marcel L. Dijkshoorn RT: Consultant, Siemens AG
Mohamed Ouhlous MD, PhD: Nothing to Disclose
Elise D. Pieterman: Nothing to Disclose
Gabriel P. Krestin MD, PhD: Consultant, General Electric Company Research Grant, General Electric Company Research Grant, Bayer AG Research Grant, Bayer AG Research Grant, General Electric Company
Koen Nieman MD, PhD: Speakers Bureau, Siemens AG

**TEACHING POINTS**

- Become familiar with TAVR procedure - how is it performed, what are the advantages and disadvantages;
- Relevant aortic valve and outflow tract anatomy;
- CT scanning:
  - Patient preparation.
  - Use of efficient contrast injection protocol.
  - Tailored acquisition protocols for patients with renal insufficiency, young age, arrhythmia.
  - Advantages of 3rd generation DSCT in customizing protocols.
  - Use, benefits and pitfalls of automatic processing tools.
  - Diagnostic pitfalls.
  - Case examples.

**TABLE OF CONTENTS/OUTLINE**


**CHE001-b**

*Nearly Impossible Nodule: What a Radiologist Needs to Know for CT-guided Biopsy of Difficult Intrathoracic Lesions*

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

Daisy Qinjun Huang MD (Presenter): Nothing to Disclose
TEACHING POINTS
The rise of lung cancer screening programs and advances in medical imaging have dramatically changed the spectrum of lung lesions presented for CT-guided biopsy. Radiologists are increasingly faced with more technically challenging lesions where traditional fine-needle aspiration techniques are not always applicable. This exhibit will present: What constitutes a difficult lung lesion Different and innovative lung biopsy techniques Pitfalls and complications to be aware of

TABLE OF CONTENTS/OVERRIDE
1) Schematic approach to defining a difficult lung biopsy Patient factors (i.e. respiratory motion) Lesion location Small size Adjacent structures 2) Biopsy techniques to improve success (using cases from our institution which oversees a large lung cancer screening program) Atypical patient positioning Atypical biopsy needle (i.e. curved needles, bevel-steering) Hydrodissection Induced pneumothorax 3) Complications Pneumothorax Pulmonary hemorrhage

CHE002-b
The Extreme Transthoracic Biopsy: Maximizing Yield and Minimizing Complications

Education Exhibits
Location: CH Community, Learning Center
Certificate of Merit

Participants
William T. Derry MD (Presenter): Nothing to Disclose
Anshuman Kumar Bansal MD: Nothing to Disclose
Scott J. Genshaft MD: Nothing to Disclose
Fereidoun G. Abtin MD: Nothing to Disclose
Antonio Joel Gutierrez MD: Nothing to Disclose
Robert D. Suh MD: Nothing to Disclose

TEACHING POINTS
The objective of this exhibit is to illustrate tips for performing successful percutaneous biopsy of lesions in precarious intrathoracic locations. We highlight practices that should help maximize the chances for a successful tissue yield while minimizing the rate of biopsy-associated complications. Management and prevention of common complications will also be addressed.

TABLE OF CONTENTS/OVERRIDE
A. Patient preparation and contraindications
B. Pre-procedure preparation (indications, contraindications, choice of imaging modality, methods of sampling)
C. Periprocedural considerations (positioning, anesthesia)
D. Parenchyma (subpleural and central lesions, needle trajectories that decrease risk of pneumothorax, avoiding vascular structures, displacing lung)
E. Mediastinum (inducing pleural effusions, direct mediastinal approach, transpleural approach with iatrogenic pneumothorax, techniques to expand the extrapleural window)
F. Post-procedure care
G. Complications and prevention

CHE003-b
Basic Principles and Benefits of Dual Energy Computed Tomography (DECT) for Diagnosis and Management of Pulmonary Embolism

Education Exhibits
Location: CH Community, Learning Center

Participants
Ying Chen MD, PhD (Presenter): Nothing to Disclose
Shima Aran MD: Nothing to Disclose
Khalid Walid Shaqdan MD: Nothing to Disclose
Elmira Hassanzadeh MD: Nothing to Disclose
Efren Jesus Flores MD: Nothing to Disclose
Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

TEACHING POINTS
CT pulmonary angiography has become the standard of care for assessment of patients with pulmonary embolism (PE). There are many exciting new applications of Dual-energy CT (DECT) for advanced imaging of PE. The capability of the DECT to use diagnostic information from both 80 and 140 kVp datasets optimizes the contrast-to-noise ratio within vessels and facilitates detection of peripheral endoluminal clots. Low-kV dataset increases vascular enhancement. A number of predictive markers are established for risk stratification and to evaluate the prognosis in acute and chronic PE. DECT is capable of iodine mapping of the pulmonary parenchyma, to show segmental defects in iodine distribution in areas corresponding to embolic vessel occlusions. Diagnostic scans and lung perfusion scans are routinely reconstructed and several available image reconstruction techniques are available for DECT imaging to enhance detection and management of PE.

TABLE OF CONTENTS/OVERRIDE
1. Basic principles of spectral CT and available techniques of DE data acquisition. 2. Image processing and reconstruction of DECT data. 3. Clinical application of DECT for diagnosis and management PE. 4. Sample cases 5. Advantages of DECT imaging over other imaging modalities for diagnosis of PE. 6. Limitations of DECT imaging such as the effects on image quality and
CHE005-b

Acute Respiratory Distress Syndrome: Update on the Berlin Criteria and Review of Radiographic and CT Findings

Education Exhibits
Location: CH Community, Learning Center

Participants

Ketan Yogesh Shah MD, BS (Presenter): Nothing to Disclose
Arun C. Nachiappan MD: Nothing to Disclose
Achala Donuru MD: Nothing to Disclose
Rafael Andres Vicens-Rodriguez MD: Nothing to Disclose
Girish S. Shroff MD: Nothing to Disclose
Daniel Ocazionez MD: Nothing to Disclose
Xiao Shi MD: Nothing to Disclose
Lorell Ruiz-Flores MD: Nothing to Disclose
Elizabeth Guy MD: Nothing to Disclose
Rodolfo Laucirica MD: Nothing to Disclose
Farber John MD: Nothing to Disclose

TEACHING POINTS

1) Describe the definition (new Berlin criteria) of ARDS, etiologies, and clinical presentation
2) Define three histopathologic phases of ARDS
3) Illustrate chest radiographic and CT findings in ARDS, with rad-path correlation to 3 phases
4) Explain the role of imaging in diagnosis, prognostication, and follow-up of ARDS

TABLE OF CONTENTS/OUTLINE

1) Definition of ARDS and the new Berlin clinical criteria
2) Updated histopathologic phases of ARDS (exudative/acute, proliferative/intermediate, and fibrotic/late)
3) Chest radiographic and CT findings in the different phases of ARDS
4) Role of imaging in prognostication, determining etiology, and follow-up

CHE006-b

“Sponge Lung”: Radiographic and CT Appearance of Pulmonary Edema Superimposed on Emphysema

Education Exhibits
Location: CH Community, Learning Center

Participants

Suraj Jay Kabadi MD (Presenter): Nothing to Disclose
Juliana Marcela Bueno MD: Co-author, Oxford University Press
Michael Hanley MD: Nothing to Disclose

TEACHING POINTS

1. Understand why underlying chronic lung disease, particularly COPD, can cause atypical patterns of pulmonary edema
2. Recognize the appearance of a novel term, “sponge lung”, in describing the radiographic and CT findings of pulmonary edema superimposed on emphysema
3. Understand how “sponge lung” also aptly describes the underlying physiology of pulmonary edema

TABLE OF CONTENTS/OUTLINE

1. Classic appearance of pulmonary edema on chest radiography and CT imaging
2. Review of findings previously described in the literature of atypical patterns of pulmonary edema in patients with underlying COPD, e.g. regional distribution of edema to the bases
3. A novel description of pulmonary edema superimposed on emphysema termed “sponge lung” due to its characteristic likeness to the appearance of a sponge
4. On radiographs, this appears as diffuse reticular and alveolar opacities with scattered rounded lucencies. On CT, this appears as smooth interlobular septal thickening and alveolar consolidation/ground-glass on a background of centrilobular lucencies
5. How “sponge lung” fittingly also describes the underlying physiology of pulmonary edema, i.e. lung parenchyma acting as a reservoir for transudative fluid much like a sponge

CHE007-b

What Radiologists Need to Know: Surgical Management of Non-neoplastic Thoracic Diseases

Education Exhibits
Location: CH Community, Learning Center

Participants

Hwi Ryong Park (Presenter): Nothing to Disclose
Semin Chong MD: Nothing to Disclose
Ju-Won Choe: Nothing to Disclose
Mi Kyung Kim: Nothing to Disclose
Jae Seung Seo: Nothing to Disclose
Yang Soo Kim MD: Nothing to Disclose
TEACHING POINTS
To categorize the non-neoplastic thoracic diseases in which the surgical management can be required. To review their clinical and imaging findings in preoperative assessment, discuss with the surgical findings, and investigate the postoperative complications of these diseases.

TABLE OF CONTENTS/OUTLINE
Categorization of non-neoplastic thoracic diseases requiring surgical management
- Infection/inflammation
- Trauma
- Congenital
- Idiopathic/miscellaneous

Clinical and imaging findings of non-neoplastic thoracic diseases requiring surgical management
1. Pneumothorax, hemothorax and hemopneumothorax - Spontaneous/Trauma/Others
2. Empyema, lung abscess and combined - Infection: bacterial, fungal, tuberculous, NTM - Miscellaneous
3. Bronchiectasis
4. Pneumatocele - infection/trauma
5. Acute mediastinitis
6. BPF/TEF/Pleuroperitoneal communication
7. Emphysema
8. Others

Review of the surgical findings and postoperative complications
Summary

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**CHE008-b**

Long Term CT Follow Up of Ground Glass Opacities Progressing to Invasive Adenocarcinoma: A Review and Case Series

*Education Exhibits*

Location: CH Community, Learning Center

Cum Laude

Participants

- Daria Manos MD, FRCPC (Presenter): Author, Springer Science+Business Media Deutschland GmbH
- Joy Nina Borgaonkar MD, FRCPC: Nothing to Disclose

TEACHING POINTS
1. At least 75% of persistent ground glass opacities represent atypical adenomatous hyperplasia or adenocarcinoma in situ.
2. Management of persistent ground glass opacities is controversial and resection of ground glass neoplasm has been criticized for contributing to overdiagnosis in CT screening.
3. The 5-year prognosis for resected adenocarcinoma in situ is 100%.
4. Pure ground glass neoplasm typically grows slowly but can progress to invasive adenocarcinoma. Worrisome CT features include large size, rate of growth, increase in density and association with an irregular lung cyst.
5. The decision to resect a ground glass opacity should be made on an individual basis with consideration of the nodule characteristics, the risks of surgery and competing causes of death in the next 5 years.

TABLE OF CONTENTS/OUTLINE
1. Differential of focal ground glass opacity on CT
2. Natural history of persistent ground glass opacities; what is known, what is unknown.
3. Work up options for ground glass opacities.
4. Illustration of teaching points including a case series of 20 tissue-proven adenocarcinomas originally appearing on CT as ground glass opacities. All cases have serial CT documenting CT behavior over 5 to 12 years.
5. Risks and benefits regarding the resection of ground glass neoplasm.

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**CHE009-b**

Thoracic Manifestations Following CyberKnife Radiosurgery Therapy on High Resolution CT

*Education Exhibits*

Location: CH Community, Learning Center

Participants

- Myriam Irislimane (Presenter): Nothing to Disclose
- Myriam Bouchard: Nothing to Disclose
- Jean Chenard MD: Nothing to Disclose
- Pierre-Luc P Becotte MD: Nothing to Disclose
- Patricia Diez Martinez MD: Nothing to Disclose

TEACHING POINTS
Describe CyberKnife Radiosurgery Therapy in lung cancer. Review and illustrate radiologic findings post-radiosurgery on High Resolution CT.

TABLE OF CONTENTS/OUTLINE
CyberKnife radiosurgery treatments offer a safe and non-invasive approach in poor surgical candidates. High Resolution CT is frequently performed to monitor tumoral response. In some patients, the tumour tends to shrink gradually over a period of weeks to months with desmoplastic reaction around the irradiated field. High Resolution CT is also used to assess complications post-radiosurgery therapy. Early and late toxicity from radiosurgery include radiation pneumonitis, pneumothorax, radiation fibrosis, bronchiectasis. We plan to discuss these complications with illustrative examples. Understanding the imaging features post-radiosurgery is essential for the radiologist. Distinction between usual post-treatment changes, local recurrence and tumour necrosis is sometime challenging.

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**CHE010**

Thoracic Multi-Disciplinary Tumor Board: Essential Knowledge for Every Radiologist

*Education Exhibits*

Location: CH Community, Learning Center

Certificate of Merit

Participants

- Arun C. Nachiappan MD: Nothing to Disclose
- Morgan Elizabeth Telesmanich MD (Presenter): Nothing to Disclose
- Stephanie Spann: Nothing to Disclose
TEACHING POINTS

1) Compare and contrast various histopathologic markers for classification of lung cancer and pulmonary metastatic disease.

2) Discuss the International Association for the Study of Lung Cancer (IASLC) seventh edition TNM staging criteria for primary lung cancer.

3) Outline treatment options based on staging, histopathology, and patient-specific factors (including pulmonary function, performance, nutritional status, and comorbidities).

TABLE OF CONTENTS/OUTLINE

1) Importance of multi-disciplinary care, patient-specific prognosticators, and radiologist's role in patient outcome
2) Types of primary lung cancers and discussion of their histopathologic appearance, markers, and TNM staging
3) CT and PET- pros and cons of each modality
4) Decision to biopsy- percutaneous, bronchoscopic, EBUS, mediastinoscopy, surgical
5) Treatment options including chemotherapy, several types of radiation therapy, and surgery.

CHE011-b

Rationale and Logistics of Lung Cancer Screening

Education Exhibits

Location: CH Community, Learning Center

Certificate of Merit
Selected for RadioGraphics

Participants

Adam Marc Bernheim MD: Nothing to Disclose
Florian J. Fintelmann MD, FRCP (Presenter): Nothing to Disclose
Subba Rao Digumarthy MD: Nothing to Disclose
Inga T. Lennes: Nothing to Disclose
Mannudeep K. S. Kalra MD: Nothing to Disclose
Jo-Anne O. Shepard MD: Consultant, Agfa-Gevaert Group

TEACHING POINTS

- Minor but important differences exist among low dose CT lung cancer screening trials
- Eligibility criteria of USPSTF slightly differ from prominent medical societies
- Successful implementation of a screening program requires careful organization, from patient education to follow up, and requires a step-wise approach
- New technologies of dose reduction, nodule detection, and biomarkers make screening safer and more efficient

TABLE OF CONTENTS/OUTLINE

- Salient differences between European and American clinical trials
- Eligibility criteria as per major medical societies
- Essentials (pillars) for a lung cancer screening program, organized in a easy to understand format, covering all aspects, from hospital administration support to educational initiatives, management guidelines, and reimbursement
- Summarize guidelines and lexicon for standardized reporting
- Potential integration of emerging dose reduction technology, nodule detection and biomarkers
- Do radiologists need dedicated training to read screening CTs

Conclusion: The exhibit provides the rationale for Lung Cancer Screening, and requisites for starting a successful lung cancer screening program organized in tables, charts, figures and examples for an international audience with practical pointers for both novice and expert.

CHE012-b

Build it Right: Tools and Instructions for Assembling a Lung Cancer Screening Program

Education Exhibits

Location: CH Community, Learning Center

Participants

Julianna M. Czum MD (Presenter): Consultant, M2S, Inc
William C. Black MD: Nothing to Disclose
Cherie P Erkmen MD: Nothing to Disclose

TEACHING POINTS

1. An ideal lung cancer screening program (LCSP): is easily accessible, fair, safe, affordable, understandable and efficacious for patients; provides clear, accurate and timely results and meaningful recommendations for providers; emphasizes primary prevention/smoking cessation and facilitates education, research and continuous quality improvement. 2. Recognizing that each institution will develop a best-fit LCSP for its needs/priorities, program architects should prepare a comprehensive blueprint including cornerstone values, clinical pathway, shared decision making, financial plan, timetable, and resource assessment to muster support from institutional leadership and the community.
CHE013-b

What are Essential Imaging Findings and Clinical Information for the Diagnosis of Lung Nodules? An Analysis Based on a Large Database of Thin-slice CT Image

Education Exhibits
Location: CH Community, Learning Center

Participants
Takeshi Kubo MD : Nothing to Disclose
Gakuto Aoyama (Presenter): Employee, Canon Inc
Ryo Sakamoto MD, PhD : Nothing to Disclose
Masahiro Yakami MD, PhD : Nothing to Disclose
Koji Fujimoto MD, PhD : Nothing to Disclose
Koichi Tokashiki, MD, PhD : Research Grant, Tokyo Medical and Dental University Research Grant, Nihon Mediphysics Co., Ltd
Yutaka Emoto MD, PhD : Nothing to Disclose
Hiroyuki Sakai : Nothing to Disclose
Masami Kawagishi : Employee, Canon Inc
Yoshio Iizuka : Employee, Canon Inc
Keita Nakagomi MD, PhD : Nothing to Disclose
Bin Chen : Employee, Canon Inc
Hiroyuki Yamamoto : Employee, Canon Inc

TEACHING POINTS
The purpose of this exhibit are;
- To demonstrate essential clinical information for the diagnosis of lung nodule
- To describe the distribution of imaging findings observed in primary lung cancer, metastasis and benign nodule on thin-slice CT

The knowledge of these nodule characteristics will enhance diagnostic performance of radiologists.

CHE014-b

Complex but Uncomplicated: Simplifying the Task of CT Protocol Optimization with Multiple-Vendor based Iterative Reconstruction Techniques

Education Exhibits
Location: CH Community, Learning Center

Selected for RadioGraphics

Participants
Ranish Deedar Ali Khawaja MD (Presenter): Nothing to Disclose
Sarabjeet Singh MD : Research Grant, Siemens AG Research Grant, Toshiba Corporation Research Grant, General Electric Company Research Grant, Koninklijke Philips NV
Rachna Madan MD : Nothing to Disclose
Subba Rao Digumarthy MD : Nothing to Disclose
Jo-Anne O. Shepard MD : Consultant, Agfa-Gevaert Group
Mannudeep K. S. Kalra MD : Nothing to Disclose
Atul Padole MD : Nothing to Disclose
Sarvenaz Pourjabbar MD : Nothing to Disclose

TEACHING POINTS
1. Method of setting up protocols for vendor-specific IR techniques
2. Image quality is dependent on an optimal balance between patient size, tube voltage and tube current
3. Clinical indication and patient size specific CT protocols for application of different IR techniques (routine, low dose lung nodule and CT pulmonary embolism)
4. Appearance of chest pathologies that can be scanned at substantially lower radiation dose levels with IR techniques
5. Appearance of chest findings that need relatively higher dose even with IR techniques.

TABLE OF CONTENTS/OUTLINE
1. Overview of iterative reconstruction (IR) techniques from four major CT vendors (AIDR3D, ADMIRE, ASiR, iDose, IMR, IRIS, SAFIRE, SafeCT, VEO).
2. Protocols for chest CT with above mentioned IR techniques.
3. Effect of IR techniques on lesion detection, characterization and overall image quality of chest CT examination at different radiation doses.
4. Illustration of examples from our institutions for chest CT performed at an array of radiation doses.
5. Illustrate effect of different tube
potential (kV) and tube current (mA) on the image quality across multiple CT platforms.

**CHE015-b**

**Dual Energy CT (DECT) Cinematography on Spectrum of Thoracic Abnormalities: How Things Look on DECT Images**

*Education Exhibits*

*Location: CH Community, Learning Center*

*Selected for RadioGraphics*

**Participants**

- Alexi Otrakji MD (Presenter): Nothing to Disclose
- Roberto Lo Gullo MD: Nothing to Disclose
- Andrew Primak PhD: Employee, Siemens AG
- Subba Rao Digumarthy MD: Nothing to Disclose
- Mannudeep K.S. Kalra MD: Nothing to Disclose
- Jo-Anne O. Shepard MD: Consultant, Agfa-Gevaert Group
- Efren Jesus Flores MD: Nothing to Disclose
- Sarabjeet Singh MD: Research Grant, Siemens AG Research Grant, Toshiba Corporation Research Grant, General Electric Company Research Grant, Koninklijke Philips NV

**TEACHING POINTS**

Routine use of DECT for routine chest examinations is feasible with radiation dose neutral scanning protocols. In our institutions, contrast enhanced chest CT are performed with DECT, which can provide substantial clinical information in many clinical situations. We use our institutional experience to highlight following teaching points: A. Distinct appearances of various pulmonary processes on DECT images including pulmonary embolism, pneumonia, atelectasis, and pulmonary masses. B. Use of perfused blood volume or iodine map (PBV/I) images for evaluation of pulmonary findings: What nuclear medicine perfusion scans teach us. C. Appropriate use of quantitative spectral and iodine uptake values in DECT. D. Multivendor scanning technique and radiation dose with DECT

**TABLE OF CONTENTS/OUTLINE**

All included cases, images and data will be from our institutional experience. Blended, monoenergetic and PBV/I images will be used for describing a host of findings including 1. Normal chest on DECT 2. Pulmonary embolism with and without defects and infarcts 3. Chronic pulmonary thrombo-embolic disease 4. Pneumonia 5. Atelectasis 6. Pulmonary and mediastinal masses 7. Post radiofrequency appearance of lung masses on DECT 8. Lung abscess on DECT 9. Pulmonary lucencies on DECT (emphysema, lung cysts, and air trapping)

**CHE016-b**

**Find Airway Lesions on Chest Radiography? Digital Tomosynthesis Can Help your Diagnosis of Airway Lesions**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

- Ji Yung Choo MD: Nothing to Disclose
- JungWon Kwak (Presenter): Nothing to Disclose
- Ki Yeol Lee MD, PhD: Nothing to Disclose
- Jung Won Choi: Nothing to Disclose
- Je Hyeong Kim: Nothing to Disclose
- Seung Heon Lee: Nothing to Disclose
- Eun-Young Kang MD: Nothing to Disclose
- Whan Oh: Nothing to Disclose

**TEACHING POINTS**

1. To understand the technical concept of low dose digital tomosynthesis of the chest and its implementation 2. To understand which type of airway lesion can be evaluated under digital tomosynthesis 3. To recognize the limitations and benefits of digital tomosynthesis of the chest in radiation exposure and image acquisition

**TABLE OF CONTENTS/OUTLINE**


**CHE017-b**

**Imaging of the Patient with Thoracic Outlet Syndrome**

*Education Exhibits*

*Location: CH Community, Learning Center*

*Selected for RadioGraphics*

**Participants**

- Constantine Apostolos Raptis MD (Presenter): Nothing to Disclose
Thoracic outlet syndrome (TOS) refers to the constellation of symptoms produced as a result of compression of the neurovascular structures which traverse the thoracic outlet. As part of a large referral center for patients with TOS, our radiology department has had the opportunity to participate in the care of thousands of patients with TOS or suspected TOS. The purpose of this poster is to share our experiences and highlight the role the radiologist plays in the care of these patients from initial diagnosis to post-surgical care. Specifically, we will:

1. Review relevant anatomy of the thoracic outlet on cross sectional imaging
2. Present imaging findings associated with the diagnosis of TOS
3. Discuss common post-operative complications of corrective surgery for TOS

TABLE OF CONTENTS/OUTLINE

I. Anatomy of the thoracic outlet on CT and MRI
II. Clinical aspects of TOS
III. Role of imaging and findings seen in the diagnosis of TOS
IV. Conventional radiographs
V. CT
VI. MRI
VII. Angiography

Early complications: Hemorrhage, chylothorax, pneumothorax, supraclavicular infection or hematoma, pulmonary infection
More delayed complications: Lung herniation, nerve damage, graft thrombosis, vascular stenosis, remnant rib, contralateral symptoms

CHE018-b

Lateral Chest Radiography, is it a Forgotten Study? Systematic Analysis in 8 Easy Steps and Correlation with Computed Tomography

Education Exhibits
Location: CH Community, Learning Center

Participants
Luis Alberto Ruiz Elizondo MD (Presenter): Nothing to Disclose
Regina De La Mora Cervantes MD: Nothing to Disclose
Mary Carmen Herrera-Zarza MD: Nothing to Disclose
Daniel Alejandro Guerrero MD: Nothing to Disclose
Victor Alfonso Ortega Marrugo MD: Nothing to Disclose
Jose Manuel Cardoso MD: Nothing to Disclose
Gerardo Villegas MD: Nothing to Disclose
Jose Luis Criales Cortes MD: Nothing to Disclose

TEACHING POINTS

To describe a systematic analysis approaching the lateral chest x-ray with computed tomography correlation. To review the normal anatomy, including some common anatomical variants seen on the lateral radiograph. To determine the main pathologies that obliterate the different areas delineated in the lateral radiograph

TABLE OF CONTENTS/OUTLINE


CHE019-b

Pitfalls in Imaging of Benign Thymic Lesions; How Thymic MRI Can Help

Education Exhibits
Location: CH Community, Learning Center

Participants
Micheal McInnis MD: Nothing to Disclose
Efren Jesus Flores MD (Presenter): Nothing to Disclose
Jo-Anne O. Shepard MD: Consultant, Agfa-Gevaert Group
Jeanne B. Ackman MD: Nothing to Disclose

TEACHING POINTS

From this exhibit, the viewer will have a better understanding of: 1. Misleading CT and/or PET appearances of thymic hyperplasia and thymic cysts; how MRI can prevent potential diagnostic errors and unnecessary diagnostic intervention. 2. How to avoid pitfalls in Thymic MR imaging and interpretation. 3. How to tailor the Thymic MRI protocol to the clinical question and keep the exam as short and efficacious as possible.

TABLE OF CONTENTS/OUTLINE

1. Approach to MR imaging of the thymus a. Our standard Thymic MRI protocol; an algorithm depicting how to tailor it to clinical question. b. The nuts and bolts of chemical shift ratio assessment of thymic lesions, when applicable. 2. Pitfalls of thymic lesion assessment and how to avoid them a. Case-based figures illustrating how inaccurate assessment of CT, PET, thymic anatomy on MRI, and chemical shift MR imaging can yield pseudolesions and other misinterpretations that can negatively impact clinical management. b. Case-based figures illustrating how correct performance and interpretation can provide accurate diagnosis and aid clinical management. 3. Summary From this exhibit, the viewer will be able to understand pitfalls in multimodality thymic imaging interpretation and how Thymic MRI, when performed correctly, can help.

CHE020-b

Birt Hogg Dube Syndrome: Not Your Usual Cystic Lung Disease

Education Exhibits
Participants
Prachi P. Agarwal MD (Presenter): Nothing to Disclose
Ezra Haggerty MD: Nothing to Disclose
Barry Howard Gross MD: Nothing to Disclose
Victoria Raymond: Nothing to Disclose
Ella A. Kazerooni MD: Nothing to Disclose
William J. Weadock MD: Owner, Weadock Software, LLC

TEACHING POINTS
1. To illustrate the clinical manifestations of Birt Hogg Dube (BHD) syndrome
2. To demonstrate the spectrum of imaging findings in BHD syndrome pertaining to kidneys and lungs
3. To compare and contrast cyst characteristics in BHD syndrome and other cystic lung diseases

TABLE OF CONTENTS/OUTLINE
1. Introduction
2. Skin manifestations: Classic triad
3. Renal manifestations
   a. Solid renal tumors (oncocytomas and renal cell cancers)
   b. D/D for bilateral hereditary renal masses
4. Lung manifestations
   a. Cyst characteristics in BHD syndrome
      i. Cysts of variable shapes and sizes
      ii. Lower lung predominance
   b. Differentiating features from other cystic diseases
      i. Lymphangioleiomyomatosis (LAM): Similarities between LAM and BHD include skin, renal and lung involvement. Cysts involve costophrenic (CP) angles in both. Differentiating features of LAM are uniform round cysts, diffuse distribution and the type of renal (angiomylipomas) and skin lesions (facial angiofibromas etc.). ii. Langerhans cell histiocytosis (LCH): Similarities include variably shaped lung cysts. Differentiating features of LCH are sparing of CP angles, upper lung predominance and association with nodules iii. Lymphocytic interstitial pneumonitis: Typically perivascular cysts in a specific clinical setting (e.g. Sjogren syndrome) often associated with nodules. 5. Conclusion

CHE021-b
Pulmonary Function Testing for the Radiologist

Education Exhibits
Location: CH Community, Learning Center

Participants
Ujval B. Patel MD (Presenter): Nothing to Disclose
Michael A. Kadoch MD: Nothing to Disclose
Corey Drew Eber MD: Nothing to Disclose
Mary Margaret Salvatore MD: Nothing to Disclose
Adam Jacobi MD: Nothing to Disclose

TEACHING POINTS
PURPOSE The purpose of this exhibit is:
1. To review the major types of pulmonary function tests (PFTs) including spirometry (FEV1, FVC), measurements of lung volumes (TLC), and quantification of diffusion capacity (DLCO).
2. To review the interpretation of pulmonary function test values in determining the pattern of abnormality (i.e. obstructive, restrictive, or mixed).
3. To correlate abnormal pulmonary function test patterns with chest x-ray and/or chest CT imaging findings.

Teaching Points The major teaching points are:
1. To review the basic principles of lung physiology and the major types of pulmonary function testing.
2. To provide the radiologist with an organized approach to interpreting PFTs and identify patterns of lung disease.
3. To correlate abnormal pulmonary function test patterns with chest imaging findings.
4. To guide the radiologist in forming and narrowing differential diagnoses based on the combination of imaging findings and PFT values.

TABLE OF CONTENTS/OUTLINE
CONTENT ORGANIZATION Briefly review lung physiology associated with PFT measurements. Describe abnormal PFT results and their clinical significance. Provide a simple algorithm in identifying the main patterns of lung disease based on PFT values. Review chest x-ray and chest CT imaging findings that correlate with specific abnormal PFT patterns.

CHE022-b
Architectural Distortion and Fibrotic Response of the Lung: Pictorial Essay

Education Exhibits
Location: CH Community, Learning Center

Participants
Sandra Milena Ramirez MD (Presenter): Nothing to Disclose
Ana Cristina Manzano MD: Nothing to Disclose
Catalina de Valencia MD: Nothing to Disclose
Diana Constanza Quesada MD: Nothing to Disclose
Carlos Javier Cogollo MD: Nothing to Disclose
Catalina Barragan MD: Nothing to Disclose

TEACHING POINTS
Development of abnormal fibrous tissue in the lung is the final sequel of a variety of pathologies. Processes that result in parenchymal fibrosis distort normal architecture of the lung. The purpose of this exhibit is:
1. To explain imaging signs of lung fibrosis
2. To present imaging of different diseases where the lung may be involved in a fibrotic response and also explain how these processes occur. 3. To establish regional distribution at CT of fibrotic process

TABLE OF CONTENTS/OUTLINE
1. Definition
2. Imaging signs of fibrotic response of the lung, patterns and distribution
3. Causes of pulmonary fibrous reaction - Idiopathic disorders - Congenital conditions - Iatrogenic - Post infectious - Connective tissue disorders - Inhalation or occupational exposure - Others
4. Conclusions

CHE023-b
Syndromes and Congenital Diseases: Attaching Relevance for the Adult Chest Radiologist to Information Long Forgotten

Participants
Cindy Renee Miller MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. Complications of congenital disease may manifest in adulthood. 2. Congenital diseases may mimic acquired diseases. 3. Congenital diseases are no longer seen only in children due to improved treatments. 4. Treatment of congenital malformations may lead to confusing appearances on adult radiographs. 5. Knowledge that a patient has an underlying syndrome may allow for a narrower differential diagnosis of abnormalities.

TABLE OF CONTENTS/OUTLINE

CHE100
Congenital and Acquired Diseases of the Aorta

Participants
Shirley Chan MD (Presenter): Nothing to Disclose
Mohammed Mohsin Khadir MD: Nothing to Disclose
Abhishek Chaturvedi MD: Nothing to Disclose

TEACHING POINTS
Characterize the most common anomalies and diseases of the aorta. Review the imaging findings of these entities using illustrations, radiographs, CT, and MR

TABLE OF CONTENTS/OUTLINE
Review the developmental anatomy of the aorta. Discuss most common congenital and development aortic anomalies and diseases. Present the imaging findings of these entities using illustrations, radiographs, CT, and MR. After the review, the reader will be able to 15 unknown cases in a multiple choice format to cover the most important teaching points Congenital anomalies of the Aortic Arch Double aortic arch Mirror image right aortic arch Right aortic arch with an aberrant left subclavian artery Left aortic arch with an aberrant right subclavian artery Coarctation Pseudocoarctation Cervical aortic arch Transposition of the great vessels Patent ductus arterialus Acquired anomalies of the Aortic Arch: Intramural hematoma Aortic aneurysm Aortic dissection Aortic inflammation Aortic Sarcoma Intramural hematoma Acute aortic injury

CHE101
Emerging Concepts in Intramural Hematoma

Participants
Susan Elizabeth Gutschow MD (Presenter): Nothing to Disclose
Christopher Walker MD: Author, Amirsys, Inc Author, Reed Elsevier
Santiago Martinez-Jimenez MD: Author, Amirsys, Inc
Melissa L. Rosado De Christenson MD: Author, Thieme Medical Publishers, Inc Author, Amirsys, Inc Author, American Registry of Pathology Author, Oxford University Press
Jeffrey Russell Kunin MD: Investigator, Oncimmune LLC

TEACHING POINTS
1. Define acute aortic syndrome with emphasis on intramural hematoma 2. Describe pathogenesis, natural progression, and potential complications of intramural hematoma 3. List cross-sectional imaging findings that impact management and prognosis

TABLE OF CONTENTS/OUTLINE
1. Definition of acute aortic syndrome and its subtypes, including intramural hematoma and differences with penetrating aortic ulcer and incomplete dissection. 2. Controversies regarding pathogenesis of intramural hematoma (e.g. ruptured vasa vasorum versus microscopic intimal tear versus penetrating aortic ulcer). 3. Description of natural progression and possible complications of intramural hematoma including focal mural contrast enhancement (intramural blood pools and ulcerlike projections), progression to complete aortic dissection, and localized aortic dilatation or saccular aneurysm. 4. Cross-sectional findings which impact prognosis: initial size of intramural hematoma, initial maximum aortic diameter, Stanford type, initial presence or development of focal mural contrast enhancement, distinction of intramural blood pool from ulcerlike projection. 5. Outline current controversies regarding surgical, endovascular, and medical management of intramural hematoma.

CHE102
The Many Faces of Sinus of Valsalva Aneurysms
**Participants**

Mina F. F. Hanna  MBCh (Presenter): Nothing to Disclose  
Nagina Malguria  MBBS : Nothing to Disclose  
Kirk Gerald Jordan  MD : Nothing to Disclose  
Brian Burns  Ghoshhajra  MD : Nothing to Disclose  
Suhny  Abbara  MD : Research Consultant, Radiology Consulting Group  

**TEACHING POINTS**

1. Recognition of Sinus of Valsalva (SOV) aneurysms in their myriad presentations on crosssectional imaging. 2. Clinical and Imaging presentation of ruptured and unruptured SOV aneurysms.

**TABLE OF CONTENTS/OFFLINE**

1. Normal anatomy of the aortic root and sinuses of valsalva 2. Pathophysiology and origin of Sinus of Valsalva aneurysms  
   Congenital: Incomplete fusion of proximal and distal bulbar cordis, anatomic defect in the elastic tissue, deficiency of the conal septum. Acquired: posttraumatic, prior aortic surgery, endocarditis, cystic medial necrosis 3. Typical and Atypical appearances of Sinus of Valsalva aneurysms on CT • Saccular contrast outpouching: (Typical aneurysmal) • Mass like (intracardiac, aortic, interatrial septum) • Thrombosed 4. Associated cardiac abnormalities. 5. Ruptured SOV aneurysm or fistula: Incidence, sites with frequency, clinical significance. 6. Pitfalls and variants. Asymmetric dilatation of the sinuses of valsalva, aorta-right atrial tunnel.

**CHE103**

**Thoracic Aortic Aneurysms: What Every Radiologist Should Know To Effectively Communicate With Cardiologists and Cardiothoracic Surgeons**

**Participants**

Amanda Lea  Steinberger  DO (Presenter): Nothing to Disclose  
Oleg  Teytelboym  MD : Nothing to Disclose  

**TEACHING POINTS**

1. Examine current guidelines (American, European, and other international) with respect to radiologic diagnosis and treatment of thoracic aortic aneurysms (TAAs) 2. Illustrate imaging appearance and proper measurement techniques of TAAs across multiple modalities (CT, MRI, Echo) based on current guidelines through pictorial illustration 3. Review common pitfalls in TAA measurement 4. Illustrate TAA complications 5. Review post-repair imaging of TAAs

**TABLE OF CONTENTS/OFFLINE**

Our exhibit will review 3D imaging of the aorta as well as proper measurement and diagnosis of thoracic aortic aneurysms based upon the current guidelines. After a brief discussion and comparison of current guidelines, we will demonstrate multimodality imaging of thoracic aortic aneurysms, with an emphasis on proper measurements and examples of common pitfalls. Additionally, we will pictorially illustrate the appearances of complications of TAAs such as dissection and intramural hematomas. Review post repair appearance of TAAs and optimal imaging techniques. Finally, we will summarize our presentation with key points for measuring TAAs in daily radiology practice.

**CHE104**

**Typical and Atypical Imaging Features of Takayasu Arteritis**

**Participants**

Ichiro  Sakamoto (Presenter): Nothing to Disclose  
Hideyuki  Hayashi : Nothing to Disclose  
Hiroki  Nagayama : Nothing to Disclose  
Hironori  Onizuka  MD : Nothing to Disclose  
Eijun  Sueyoshi  MD : Nothing to Disclose  
Masataka  Uetani  MD : Nothing to Disclose  

**TEACHING POINTS**

1. To learn optimal imaging techniques (CT, MRI, PET, angiography) in the diagnosis of Takayasu arteritis (TA) 2. To learn typical imaging features of TA 3. To learn atypical imaging features of TA 4. To learn pitfalls and limitations of each imaging modality

**TABLE OF CONTENTS/OFFLINE**


**CHE105**

**Non-neoplastic Intrathoracic Masses: When Cancer is not the Answer**
TEACHING POINTS

Radiologists often encounter mass lesions in the lungs and mediastinum on imaging studies. It is essential for radiologists to recognize findings that suggest non-neoplastic disease when evaluating an intrathoracic mass to most efficiently direct subsequent patient workup and management. The purpose of this exhibit is to:

1. Illustrate the appearances of some unusual non-neoplastic lesions of the lungs and mediastinum that can mimic malignancy.
2. Discuss features that suggest a benign etiology or a specific diagnosis.

TABLE OF CONTENTS/OUTLINE

1. Introduction: Importance of differentiating benign from malignant lesions.
2. Mediastinal lesions to be discussed include: bronchopulmonary foregut malformations, extramedullary hematopoiesis, diaphragmatic defects, non-neoplastic adenopathy, meningocoele, and fibrosing mediastinitis.
3. Lung parenchymal lesions presented include: bronchogenic cysts, sequestration, rounded atelectasis and mass lesions of infectious or inflammatory etiology.
4. Summary - imaging features that suggest benign disease.
5. References
TABLE OF CONTENTS/OUTLINE
World Health Organization histopathological classification of thymic epithelial tumors CT and MR imaging features of thymic epithelial tumors (including thymomas [types A, AB, B1, B2, and B3], squamous cell carcinomas, mucoepidermoid carcinomas, basoid carcinomas, lymphoepithelioma-like carcinomas, carcinoid and neuroendocrine carcinomas, undifferentiated carcinomas, thymoma and thymic carcinomas arising in multilocular thymic cysts, etc.) with histopathological correlation Differential diagnosis of other anterior mediastinal lesions (including thymic hyperplasia, thymolipoma, malignant lymphomas, germ cell tumors, intrathoracic goiter, etc.) Imaging evaluation points to consider before the treatment of thymic epithelial tumors (including Masaoka classification, TNM classification, extracapsular invasion, dissemination, metastasis, and more)

CHE108
Ready... Set... Go... How Much Do I Know About Esophageal Strictures?

Education Exhibits
Location: CH Community, Learning Center
Certificate of Merit

Participants
Justin Ross Hutto MD : Nothing to Disclose
Jessica Garrette Zarzour MD (Presenter): Nothing to Disclose
Sushilkumar K. Sonavane MD : Nothing to Disclose
Rupan Sanyal MD : Research Grant, Bracco Group
Michelle Mae McNamara MD : Nothing to Disclose
Christine O. Menias MD : Nothing to Disclose

TEACHING POINTS
Strictures in the esophagus are caused by many etiologies apart from esophagitis.

The aim of the exhibit is to subject the readers to challenging cases in order to improve their understanding of various esophageal abnormalities causing strictures.

TABLE OF CONTENTS/OUTLINE
Esophageal stricture cases from common and uncommon entities will be presented in a quiz format. Images with brief clinical history will be displayed along with multiple choices to pick the correct diagnosis from. Key points for the case will be highlighted subsequently. Following cases will be included- Cervical esophageal web Vascular ring Cricopharyngeal bar Epidermolysis bullosa Eosinophilic esophagitis Squamous cell carcinoma Barrett’s esophagus with adenocarcinoma Lymphoma Prolonged NG tube placement Caustic Crohn’s Post treatment, ie post esophageal banding for varices Post radiation Pill induced Peptic stricture

CHE109
Tracheal Lumps and Bumps: The Good, the Bad and the Unusual

Education Exhibits
Location: CH Community, Learning Center
Certificate of Merit

Participants
Sonia Liliana Betancourt Cuellar MD (Presenter): Nothing to Disclose
Annikka Weisfeder MD : Nothing to Disclose
Diana Maria Palacio MD : Nothing to Disclose
Brett Wilson Carter MD : Author, Reed Elsevier Consultant, St. Jude Medical, Inc
Edith Michelle Marom MD : Nothing to Disclose

TEACHING POINTS
1-To describe unusual tracheal tumors, other than squamous cell carcinoma and adenoid cystic carcinoma 2- To review the CT and clinical findings of uncommon tracheal tumors, emphasizing axial imaging and clinical characteristics that can help narrow the differential diagnosis 3- To alert the radiologist to imaging features typical for benign versus malignant lesions 4-To describe the pathology characteristics of these tumors.

TABLE OF CONTENTS/OUTLINE
1.Anatomic and histologic overview of the trachea 2.Histologic classification of atypical tracheal tumors 3.Review imaging findings (CT and FDG PET/CT) with histopathology and clinic correlation 4.Summary

CHE110
Approach to Diagnosis of Pulmonary Fungal Infections

Education Exhibits
Location: CH Community, Learning Center

Participants
Ashish Rajendra Khandelwal MD (Presenter): Nothing to Disclose
Prashant Nagpal MD : Nothing to Disclose
Naman Sanjiv Desai MD : Nothing to Disclose
James Conner MD : Nothing to Disclose
Ameya Jagadish Baxi MBBS, DMRD : Nothing to Disclose
Sachin Shyamsunder Saboo FRCR, MD : Nothing to Disclose

TEACHING POINTS

Reader will be able to accomplish following by viewing the exhibit:

- Rational and simplified clinic-radiological algorithm for radiologists to diagnose pulmonary fungal infections
- Imaging spectrum of common pulmonary fungal infections with focus on diagnostic clues for arriving at the diagnosis
- Imaging of emerging uncommon fungal infections

TABLE OF CONTENTS/OUTLINE

1. Case based review of common and uncommon pulmonary fungal infections. 2. Each case to be discussed as: key imaging pearls, diagnostic pitfalls, common mimics and differential diagnosis. 3. Role of imaging in management and follow-up of pulmonary fungal infections.

CHE111

Bronchiolitis: A Schematic Diagnostic Approach with Radiologic-pathologic Correlation

Education Exhibits
Location: CH Community, Learning Center
Certificate of Merit

Participants
Mariana Nelida Benegas Urteaga MD (Presenter): Nothing to Disclose
Marcelo Sanchez MD : Nothing to Disclose
Jose Ramirez MD : Nothing to Disclose
Daniel Barnes MD : Nothing to Disclose
Teresa Maria de Caralt : Nothing to Disclose
Rosario Jesus Perea MD, PhD : Nothing to Disclose

TEACHING POINTS

1. To show the classification of bronchiolitis with radio-pathological correlation 2. To provide an easy and schematic diagnostic approach, based on HRCT findings and relevant clinical information 3. To emphasize the role of post-processing techniques: MIP, MinIP and densitometric evaluation

TABLE OF CONTENTS/OUTLINE


CHE112

Imaging of Pulmonary Eosinophilia: Not Just a Fleeting Abnormality

Education Exhibits
Location: CH Community, Learning Center

Participants
Tariq Ali MBBS, MRCP (Presenter): Nothing to Disclose
Judith Lynn Babar MBChB : Nothing to Disclose
Pasupathy Sivasothy : Nothing to Disclose
Anu Balan MBBS, MRCP : Nothing to Disclose

TEACHING POINTS

To recognise a broad spectrum of eosinophilic lung disease on imaging. Clinical and radiological correlation are required as there are similarities and overlaps within the broad range of disease manifestations.

TABLE OF CONTENTS/OUTLINE

Purpose/Aim: Review the imaging manifestations of eosinophilic lung disease in patients with blood eosinophilia from our institutional experience. Eosinophilic lung disease is rare, comprising a variety of clinical entities associated with tissue and blood eosinophilia showing typical and uncommon radiologic manifestations. Content organization: Review of key imaging findings on radiography and MDCT in pulmonary eosinophilic disease, enhancing knowledge of underlying causes including: 1) Idiopathic a. Eosinophilic pneumonia i. Acute Eosinophilic pneumonia ii. Loffler Syndrome (may have an underlying cause) iii. Chronic Eosinophilic pneumonia; b. Hypereosinophilic syndrome 2) Secondary a. Vasculitis: Churg-Strauss syndrome b. Allergic bronchopulmonary aspergillosis (ABPA); c. Bronchocentric granulomatosis d. Drug reactions e. Tropical eosinophilia f. Infection Summary: To identify imaging features which help in the classification of pulmonary eosinophilic lung disease, by illustrating key differences and overlaps, in order to aid correct clinical management.

CHE113

Imaging of Thoracic Infections in the Oncologic Setting

Education Exhibits
Location: CH Community, Learning Center
Cum Laude

Participants
TEACHING POINTS

1. The use of MDCT to detect infection 2. Worrisome complications of infection requiring immediate intervention 3. CT findings that are suggestive of specific types of infection in immunocompromised hosts to initiate tailored therapy in a timely fashion. 4. Pitfalls in imaging of infection in the oncologic setting

TABLE OF CONTENTS/OUTLINE


CHE115

Know How your Lungs Behave with Newer Drugs—Imaging Appearances of Lung Toxicity Related to Recently Marketed Drugs

Education Exhibits

Location: CH Community, Learning Center

Participants

Dhiraj Baruah MD (Presenter): Partner, DICOM Grid Stockholder, Fleury Group
Kashik S. Shahir MD : Nothing to Disclose
Rahul N. Sawlani MD : Nothing to Disclose
Zachary R. Laste MD : Nothing to Disclose
Vijay Ramalingam MD : Nothing to Disclose
Kavita Joshi MD : Nothing to Disclose
Lawrence R. Goodman MD : Nothing to Disclose

TEACHING POINTS

Pulmonary toxicity of many established drugs have been described in the literature along with their imaging appearances (like amiodarone, busulfan, lidocaine etc). However, we have encountered changes with several newer drugs (bortezomib, cimzia, voriconazole, remicade etc.), which are not well described. These changes are very important to understand for proper patient care. Aim of our exhibit is to present examples of pulmonary changes related to some of the newer drugs and their pathophysiologic mechanism. This review will help radiologists understand these changes and keep them in differential consideration in proper clinical situations.

TABLE OF CONTENTS/OUTLINE

a. Overview of pathophysiology of pulmonary changes related to newer drugs. b. Correlating those changes in imaging with case examples

CHE116


Education Exhibits

Location: CH Community, Learning Center

Participants

Gustavo S.P. Meirelles MD, PhD (Presenter): Partner, DICOM Grid Stockholder, Fleury Group
Julia Capobianco MD : Nothing to Disclose
Dany Jasinowodolinski MD : Nothing to Disclose
Dante Luiz Escuissato MD, PhD : Nothing to Disclose
Arthur Soares Souza MD, PhD : Nothing to Disclose
Pedro Daltro MD : Nothing to Disclose
Edson Marchiori MD, PhD : Nothing to Disclose

TEACHING POINTS

The teaching points of this exhibit are:
1. To describe the main tropical and subtropical parasitic diseases in terms of their geographic distribution.
2. To demonstrate their most common imaging, clinical and pathological findings.

TABLE OF CONTENTS/OUTLINE

The authors will focus on the following points: 1. Geographic distribution of tropical and subtropical parasitic diseases which may affect the thorax. 2. Review of clinical, imaging and pathological findings of the following diseases, with sample cases; 2.1 Malaria 2.2 Amebiasis 2.3 Toxoplasmosis 2.4 Trypanosomiasis 2.5 Ascariasis 2.6 Strongyloidiasis 2.7 Dirofilaria 2.8 Cysticercosis 2.9 Toxocariasis 2.10 Syngamosis 2.11 Hydatidosis 2.12 Paragonimiasis 2.13 Schistosomiasis 3. Summary of findings and conclusions.

CHE117

Pulmonary Tuberculosis Beyond Cavitation

Education Exhibits

Location: CH Community, Learning Center
Participants
Rosana Souza Rodrigues MD, PhD (Presenter): Nothing to Disclose
Miriam Menia Barreto MD, PhD: Nothing to Disclose
Edson Marchiori MD, PhD: Nothing to Disclose
Domenico Capone: Nothing to Disclose
Saula Hamad Timene Farias MD: Nothing to Disclose
Andrea Brito: Nothing to Disclose

TEACHING POINTS
1. Discuss the physiopathology, epidemiology, and clinical manifestations of pulmonary tuberculosis (PTB). 2. Learn to recognize the atypical distribution and patterns in PTB, such as clusters of small nodules, confluent micronodules, reversed halo sign, fissural nodularity, tracheobronchial abnormalities, endogenous reactivation, Rasmussen’s aneurysm. 3. Review and illustrate associated imaging findings and the differences between active and inactive disease. 4. Discuss the main differential diagnosis.

TABLE OF CONTENTS/OUTLINE

CHE118
Pulmonary Tuberculosis: An Algorithm for Radiologic Evaluation, Management, and Treatment

Education Exhibits
Location: CH Community, Learning Center

Selected for RadioGraphics

Participants
Xiao Shi MD (Presenter): Nothing to Disclose
Arun C. Nachiappan MD: Nothing to Disclose
Kasra Rahbar: Nothing to Disclose
Lorell Ruiz-Flores MD: Nothing to Disclose
Girish S. Shroff MD: Nothing to Disclose
Daniel Ocazionez MD: Nothing to Disclose
Ketan Yogesh Shah MD, BS: Nothing to Disclose
Elizabeth Guy MD: Nothing to Disclose
Andrew DiNardo MD: Nothing to Disclose
Rodolfo Laucirica MD: Nothing to Disclose
Alan Schlesinger MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to: 1. Discuss the utility of imaging and laboratory tests in the diagnosis and management of pulmonary tuberculosis. 2. Demonstrate the radiographic and CT findings of tuberculosis with emphasis on differences between immunocompetent and immunocompromised patients. 3. Discuss an algorithm for the management and treatment of active and latent tuberculosis.

TABLE OF CONTENTS/OUTLINE
1. Description of TB classification system. 2. Illustration of an algorithm for diagnosis and management of pulmonary tuberculosis. 3. Discussion of how the radiographic finding of cavitation affects management and prognosis. 4. Pictorial review of radiographic and CT findings in pulmonary tuberculosis.

CHE119
Radiologic and Pathologic Manifestations of Thoracic Fungal Disease in the Immunocompetent and Immunocompromised Hosts

Education Exhibits
Location: CH Community, Learning Center

Participants
Kyle Elmer Pfeifer MD (Presenter): Nothing to Disclose
Vivek Bhari Kaira MD: Nothing to Disclose
Brian Haas MD: Nothing to Disclose
Adebawale Adeniran MD: Nothing to Disclose
Myung Soo Shin MD, Dsc: Nothing to Disclose

TEACHING POINTS
1. Thoracic fungal disease result in significant morbidity and mortality and can be best classified according to patient immune status. 2. We discuss how the appropriate diagnosis of thoracic fungal disease is important for patient care/prognosis. 3. We review the pathophysiology and radiographic findings of thoracic fungal disease in immunocompetent hosts, focusing on geographic location, as well as implications for treatment and prognosis 4. We review the pathophysiology and radiographic findings of thoracic fungal disease in the immunocompromised host, focusing on implications for patient care.

TABLE OF CONTENTS/OUTLINE
We describe the prevalence, imaging features, pathological characteristics of common thoracic fungal pathogens, dividing pathogens into opportunistic and endemic categories. Common opportunistic fungal pathogens include Aspergillus, Candida, Cryptococcus, Pneumocystis, and Muco. Prompt recognition of disease is important for patient morbidity and mortality and can
be difficult in the immunocompromised host. We then focus on the radiographic and pathologic appearance of common endemic fungal pathogens such as Histoplasma, Coccidioides, Blastomycosis, and Paracoccidioidomycosis which have a specific geographic distribution, and discuss the importance of recognizing thoracic fungal infections as it pertains to patient care.

**CHE120**

**Regional Theater: Avoiding Pitfalls in Thoracic Radiology by Understanding Regional Mycoses**

*Education Exhibits*

*Location: CH Community, Learning Center*

- Cum Laude
- Selected for RadioGraphics

**Participants**

- Clinton Eugene Jokerst MD (Presenter): Nothing to Disclose
- Sterling Kellon Hansen MD : Nothing to Disclose
- Gregory Kicska MD, PhD : Nothing to Disclose
- Demetrios A. Raptis MD : Nothing to Disclose
- Daniel Vargas MD : Nothing to Disclose
- Veronica Ann Arteaga MD : Nothing to Disclose
- Sanjeev Bhalla MD : Nothing to Disclose

**TEACHING POINTS**

1. Be familiar with the geographic distribution and prevalence of common endemic mycoses in the United States 2. Recognize that thoracic manifestations of endemic mycoses can mimic malignancy or tuberculosis and may be encountered on screening chest CT 3. Identify findings (such as clustered nodules, thin-walled cavities, etc.) which help to differentiate endemic mycoses from other entities

**TABLE OF CONTENTS/OUTLINE**

1. Introduction including a discussion of how thoracic manifestations of endemic mycoses are likely to be encountered regularly on lung cancer screening CTs 2. Discussion of prevalence, distribution, and common clinical manifestations of common endemic mycoses in the United States 3. Review of imaging findings which will help the radiologist avoid pitfalls such as misinterpreting regional mycosis as malignancy or tuberculosis 4. Case examples including: a. Histoplasmosis b. Blastomycosis c. Coccidioidomycosis d. Cryptococcus gattii e. Mimics (including but not limited to tuberculosis, bronchogenic carcinoma) 5. Conclusions

**CHE121**

**TB or not TB? CT Findings of DS, MDR and XDR Pulmonary Tuberculosis in Non-AIDS Patients**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

- Edilberto David Villanueva MD : Nothing to Disclose
- Larry Marden Alpaca Rodriguez MD (Presenter): Nothing to Disclose
- Lourdes Angela Chumbimune Vivanco MD : Nothing to Disclose

**TEACHING POINTS**

• Tuberculosis (TB) is a common worldwide airborne infection and it is a medical and social problem with high mortality and morbidity, especially in developing countries like Peru and Haiti that share the highest incidence of MDR and XDR TB. • Pulmonary TB images depend on diverse aspects, being CT a highly sensitive technique in the detection of minimal exudative lesions, subtle or occult parenchymal disease and in assessing disease activity and treatment effectiveness. • Micronodules, nodules, "tree-in-bud" appearance, consolidation, and cavities are the most common CT findings in active pulmonary TB, whereas disappearance of tree-in-bud, pleural effusion and presence of fibrotic change appear to be indicators of treatment effectiveness. • Imaging appearances of MDR TB are the same as those of non-MDR TB, however, multiple cavities, nodules and bronchial dilatation seen on CT in young patients with acid-fast bacilli positive sputum, can suggest the presence of MDR TB or XDR TB rather than DS TB.

**TABLE OF CONTENTS/OUTLINE**


**CHE122**

**The Fungus Among Us: A Review of Pulmonary Aspergillosis**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

- Patrick Kober DO (Presenter): Nothing to Disclose
- Anthony Dennis Mohabir MD : Nothing to Disclose
- Ilana Kafer MD : Nothing to Disclose
- Leon Bacchus MD : Nothing to Disclose
- Arfa Khan MD : Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is:
1. To review the pathophysiology and imaging findings of the spectrum of Pulmonary Aspergillosis.
2. To discuss pertinent differential diagnoses as related to the imaging findings and clinical history.
TABLE OF CONTENTS/OUTLINE

CHE123
Thoracic Manifestations of Sickle Cell Disease: Complete Radiological Spectrum

Education Exhibits
Location: CH Community, Learning Center
Certificate of Merit

Participants
Ameya Jagadish Baxi MBBS, DMRD (Presenter): Nothing to Disclose
Carlos S. Restrepo MD: Nothing to Disclose
Gregg William Bean MD: Nothing to Disclose
Amy Laura Mumbower MD: Nothing to Disclose
Michael James McCarthy MD: Nothing to Disclose
Rashmi S. Katre: Nothing to Disclose
Mateen Siddiqui MBBS: Nothing to Disclose

TEACHING POINTS
1. To study thoracic manifestations of sickle cell disease 2. To discuss the role of imaging in the diagnosis and evaluation of suspected complications of sickle cell disease 3. To differentiate manifestations of sickle cell disease from diseases having similar radiological appearances

TABLE OF CONTENTS/OUTLINE
Patients with sickle cell anemia frequently develop pulmonary complications due to slow progressive decline in pulmonary function. Though it affects multiple organs, pulmonary complications are the prime cause of morbidity and mortality in sickle cell disease. Pulmonary manifestations can be divided into acute and chronic. The acute manifestations include acute chest syndrome, asthma, pneumonia, thromboembolism and left ventricle failure. Chronic manifestations include cardiomegaly, pulmonary edema, pleural effusion, pulmonary fibrosis and pulmonary hypertension. In addition, patients with sickle cell disease frequently suffer from skeletal manifestations which include bone necrosis, osteomyelitis, extramedullary hematopoiesis, osteopenia and pathologic fractures. Many of these manifestations have a distinct radiological appearance on plain radiographs, CT scans and MRI. A timely and accurate radiological diagnosis of thoracic manifestations and complications of sickle cell may have significant impact on treatment and patient survival.

CHE124
Thoracic Tuberculosis: Typical and Atypical Radiological Manifestations. An Anatomic-based Approach

Education Exhibits
Location: CH Community, Learning Center

Participants
Sebastian Bravo-Grau MD, MSc (Presenter): Nothing to Disclose
Jose Gutierrez Chacoff MD: Nothing to Disclose
Ignacio Maldonado MD: Nothing to Disclose
Cristian Varela MD: Nothing to Disclose
Veruska de Luccas: Nothing to Disclose

TEACHING POINTS
Signs of bronchiolitis associated with the presence of cavitation with or without hilar or mediastinal hypodense adenopathies are findings highly suggestive of TB (tuberculosis). The knowledge of the uncommon presentations of thoracic TB helps to improve the diagnosis, thereby avoiding unnecessary procedures. For proper interpretation of the unusual manifestations of TB, it is necessary to integrate in the diagnostic algorithm the radiological, clinical and microbiological findings.

TABLE OF CONTENTS/OUTLINE

CHE125
Current Concepts in Hypersensitivity Pneumonitis

Education Exhibits
Location: CH Community, Learning Center

Participants
Santiago Martinez-Jimenez MD (Presenter): Author, Amirsys, Inc
Melissa L. Rosado De Christenson MD: Author, Thieme Medical Publishers, Inc Author, Amirsys, Inc Author, American Registry of Pathology Author, Oxford University Press
Christopher Walker MD: Author, Amirsys, Inc Author, Reed Elsevier
Jeffrey Russell Kunin MD: Investigator, Oncimmune LLC
Paul P. Pettavel MD: Nothing to Disclose
TEACHING POINTS

1. The traditional classification of hypersensitivity pneumonitis (HP) includes acute, subacute and chronic types. Subacute HP is characterized by diffuse centrilobular ground-glass nodules, Chronic HP typically manifests as upper lobe predominant architectural distortion and fibrosis and may exhibit ground-glass opacity and air-trapping. 2. A proposed new classification divides HP into two disease clusters. Cluster 1 HP is characterized by respiratory symptoms (e.g. chest tightness), occurrence hours after exposure, systemic symptoms (e.g. chills, body aches), and imaging features of acute and subacute HP. Cluster 2 HP is characterized by symptoms similar to those of chronic interstitial lung disease (i.e. clubbing, hypoxemia, inspiratory crackles), abnormal pulmonary function tests, and imaging features of chronic HP.

TABLE OF CONTENTS/OPTIONE

1. Describe traditional classification and imaging features of HP. 2. Discuss limitations of the traditional classification including poor epidemiologic and pathologic validation and poor evidence of disease progression along the acute, subacute, and chronic spectrum. 3. Outline proposed new classification based on demographic, clinical and HRCT features which divides disease into Cluster 1 and Cluster 2. 4. Present typical imaging findings of HP in both clusters with supporting histopathology.

CHE126

Imaging Characteristics of Pleuroparenchymal Fibroelastosis, A Rare form of Interstitial Pneumonia: What the Radiologist Needs to Know

Education Exhibits
Location: CH Community, Learning Center

Participants
- Lan-Chau Thi Kha MD, MSc (Presenter): Nothing to Disclose
- David M Hwang MD, PhD: Nothing to Disclose
- Demetris Andrea Patsios MBCh: Nothing to Disclose
- Gordon Weisbrod MD: Nothing to Disclose
- Taebong Chung MD: Nothing to Disclose

TEACHING POINTS

Pleuroparenchymal fibroelastosis (PPFE) has recently been classified as a separate interstitial pneumonia. PPFE may be idiopathic or may be related to underlying medical conditions such as bone marrow and lung transplantation, recurrent infection and autoimmunity. An understanding of the etiologies, histopathology and imaging characteristics of this rare interstitial pneumonia is important, particularly as the radiologist may be the first member of the health care team to consider this diagnosis in the presenting patient. The purpose of the exhibit is: 1. To review the etiologies, clinical presentation and demographic of PPFE. 2. To review the underlying histopathologic changes that produces the chest radiograph and CT imaging appearances of PPFE. Histopathologic imaging with correlative radiographic imaging from our institution will be used as teaching cases. 3. To highlight the characteristic findings of PPFE on chest radiograph and CT. Idiopathic, bone marrow transplant and lung transplant cases of PPFE from our institution will be used to illustrate specific imaging features. Imaging of progressive PPFE will also be presented.

TABLE OF CONTENTS/OPTIONE

1. Demographics and clinical presentation 2. Etiologies of PPFE 3. Imaging-histopathologic correlation of PPFE: 4. Imaging characteristics of PPFE on: • chest radiograph • chest CT

CHE127

Just Breathe! A SLEw of CT Findings in SLE Patients with Thoracic Involvement and Correlations with Serology, Smoking and PFT’s

Education Exhibits
Location: CH Community, Learning Center

Participants
- Kim Lee MD (Presenter): Nothing to Disclose
- Anna Shmukler MD: Nothing to Disclose
- Benjamin Zalta MD: Nothing to Disclose
- Linda Brody Haramati MD, MS: Investor, OrthoSpace Ltd Investor, Kryon Systems Ltd Spouse, Board Member, Bio Protect Ltd Spouse, Board Member, OrthoSpace Ltd Spouse, Board Member, Kryon Systems Ltd

TEACHING POINTS

The purpose of this exhibit is to:
1) Review the pathophysiology of SLE focusing on the development of the antibodies to native dsDNA, as they are relatively specific for the diagnosis of SLE
2) Identify and describe thoracic imaging manifestations of SLE on chest CT.
3) Discuss the pulmonary function abnormalities associated with SLE.
4) Correlate imaging findings with smoking status, pulmonary function tests, and double-stranded DNA (dsDNA) serology.

TABLE OF CONTENTS/OPTIONE

Review of pathophysiology of SLE Review of cases demonstrating chest CT findings in SLE Airway involvement- Bronchiectasis Parenchymal disease- From ground glass opacities and linear opacities to manifestations of fibrosis including honeycombing and architectural distortion Pleural Involvement- Pleural Effusions, Pleural Thickening Cardiac Involvement- Cardiomegaly, Pericardial effusions,Pericardial Thickening Pulmonary Embolism Pulmonary Hypertension Lymphadenopathy- Axillary, Mediastinal, Hil of Esophageal disease- Esophageal dilatation, Esophageal thickening Upper abdominal findings- Splenomegaly, Lymphadenopathy Discussion of correlations between smoking status and PFTs with imaging abnormalities in SLE Discussion of correlations between dsDNA serology with imaging abnormalities in SLE Future directions and summary

CHE128

Long-term Follow-up CT Findings in Chronic Interstitial Lung Diseases


**Education Exhibits**  
**Location:** CH Community, Learning Center

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**Participants**

Masanori Akira MD (Presenter): Nothing to Disclose  
Sayoko Tokura: Nothing to Disclose  
Tomohisa Okuma MD, PhD: Nothing to Disclose  
Narufumi Suganuma MD: Nothing to Disclose

**TEACHING POINTS**

1. To describe CT findings, pathologic findings, and long-term follow-up CT findings in several of chronic interstitial lung diseases  
2. To learn honeycomb and various changes other than honeycombing on long-term follow-up CT scans in chronic interstitial lung diseases

**TABLE OF CONTENTS/OVERSEVIEW**

OUTLINE: The previous concept of end-stage lung disease suggested a final common pathway for most ILD. The end-stage disease is characterized by the presence of extensive honeycombing, however, sequential CT scans in chronic ILD show various changes other than honeycombing. In long-standing fibrotic NSIP, a small focus of honeycombing is found and mainly consists of dilatation of bronchioles rather than dilatation of peripheral air spaces. In DIP and pulmonary Langerhans' cell histiocytosis, ground-glass opacity and nodular opacity evolve into emphysema-like lesions on CT. In CPFE and sarcoidosis, honeycomb cysts tend to be larger than in UIP.

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**CHE129**

**Perilobular Anatomy and Abnormalities on CT: Radiologists Should Memorize and Understand Them!**

**Education Exhibits**  
**Location:** CH Community, Learning Center

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**Participants**

Takeshi Johkoh MD, PhD (Presenter): Research Consultant, Bayer AG Research Consultant, F. Hoffman-La Roche Ltd  
Kazuya Ichikado MD, PhD: Nothing to Disclose  
Kiminori Fujimoto MD, PhD: Nothing to Disclose  
Tomonori Tanaka MD: Nothing to Disclose  
Junya Fukuda: Nothing to Disclose  
Noriyuki Tomiyama MD, PhD: Nothing to Disclose

**TEACHING POINTS**

To acknowledge the essential anatomy in perilobular areas  
To learn precise pathologic backgrounds of perilobular abnormalities on CT

**TABLE OF CONTENTS/OVERSEVIEW**

Contents  
A. Anatomy Perilobular structures; interlobular septa, pleura, veins, and large bronchus and arteries  
Extralobular pulmonary arteries and bronchi are borders of lobules. Perilobular interstitium encloses lymphatic vessels. B. Perilobular abnormalities on CT; Perilymphatics Showing nodular border; Lymphangitic carcinomatosis, sarcoidosis, etc. Showing smooth border Interstitial edema, etc.  
Parenchymal Showing irregular border Usual interstitial pneumonia, organizing pneumonia, etc.  
Summary Although pulmonary lobules are the most important lung units, acknowledgement of lobular borders and perilobular abnormalities on CT has not still been enough. All normal structures other than centrilobular arteries and bronchioles on CT locate on lobular borders. Parenchymal diseases as good as interstitial ones cause perilobular abnormalities. We will let you understand perilobular structures and abnormalities using many impressive histological and CT images.

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**CHE130**

**Thoracic Manifestations of Inherited Interstitial Lung Diseases: Genotype vs. Phenotype**

**Education Exhibits**  
**Location:** CH Community, Learning Center

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**Participants**

Saurabh Agarwal MD (Presenter): Nothing to Disclose  
Marilyn J. Siegel MD: Research Consultant, Siemens AG Speakers Bureau, Siemens AG  
Cylen Javidan-Nejad MD: Nothing to Disclose

**TEACHING POINTS**

1. Discuss inheritance patterns and genotypes of inherited lung diseases in adults  
2. Understand CT features of these diseases  
3. Describe a pattern-based approach to diagnosing inherited lung diseases, based on predominant CT abnormality: nodules, lines, airspace patterns, and cysts.

**TABLE OF CONTENTS/OVERSEVIEW**

Introduction: Importance of multidisciplinary consultation in diagnosis of inherited lung disease  
Genetics in inherited lung disease  
CT findings of diseases with diffuse systemic abnormalities: Tuberous sclerosis, Lymphangioleiomyomatosis  
Neurofibromatosis Cystic Fibrosis Marfan Syndrome Birt-Hogg-Dube  
Other rare diseases CT findings of diseases with predominantly pulmonary phenotypes: Congenital pulmonary alveolar proteinosis, Alpha1-antitrypsin deficiency, Kartagener syndrome  
Key primary elements to identify inherited lung disease: a pattern based approach  
Conclusion: Understanding the CT features of inherited interstitial lung diseases is vital for appropriate diagnosis and treatment planning  
Future directions of genetic analysis in inherited lung diseases

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**CHE131**

**Update of the International Multidisciplinary Classification of the Idiopathic Interstitial...**
Pneumonias: Revised Concepts and Radiologic Implications

Education Exhibits
Location: CH Community, Learning Center

Participants
Yeon Joo Jeong MD : Nothing to Disclose
Ji Won Lee MD (Presenter): Nothing to Disclose
Geewon Lee MD : Nothing to Disclose
Chang Hun Lee MD : Nothing to Disclose
Seungbaek Hong MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to provide an illustrated overview of the update of the 2002 ATS/ERS international multidisciplinary classification of the idiopathic interstitial pneumonias with an emphasis upon what the radiologist needs to know in order to successfully contribute to the multidisciplinary strategic management of the patients. The major teaching points: 1. Substantial progress has been made in idiopathic interstitial pneumonias since the previous classification. 2. A group of rare entities, including pleuroparenchymal fibroelastosis and rare histologic patterns, is introduced. 3. Unusual manifestation of idiopathic interstitial pneumonias and important differential diagnostic considerations will be reviewed. 4. The accurate classification of idiopathic interstitial pneumonias is best done with a collaborative approach between clinicians, radiologists, and pathologists.

TABLE OF CONTENTS/OUTLINE

CHE133
Cryoablation of Perivascular Neoplasms: Novel Minimally Invasive Approach to Treat Unresectable Tumors

Education Exhibits
Location: CH Community, Learning Center

Participants
Ammar Ahmed Chaudhry MD (Presenter): Nothing to Disclose
Jung Hwoon Edward Yoon MD : Nothing to Disclose
William Henry Moore MD : Research Grant, EDDA Technology, Inc Medical Board, EDDA Technology, Inc Research Grant, Gaill Medical Ltd Research Grant, Endo Health Solutions Inc
Kenny Lien MD : Nothing to Disclose

TEACHING POINTS
1- Review indications, interventional methods, contraindications, complications, pearls and pitfalls of percutaneous cryoablation. 2- Cryoablation was previously not recommended for perivascular neoplasms due to heat sink effects and potential damage to adjacent organs. We will discuss novel approach to treat these previously ‘do NOT cryo’ lesions and how to minimize potential risks while obtaining an appropriate size ablation zone. 3- Algorithm to help determine the best treatment modality in managing lung masses.

TABLE OF CONTENTS/OUTLINE
A. Anatomy- Effect of cryoablation on vessels, nerves (vagus, phrenic), tracheobronchial tree, esophagus, etc. B. Clinical Findings secondary to mass effect/obstruction C. Highlight imaging findings (e.g. significance of fat planes) that serve as key to patient inclusion and exclusion criteria. D. Pathophysiology: Cryobiology: Intra- and extracellular mechanisms that promote tumor cell death E. Procedure Technique: discuss key do's and don'ts e.g. not crossing fissures, not ablating needle tract, etc. F. Follow-up: Immediate post-procedure management and follow-up guidelines G. Outcomes: a. Complications: Immediate (PTX, hemorrhage, BPF, nerve injury, etc), Delayed (recurrence, BPF, pleural effusions, etc) b. Survival

CHE134
CT-Guided Biopsy and Fine-Needle Aspiration of Lung Lesions: Technique, Diagnostic Performance and Complications

Education Exhibits
Location: CH Community, Learning Center

Participants
M. Rosa Calero (Presenter): Nothing to Disclose
Esteban Peghini MD : Nothing to Disclose
Enrique Rico : Nothing to Disclose
GERARDO AYALA : Nothing to Disclose
Sergio Alonso : Nothing to Disclose
Daphne Castano : Nothing to Disclose

TEACHING POINTS
Purpose: 1) To review the advantages of lung imaging-guided interventional procedures. 2) To present our experience with CT-guided procedures, practical difficulties, spectrum of findings and complications you may encounter during FNA/Biopsy.

TABLE OF CONTENTS/OUTLINE
INTRODUCTION: The procedure is indicated for indeterminate pulmonary lesions. In lung cancer, when feasible, we should have tumour assessed for the presence of a driver mutation in order to offer a personalized targeted therapy (ALK, EGFR, KRAS) METHOD: All lung lesions punctured with CT-guidance at our institution since January 2012 are reviewed, with 130 lesions so far. DIAGNOSTIC ACCURACY: Most procedures have been diagnostic with non-small cell lung cancer being the most common diagnosis followed by metastasis. COMPLICATIONS AND DIFFICULTIES: Pneumothorax is the most common complication, usually small and not requiring chest tube. Hemoptysis is the second more common complication, rarely severe. CONCLUSION:
Percutaneous needle biopsy of the lung has high sensitivity, specificity and is relatively safe, and should be considered an important diagnostic tool in the evaluation of pulmonary lesions. We can obtain reliable samples for mutational analysis. Careful case and technique selection is necessary to increase diagnostic yield and avoid unnecessary complications.

**CHE135**

**Do’s and Don’ts of CT-guided Mediastinal Biopsy**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

- **Shaunagh McDermott** FFR(RCSI) (Presenter): Nothing to Disclose
- **Milena Petranovic** MD: Nothing to Disclose
- **Carol C. Wu** MD: Author, Reed Elsevier
- **Matthew David Gilman** MD: Nothing to Disclose
- **Jo-Anne O. Shepard** MD: Consultant, Agfa-Gevaert Group

**TEACHING POINTS**

Pre-procedural contrast enhanced CT or MR and PET are helpful in biopsy planning. Biopsies of bronchogenic cysts or vascular lesions should be avoided. Safe biopsy needle trajectory should be directed away from major vessels, the pericardium, and the heart and not cross the pleura when possible. On-site rapid cytology can help optimize allocation of biopsy specimen for flow cytometry or special immunological stains. Core biopsy improves diagnostic yield compared to FNA alone.

**TABLE OF CONTENTS/OUTLINE**

1. Brief introduction to differentials of mediastinal lesions and benefits of CT-guided biopsy
2. Interactive case-based quiz questions to illustrate: a) Pre-biopsy evaluation and patient selection i) Role of contrast-enhanced CT, MR, and PET ii) Do not touch lesions such as bronchogenic cyst b) Biopsy technique i) Targeting solid, FDG-avid portion of mediastinal mass ii) Needle path away from major vessels and heart iii) Avoid crossing pleura iv) Role of on-site rapid cytology v) Importance of core biopsy and flow cytometry c) Post-biopsy care i) Complications: pneumothorax, hemothorax, hemopericardium ii) Needle biopsy result and treatment options

**CHE136**

**Imaging Findings Following Common and Uncommon Bronchoscopy Procedures**

*Education Exhibits*

*Location: CH Community, Learning Center*

*Certificate of Merit*

**Participants**

- **Joseph Thomas Azok** MD (Presenter): Nothing to Disclose
- **Ahmed El-Shereif** MD: Nothing to Disclose
- **Jason K. Lempel** MD: Nothing to Disclose
- **Ruchi Yadav** MD: Nothing to Disclose
- **Charles T. Lau** MD: Nothing to Disclose
- **Rahul Dinkar Renapurkar** MD: Nothing to Disclose

**TEACHING POINTS**

1. Understand the current diagnostic and therapeutic bronchoscopic techniques utilized by interventional pulmonologists
2. Recognize the normal and abnormal imaging appearance following both diagnostic and interventional bronchoscopy procedures

**TABLE OF CONTENTS/OUTLINE**

1. Introduction
2. Diagnostic bronchoscopy - description of technique and associated imaging findings
3. Interventional bronchoscopy - The following procedures will be discussed with their associated imaging findings: - Transbronchial biopsy (e.g., EBUS, electromagnetic navigation) - Mechanical debulking (e.g., rigid bronchoscopy, balloon bronchoplasty) - Bronchial stent placement and management - Ablative therapies (e.g., argon laser, cryotherapy, electrocautery) - Endobronchial valve placement (e.g., endoscopic lung volume reduction, bronchopleural fistula treatment) - Bronchial thermoplasty for management of asthma - Fiducial marker placement for stereotactic radiosurgery

**CHE137**

**Making of the Distortion for the Real Time IVR-CT System using Slice Image Projection Mapping Method**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

- **Katsumi Tsujioka** PhD (Presenter): Nothing to Disclose
- **Yasutomo Sato**: Nothing to Disclose
- **Hirona Kimata**: Nothing to Disclose
- **Masayoshi Nawa**: Nothing to Disclose
- **Yoshitaka Isobe**: Nothing to Disclose
- **Ryoichi Kato** MD: Nothing to Disclose

**TEACHING POINTS**

We developed the real time IVR-CT system using slice image projection mapping method. It is necessary to let a CT image warp to reflect this on the surface of the patient definitely. The operator watches a crooked CT image at the surface of the patient and understands that it is a CT image in the human body. We carried out the making of the image distortion using...
projection mapping software. And we evaluated the visual precision. (1) A liquid crystalline projector was used to reflect a CT image. (2) Video Projection Tools (VPT) was used as software to make a distortion. (3) The position of the projector changed it into Z-axis direction and the X-Y direction. (4) We evaluated the sharpness and the visual effect.

TABLE OF CONTENTS/OUTLINE
(1) The angle for the Z-axis was good at 70 degrees from 50 degrees. (2) The angle for the X-Y axis was good at 90 degrees from 70 degrees. (3) The change of the sharpness was small. (4) It was recognized as an image in the human body visually. It was necessary to let an image warp to perform slice image projection mapping method. By using VPT software, we could make the distortion precisely and freely.

CHE138
Touch Imprint Cytology during Thoracic Needle Biopsy: Everything the Radiologist Needs to Know

Education Exhibits
Location: CH Community, Learning Center

Participants
Muntasir Hoque MD : Nothing to Disclose
Leah Muhm Lin MD : Nothing to Disclose
Sue Ellen Martin MD : Nothing to Disclose
Christopher Lee MD : Nothing to Disclose
Alison Wilcox MD : Speaker, Toshiba Corporation
Cameron Hassani MD (Presenter): Nothing to Disclose
Farhood Saremi MD : Nothing to Disclose

TEACHING POINTS
Touch imprint cytology (TIC), is a real-time method for microscopic examination of core needle biopsy specimens. TIC provides cytologic confirmation of needle position within the target lesion, which may improve diagnostic yield.

An experienced cytopathologist or cytotechnologist is required for assessment of TIC. Inexperience can lead to longer procedure time and unnecessary manipulation of the biopsy needle, which may result in higher procedural complication rate. Unfortunately, many radiologists may not have access to experienced cytopathologists/cytotechnologists. For these reasons, it can be extremely useful for the radiologist to determine cytologic adequacy of the biopsy material themselves.

Teaching goals:
1. The radiologist will have an understanding of the procedure for creating meaningful TIC slides
2. The radiologist will be able to determine adequacy of material on a broad array of histologies

TABLE OF CONTENTS/OUTLINE
Introduction
Definition of touch imprint cytology (TIC)
Review material required for TIC
Learn technique for proper TIC preparation
Identify properly and improperly stained slides
Review of cytologic findings, anatomically divided (lung, pleura, mediastinum, chest wall).
- Normal cells
- Inflammatory findings
- Infectious findings
- Benign findings
- Malignant findings
Sample cases
Summary

CHE140
A Certifying Examination System for Lung Cancer CT Screening in Japan

Education Exhibits
Location: CH Community, Learning Center

Participants
Kouzou Hanai PhD : Nothing to Disclose
Toru Matsumoto PhD : Nothing to Disclose
Yoshihisa Muramatsu PhD (Presenter): Nothing to Disclose
Kohei Murao PhD : Manager, Fujitsu Limited
Isao Yamaguchi PhD, RT : Nothing to Disclose
Keiichi Nagao MD : Nothing to Disclose

TEACHING POINTS
To establish of a certifying examination system for an authorization radiological technologist expert.

TABLE OF CONTENTS/OUTLINE
The Japan Accreditation Council for Lung Cancer CT Screening in Japan was founded in 2009, and started the system to authorize radiological technologist (RT). In order to examine the capability to detect an unusual finding with the knowledge of lung cancer was required of the authorized RT. In order to examine the capability to detect an unusual finding, software was developed specifically for this purpose. An administrator registers and loads an image set onto a designated server. Marking of the unusual findings is performed in advance by the person uploading the image set to create the "truth" answers, which are not displayed.

An examinee accesses the image database from a PC on a network, reviews the designated image set and marks any unusual findings seen in the study. TPF and FPF are calculated automatically and outputted by these operations. 11 certifying examinations have been administered. The successful candidate's TPF was 95% or more, and FPF was an average of 0.45 per case. To date, 1122 persons have taken the examination and 947 persons have passed. The authorized RT assists a certified Physician and is indispensable to implementation of a lung cancer CT screening.
CHE141
CT Imaging after Lung Resection: Review of Expected Findings and Guidelines for Accurate Interpretation

Education Exhibits
Location: CH Community, Learning Center

Participants
Sarel Gaur MD (Presenter): Nothing to Disclose
William Henry Moore MD: Research Grant, EDRA Technology, Inc Medical Board, EDRA Technology, Inc Research Grant, Galil Medical Ltd Research Grant, Endo Health Solutions Inc

TEACHING POINTS
As CT imaging techniques have improved, indeterminate nodules are being found with greater frequency. Treatment of these nodules often leads to open and video assisted minimally invasive lung surgeries. Knowledge of these techniques is necessary to accurately interpret post treatment scans and prevent confusion on part of the referring base. At our institution, we have a large cohort of patients who are co-managed by thoracic interventional radiologists and thoracic surgeons and who present for routine CT follow up. 1. Understand the critical aspects of open and minimally invasive lung resection surgery. 2. Understand the spectrum of expected findings in the post surgical patient. 3. Review of expected alteration to normal lung anatomy. 4. Guidelines and helpful tips for interpreting follow up CT imaging on patients who are status post open or minimally invasive lung surgery

TABLE OF CONTENTS/OUTLINE
Brief review of surgical techniques for removal of lung nodules and masses. Brief review of normal lung architecture
Explanation of alteration to normal anatomy based on alterations incurred in (1) and (2). Guideline / List of Steps for accurate interpretation of CT images

CHE142
CT, FDG-PET/ CT and MR Imaging of Lung Adenocarcinoma Corresponding to Newly Applied IASLC/ATS/ERS International Multidisciplinary Classification: Radiologic - Pathologic Correlation

Education Exhibits
Location: CH Community, Learning Center

Selected for RadioGraphics

Participants
Shinsuke Shiomoyama MD (Presenter): Nothing to Disclose
Hisanobu Koyama MD, PhD: Nothing to Disclose
Yoshiharu Ohno MD, PhD: Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, DAICHI SANKYO Group Research Grant, Eisai Co, Ltd Research Grant, Terumo Corporation Research Grant, Fuji Yakuhin Co, Ltd Research Grant, FUJIFILM Holdings Corporation Research Grant, Guerbet SA
Shinichiro Seki: Nothing to Disclose
Mizuo Nishio MD, PhD: Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAICHI SANKYO Group Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAICHI SANKYO Group Research Grant

TEACHING POINTS
Adenocarcinoma is the most common histologic subtypes of lung cancer, and advances have taken place in oncology, molecular biology, pathology, radiology, and surgery during the past few decades. In 2011, an international multidisciplinary classification sponsored by the International Association for the Study of Lung Cancer, American Thoracic Society, and European Respiratory Society (IASLC/ATS/ERS) was proposed. This new adenocarcinoma classification provides uniform terminology and diagnostic criteria for multidisciplinary strategic management. Therefore, the knowledge of radiological findings on not only CT, but also FDG-PET/CT and MRI according to this classification may be helpful for clinicians' more accurate classification or subtyping the nodules in routine clinical practice. The major teaching points of this exhibit are: 1. To learn IASLC/ATS/ERS classification of lung adenocarcinomas. 2. To determine the radiological features at various modalities including not only CT, but also PET/CT and MRI with corresponding pathologic findings in each subtype of adenocarcinoma based on IASLC/ATS/ERS Classification

TABLE OF CONTENTS/OUTLINE
1. IASLC/ATS/ERS classification of lung adenocarcinomas. 2. Management of lung adenocarcinomas and the role of radiologists 3. Radiologic, such as CT, FDG-PET, and MRI, - pathologic correlation

CHE143
Dual Energy CT (DECT) in Thoracic Oncology: Qualitative and Quantitative Evaluation

Education Exhibits
Location: CH Community, Learning Center

Participants
Roberto Lo Gullo MD (Presenter): Nothing to Disclose
Alexi Otrakji MD: Nothing to Disclose
Subba Rao Digumarthy MD: Nothing to Disclose
Noah Chan H. Choi MD: Nothing to Disclose
Jo-Anne O. Shepard MD: Consultant, Agfa-Gevaert Group
Mannudeep K. S. Kalra MD: Nothing to Disclose
Ranish Deedar Ali Khawaja MD: Nothing to Disclose
Sarabjeet Singh MD: Research Grant, Siemens AG Research Grant, Toshiba Corporation Research Grant, General Electric Company Research Grant, Koninklijke Philips NV
Atul Padole MD: Nothing to Disclose
Sarvenaz Pourjabbar MD: Nothing to Disclose
Diego Alfonso Lira MD: Nothing to Disclose
TEACHING POINTS
Recent publications and our experience suggest role of DECT in thoracic malignancies for differentiating benign versus malignant lesions as well as for assessing treatment response. Teaching points of our educational exhibit are A. Specific scanning protocol and contrast injection delay time are required for evaluation of patients with intrathoracic masses with DECT. B. Use of DECT datasets to generate blended, monoengetic and perfused blood volume images. Differences between the qualitative interpretations of DECT datasets versus single energy chest CT. C. Role of quantitative indexes of contrast uptake in the thoracic masses from DECT datasets in characterization of thoracic masses. D. Role of DECT for assessing treatment response F. Radiation dose with DECT can be similar to single energy routine chest CT protocols.

TABLE OF CONTENTS/OUTLINE

CHE144
Evaluating Response to New Targeted Therapies in Lung Cancer: Functional Imaging and Perfusion CT—What Should We Know?

Education Exhibits
Location: CH Community, Learning Center

Certificate of Merit

Participants
Marcelo Antonio Sanchez Gonzalez MD (Presenter): Nothing to Disclose
Mariana Neilda Benegas Urteaga MD : Nothing to Disclose
Noemi Reguart MD : Nothing to Disclose
Daniel Barnes MD : Nothing to Disclose
Josep Guitart MD : Nothing to Disclose
Oscar Sabino Chirife Chaparro MD : Nothing to Disclose
Rosario Jesus Perea MD, PhD : Nothing to Disclose
Teresa Maria de Caralt : Nothing to Disclose

TEACHING POINTS
1. To explain alternative methods to RECIST to evaluate the therapeutic response to new molecularly targeted therapies in lung cancer. 2. To know perfusion CT as a non invasive method to evaluate tumoral angiogenesis 3. To describe the CT technique, data processing and reporting to perform a perfusion CT of pulmonary tumors.

TABLE OF CONTENTS/OUTLINE

CHE145
Lung Cancer: Limitations and Imaging Pitfalls in Multimodality Staging

Education Exhibits
Location: CH Community, Learning Center

Certificate of Merit

Participants
Sonia Liliana Betancourt Cuellar MD (Presenter): Nothing to Disclose
Diana Maria Palacio MD : Nothing to Disclose
Marcelo Kuperman Benveniste MD : Nothing to Disclose
Brett Wilson Carter MD : Author, Reed Elsevier Consultant, St. Jude Medical, Inc
Patricia Monique de Groot MD : Nothing to Disclose
Jeremy J. Erasmus MD : Nothing to Disclose

TEACHING POINTS
By reading this exhibit the learner should accomplish: 1. An improved understanding of the limitations of the TNM-7 for the staging of NSCLC 2. A greater awareness of the imaging pitfalls encountered in TNM staging and the clinical implications of the mis-interpretation of these findings 3. A clinical and imaging approach to clarify imaging pitfalls that can impact staging and patient management

TABLE OF CONTENTS/OUTLINE
Describe and illustrate the limitations of staging as they pertain to the primary tumor, nodal metastasis and M1 a and M1b metastatic disease. Describe and illustrate imaging pitfalls as they pertain to the primary tumor, nodal metastasis and M1a and M1b metastatic disease. Review appropriate use of different imaging modalities including MRI and PET-CT and invasive procedures including EBUS to clarify limitations and potential imaging pitfalls that are encountered during the evaluation of patients with NSCLC and can result in inaccurate TNM staging

CHE146
Managing Subsolid Lung Nodules: A Case-Based Approach

Education Exhibits
Location: CH Community, Learning Center
**Participants**

Myrna Cobos Barco Godoy MD, PhD (Presenter): Nothing to Disclose
Stephen G. Swisher MD: Consultant, GlaxoSmithKline plc
John V Heymach MD, PhD: Nothing to Disclose
Junya Fujimoto MD, PhD: Nothing to Disclose
Ignacio Wistuba MD: Nothing to Disclose
Jeremy J. Erasmus MD: Nothing to Disclose

**TEACHING POINTS**

1. Subsolid nodule includes pure ground-glass nodules (GGNs) and part-solid nodules (PSNs).
2. Strong correlation has been demonstrated between the histologic findings of lung adenocarcinoma with lepidic growth pattern and the CT appearance of persistent subsolid nodules. 3. Serial CT imaging has demonstrated stepwise progression of GGNs in a subset of patients, characterized by increase in size and density, as well as development of a solid component. 4. Given the slow growth rate of GGNs, standardized guidelines with long-term (≥ 3 years) CT follow-up have been proposed using low-dose CT technique. 5. Given the correlation of invasive tumor with the solid component in persistent PSNs, surgical resection should be considered. 6. Radiologists must be familiar with current guidelines for management of solitary and multiple subsolid nodules.

**TABLE OF CONTENTS/OUTLINE**


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**CHE147**

**Minimally Invasive Adenocarcinoma of the Lung on Thin-section CT**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

Keiko Kuriyama MD (Presenter): Nothing to Disclose
Yoshinori Kodama MD: Nothing to Disclose

**TEACHING POINTS**

1. To understand the new concept of minimally invasive adenocarcinoma of the lung (MIA) proposed by the International Association for the Study Lung Cancer, American Thoracic Society, and European Respiratory Society.
2. To review and validate the contribution of thin-section CT with special attention to ground-glass opacity (GGO) for small peripheral lung adenocarcinomas associated with good prognosis after surgical resection.
3. To propose a simple and practical CT criteria for MIA for selecting candidates suitable for limited surgical resection.

**TABLE OF CONTENTS/OUTLINE**

Radiologic-pathologic correlation Atypical Adenomatous Hyperplasia (AAH) Adenocarcinoma in situ (AIS) Minimally invasive adenocarcinoma (MIA) Invasive adenocarcinoma with lepidic growth predominant Methods of differentiating MIA from invasive adenocarcinoma on CT Visual assessment of the GGO area using the lung window (>50%) Maximum diameter of the solid component versus that of the tumor with GGO using the lung window (<0.5) Semi-quantitative measurement: Tumor disappearance rate using the mediastinal and lung window (>0.5) Quantitative analysis using computer software: Computer-aided nodule assessment

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**CHE148**

**Misleading Findings at a Chest CT Computer-assisted Detection System**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

Hiroshi Moriya MD (Presenter): Nothing to Disclose
Manabu Nakagawa: Nothing to Disclose
Koutarou Sakuma: Nothing to Disclose

**TEACHING POINTS**

To explain the clinical utility of a computer-assisted detection system (CAD) for pulmonary metastases of extra-thoracic-cancer patients. 1. To show the false-positive CT findings in CAD system. 2. To show the false-negative nodules in CAD system.

**TABLE OF CONTENTS/OUTLINE**

[Materials and Methods] Consecutive 43 cases with post-operative status of digestive organ cancer or breast cancer. CT scanner: Aquilion ONE, plain chest scan, conventional dose, FC17/FC13. Computer-assisted lung nodule detection system: Xelis lung (effective diameter: 1mm). Radiologist-detected nodules and CAD-detected nodules were compared. [Results] 995 nodules (diameter >3mm: 536, 3mm >459) of 43 cases were evaluated. When limited to the size of 5-10mm, sensitivity was 89%, and positive predictive value was 85%. [Conclusion] CAD detected a large number of nodules less than 3 mm. As a result, there was an increase in false positives. And, there were some large nodules in false negative of CAD, however, there was no oversight of the radiologists. Detection algorithm is quite different from the thinking patterns of radiologists, CAD can be used as a supportive system for pulmonary nodule screening.

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**CHE149**

**Next Generation of Low-dose CT Screening for Lung Cancer: Simultaneous Achievement of**
Radiation Dose Reduction and Image Quality Improvement

Education Exhibits
Location: CH Community, Learning Center

Participants
Yoshinori Funama PhD (Presenter): Nothing to Disclose
Taiga Goto : Employee, Hitachi, Ltd
Yuko Aoki : Employee, Hitachi, Ltd
Osamu Miyazaki : Employee, Hitachi Ltd
Fumio Kawamata : Nothing to Disclose
Kazuo Awai MD : Research Grant, Toshiba Corporation Research Grant, Hitachi Ltd Research Grant, Bayer AG Research Consultant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd

TEACHING POINTS
1. Present an approach to reduce the X-ray radiation dose by using advanced CT techniques in the screening and the follow-up examination of the lung cancer. 2. Provide a possible countermeasure to reduce radiation dose to the patient while improving clinical workflow.

TABLE OF CONTENTS/OUTLINE
Table of Contents: 1. Screening and follow-up examination scheme for lung cancer 2. The roles and challenges of lung cancer screening CT (LCSCT) 3. Outline of two types of iterative reconstruction (IR) techniques 1) Hybrid IR 2) Model-based IR 4. The imaging performance of both hybrid and model-based IR 5. Near future aspect of LCSCT 1) Low dose high resolution CT (HRCT) 2) Ultra-low dose CT for lung cancer screening Outline: The most challenging part of the LCSCT, recommended by many organizations for high risk patients, is to lower radiation dose to the patient. This exhibit presents The key aspects to be considered in LCSCT for reducing the radiation dose Reconstruction of high resolution CT (HRCT) images from low-dose CT scan data (1-2mSv) using IR techniques to avoid unnecessary repeat CT scans How IR affects the visibility of the lung nodules including ground-glass opacity (GGO) nodule The feasibility of ultra low-dose CT (0.1mSv) for lung cancer screening

CHE150
Pitfalls in Pulmonary Nodule Characterization

Education Exhibits
Location: CH Community, Learning Center

Participants
Myrna Cobos Barco Godoy MD, PhD (Presenter): Nothing to Disclose
Brett Wilson Carter MD : Author, Reed Elsevier Consultant, St. Jude Medical, Inc
Patricia Monique de Groot MD : Nothing to Disclose
Chitra Viswanathan MD : Consultant, Hollister Incorporated
Mylene Thi Mytien Truong MD : Nothing to Disclose
Jane P. Ko MD : Editor, Reed Elsevier

TEACHING POINTS
1. Specific features to differentiate benign from malignant lung nodules include the presence of certain patterns of calcification, interval decrease in nodule size and lack of FDG uptake on PET/CT. 2. Potential pitfalls regarding characteristics to differentiate benign from malignant lung nodules and decision analysis algorithms will be reviewed. 3. Awareness of potential pitfalls in lung nodule characterization is important in avoiding misinterpretation and in appropriate patient management.

TABLE OF CONTENTS/OUTLINE
1. Chest radiograph pitfalls Artifacts Chest wall/ skin lesions Dual-energy radiograph pitfalls 2. Chest CT pitfalls Importance of thin section CT to characterize lung nodules Transient subsolid nodules Bubbly appearance of malignant ground glass nodules mimicking emphysema and scarring Malignant nodules growing next to cystic air spaces Malignant nodules with 'benign' patterns of calcification eg. metastases from osteosarcoma, chondrosarcoma Temporary regression of malignant nodules Post-radiation changes mimicking malignancy Limitations of lung nodule measurement 3. PET/CT Pitfalls False positive FDG uptake in infection and inflammation False negative FDG uptake in small lung cancers, adenocarcinoma of the lung and carcinoid

CHE151
Progression and Recurrence of Lung Cancer: Established Patterns and New Concepts

Education Exhibits
Location: CH Community, Learning Center

Participants
Charlie Sayer MBBS, FRCP (Presenter): Nothing to Disclose
Tim Benepal : Nothing to Disclose
Arjun Nair MBBC, FRCP : Nothing to Disclose
Myrna Cobos Barco Godoy MD, PhD : Nothing to Disclose
Ioannis Vlahos MRCP, FRCP : Research Consultant, Siemens AG Research Consultant, General Electric Company

TEACHING POINTS
Tumor recurrence is common. o 30-40% of surgically treated stage 1 lung cancer recur due to undetected micrometastases o Early recurrence on imaging may be missed o Early recognition potentiates the success of second line therapy. Genetic heterogeneity is common. o New therapies based on genetic mutations improve NSCLC outcome o Resistance due to new genetic mutations/transformation is common o 15% transform to small cell cancer, or develop other defects (50% T790M, 5% MET amplification) (Sequist 2011, Sci Trans Med). Expansion of treatment resistant clones and genetic transformation indicates need for therapy change. Surveillance of new therapies may differ from RECIST/WHO criteria and determine when rebiopsy is indicated.

TABLE OF CONTENTS/OUTLINE
CHE152

Radiologic Findings of Lung Adenocarcinoma and Differential Diagnosis: When is it Lung Cancer? A Radiologic-pathologic Correlation and Management Approach

Education Exhibits
Location: CH Community, Learning Center

Participants
Mariana Nelida Benegas Urteaga MD (Presenter): Nothing to Disclose
Marcelo Sanchez MD : Nothing to Disclose
Jose Ramirez MD : Nothing to Disclose
Francisco Lomena MD : Nothing to Disclose
Edmundo Rosales-Mayor : Nothing to Disclose

TEACHING POINTS
1- To describe the spectrum of CT features of lung adenocarcinoma according to the new classification with particular emphasis on subsolid nodules
2- To provide a differential diagnosis approach of subsolid nodules with pathologic correlation
3- To review the diagnosis and management implications of subsolid nodules

TABLE OF CONTENTS/OUTLINE
1. Introduction of the 2011 classification of adenocarcinoma of the lung
2. CT features of the spectrum of lesions of lung adenocarcinoma with pathologic correlation: atypical adenomatous hyperplasia, adenocarcinoma in situ, minimally invasive adenocarcinoma, invasive adenocarcinoma
3. Differential diagnosis of subsolid nodules and the imaging characteristics from benign inflammatory processes to malignant conditions:
   a - Infections: Aspergillus, virus, atypical pneumonia
   b - Malignant diseases: lymphoma, metastases
   c - Vascular diseases: pulmonary hemorrhage, vasculitis, pulmonary endometriosis
d - Inflammatory diseases: organizing pneumonia, focal interstitial fibrosis, eosinophilic pneumonia
4. Usefulness of PET-CT in diagnosis approach
5. Imaging guided biopsy of subsolid nodules and surgical approach
6. Current management guidelines for pulmonary subsolid nodules

CHE153

Screening, Treatment and Post-treatment Surveillance of Lung Cancer: A Comprehensive Review of Current Standards

Education Exhibits
Location: CH Community, Learning Center

Participants
Cameron Hassani MD (Presenter): Nothing to Disclose
Carol C. Wu MD : Author, Reed Elsevier
Christopher Lee MD : Nothing to Disclose
Alison Wilcox MD : Speaker, Toshiba Corporation
Farhood Saremi MD : Nothing to Disclose
Brett Wilson Carter MD : Author, Reed Elsevier Consultant, St. Jude Medical, Inc

TEACHING POINTS
Lung cancer screening (LCS) has been on the forefront of discussion within a broad array of medical societies. Following recommendations by the AATS, NCCN, ACCP, the US Preventive Services Task Force now recommends CT lung cancer screening in high risk patients.

LCS and treatment is best done in a multidisciplinary setting. To effectively participate in a multi-disciplinary structure, radiologists must have a firm grasp of screening, treatment and proper imaging follow-up after curative intent therapy.

Teaching goals:
- Understand the role of radiology in the multi-disciplinary approach to lung cancer detection, treatment and follow-up.
- Understand the imaging findings critical to lung cancer detection in initial screening and post-treatment surveillance

TABLE OF CONTENTS/OUTLINE
Introduction
Definition of lung cancer screening and review lung cancer screening technique
-Sample cases
Discuss biopsy and staging methods (CT, navigational bronchoscopy, EBUS, mediastinoscopy, etc)
Review treatment modalities: Ablation, Radiation therapy (SBRT, IMRT, Proton, Brachytherapy), Chemotherapy
Review goals of surveillance imaging after curative intent therapy (recurrence vs. new lung cancer)
Review current recommendations for surveillance imaging (Sample cases (Normal and abnormal post-treatment CT and PET/CT))
Summary
References

CHE154

Stage Fright: Test Your Knowledge of Lung Cancer Staging

Education Exhibits
Location: CH Community, Learning Center

Participants
Abigail Victoria Berniker MD (Presenter): Nothing to Disclose
Justin Edward Mackey MD : Nothing to Disclose
Oleg Teytelboym MD : Nothing to Disclose
TEACHING POINTS

Lung cancer is the leading cause of cancer death worldwide and is encountered routinely on imaging. Radiologists should be familiar with the most updated TNM lung cancer staging system and be comfortable applying it in succinct and accurate interpretations.

TABLE OF CONTENTS/OUTLINE

Goals This exhibit aims to:
- Review the TNM lung cancer staging system (AJCC 7th edition)
- Reinforce key concepts through a fun, interactive, case-based quiz to help radiologists feel more comfortable applying staging criteria in daily practice

Background
- Lung cancer represents 14% of all new cancers and is the leading cause of cancer death worldwide
- Staging has important implications on lung cancer treatment and prognosis
- Radiologists encounter lung cancer routinely and should be able to report accurate staging

Case-Based Quiz
- TNM criteria
- Stages I-IV
- Bonus round: challenging cases

Summary/Future Directions
Lung cancer is an important source of morbidity and mortality worldwide. Radiologists should be comfortable providing concise and accurate lung cancer staging to help guide referring clinicians and facilitate appropriate management. As lung cancer screening programs gain popularity, radiologists will have an even greater impact on lung cancer detection and treatment.

CHE155

Subsolid Pulmonary Nodules: What Do the Radiologists and Clinicians Need to Know?

Education Exhibits
Location: CH Community, Learning Center

Participants
Kavita Garg MD (Presenter): Nothing to Disclose
Stephen Malkoski: Nothing to Disclose

TEACHING POINTS

- Detection of subsolid (ground glass and part-solid nodules) nodules is expected to increase if CT screening for lung cancer becomes widespread.
- However, many questions remain, including whom to screen, how often, and for how long, especially in regards to the subsolid nodules.
- Overdiagnosis associated with screening is also a concern because we currently do not fully understand the natural history of subsolid nodules.
- Low-grade adenocarcinomas and adenocarcinoma in situ, typically manifest as subsolid nodules on low-dose CT images and are generally indolent.
- Integration of nodule features, pathology and patient characteristics (life expectancy, co-morbidities) are important in clinical decision making for management.

TABLE OF CONTENTS/OUTLINE

- Most frequently asked questions about subsolid nodules by clinicians
- Spectrum of CT findings of subsolid nodules and follow-up algorithms
- Assessment on follow-up CT and measurement techniques and variability
- CT and pathology correlations based on 2011 International Lung Adenocarcinoma Classification and implications for 7th edition of the TNM staging
- Case studies illustrating integrated personalized management decision making ranging from watchful waiting to surgical intervention

CHE157

The N Staging of Lung Cancer: To Biopsy or Not to Biopsy

Education Exhibits
Location: CH Community, Learning Center

Participants
Amanda Lea Steinberger DO (Presenter): Nothing to Disclose
Oleg Teytelboym MD: Nothing to Disclose

TEACHING POINTS

1. Understanding tumor biology and appropriate imaging utilization to guide clinical decision-making
2. Appropriate use of imaging, particularly FDG PET-CT, may obviate the standard biopsy based approaches for lymph node staging of lung cancer
3. Early stage lung cancer detected at screening may have little metastatic potential, requiring primarily local therapy
4. Routinely used biopsy based lymph node staging has a morbidity burden, and may not significantly reduce surgical upstaging

TABLE OF CONTENTS/OUTLINE

1. Review and illustrate AJCC 7th ed of TNM staging for lung cancer
2. Review the National Comprehensive Cancer Network guidelines for N-staging lung cancer
3. Address the role of mediastinoscopy and other interventional biopsy techniques in staging of potentially resectable lung cancer
4. Describe current treatment approaches to potentially curable lung cancer and subsolid nodules
5. Discuss the usage of FDG PET-CT in evaluating lymph node a. Review SUV based cut offs
6. Illustrate FDG PET-CT pitfalls
7. Review utilization of emerging techniques such as MRI for N staging of lung cancer
8. Provide practical protocols for dealing with typical staging dilemmas in work up of early lung cancer detected at screening

CHE158

Uncommon but Not Forgotten: Unusual Tumors and Tumor-like Lesions of the Lung

Education Exhibits
Location: CH Community, Learning Center

Participants
Emily Bao Tsai MD (Presenter): Nothing to Disclose
Adenocarcinoma, squamous cell carcinoma, small cell carcinoma and large cell carcinoma comprise over 90% of primary lung tumors. The remaining neoplasms consist of uncommon histologic types of non-small cell lung carcinomas and airway, lymphoepithelial and mesenchymal tumors. After viewing this presentation, participants will be able to: 1) Identify clinical and imaging features of uncommon tumors and tumor-like lesions of the lung; 2) Describe the role of cross-sectional imaging in staging and follow-up; 3) Appreciate the role of pathology in diagnosis.

TABLE OF CONTENTS/OUTLINE

The following categories of unusual lung neoplasms and tumor-like lesions are described: 1) Non-small cell lung carcinomas: adenosquamous, sarcomatoid, carcinoid, salivary gland-type; 2) Airway lesions: laryngotracheobronchial papillomatosis; 3) Lymphoepithelial neoplasms: angiocentric lymphoma, bronchus-associated lymphoid tissue lymphoma; 4) Mesenchymal tumors: inflammatory myofibroblastic tumor, solitary fibrous tumor, benign metastasizing leiomyoma; 5) Non-neoplastic lesions: lipid pneumonia, amyloidoma. Imaging characteristics are mostly non-specific; however, cross-sectional imaging is useful for documenting extent of disease, describing associated findings and planning further diagnostic/therapeutic approaches. Pathologic examination provides definitive diagnosis in most cases.

CHE159

Unusual Radiographic Manifestations of Malignant Lung Tumors on CT

Education Exhibits
Location: CH Community, Learning Center

Participants
Makiko Murota (Presenter): Nothing to Disclose
Yuka Yamamoto MD, PhD: Nothing to Disclose
Katashi Satoh MD: Nothing to Disclose
Yoshihiro Nishiyama MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:
1. To illustrate and review various unusual radiographic manifestations of malignant lung tumors on chest CT which may resemble benign lesions in appearance
2. To show the differential diagnosis of these manifestations

TABLE OF CONTENTS/OUTLINE

1. To illustrate and review unusual radiographic manifestations of malignant lung tumors on chest CT
- Thin-walled cavitation
- Calcification
- Pneumonia-like pattern
- Mimicking focal organizing pneumonia
- Others
2. To describe the mechanisms and show the differential diagnosis of these manifestations

CHE160

“Back to the Heart”: Pearls You Can Find on Non-gated Chest CT

Education Exhibits
Location: CH Community, Learning Center

Participants
Yon Mi Sung MD (Presenter): Nothing to Disclose
Yoon Kyung Kim MD: Nothing to Disclose

TEACHING POINTS

Recent developments in CT technology permits increased detection of cardiac findings on non-gated chest CT due to decreased cardiac motion artifacts. Also, some of findings are relevant to the patient's presenting complaints. The purpose of this exhibit is to expose radiologists to a series of challenging cases in order to help improve the radiologist's diagnostic accuracy when facing such cases.

TABLE OF CONTENTS/OUTLINE

The cases will be presented in a quiz format. Key features will be highlighted in the discussion of each case. The list of cases includes: Ischemic heart diseases - acute myocardial infarction, chronic myocardial infarction Valvular heart diseases - aortic stenosis Myocardial/peri-cardial diseases - hypertrophic cardiomyopathy, arrhythmogenic right ventricular cardiomyopathy, adriamycin induced cardiomyopathy, postpartum cardiomyopathy, constrictive pericarditis Tumors and thrombi - lipomatous hypertrophy of interatrial septum, lipoma, myxoma, angiosarcoma, liposarcoma, intravascular leiomyomatosis, intracardical thrombus Congenital variants/anomalies - coronary artery and vein anomalies, atrial septal aneurysm, atrial septal defect, patent ductus arteriosus, remnant of common pulmonary vein, pulmonary venous varix

CHE161

4-Dimensional (4D) CT Assessment of Abnormal Upper Airway Movement and Phonation Disorders
**Education Exhibits**

**Location:** CH Community, Learning Center

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**Participants**

Kenneth K. Lau (Presenter): Nothing to Disclose  
Theodore Lau: Nothing to Disclose

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**TEACHING POINTS**

The 320-slice multidetector CT (320-MDCT) has the ability to provide dynamic volume assessment of the laryngeal and tracheal airway during breathing and phonation. The purpose of this exhibit is to demonstrate the utility of 320-MDCT in diagnosing certain upper airway movement and phonation disorders that may not be diagnosed on conventional CT.

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**TABLE OF CONTENTS/OUTLINE**

320-MDCT is useful in detecting, monitoring, and assessing treatment response on abnormal upper airway movement in a) laryngeal dysfunction that can mimic asthma, b) different forms of tracheomalacia, c) excessive dynamic airway collapse with posterior tracheal membrane bulging into the tracheal lumen, d) primary airway amyloidosis, e) pseudoxanthoma elasticum associated with haemoglobinopathy, f) vocal cord movement disorders in vocal cord paralysis, Parkinsonism and rheumatoid arthritis. CT and MRI are common imaging techniques for laryngeal structural pathology, but cannot demonstrate abnormal movement of the larynx and trachea that can be symptomatic. The 320-MDCT with its 4-D capability can be a valuable tool in the dynamic assessment of upper airway movement and phonation disorders and become a non-invasive alternative to laryngoscopy. This CT technique would also allow better understanding of the laryngeal pathophysiology in future.

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**CHE162**

**A Quiz-based Review of Diaphragmatic Hernias and Their Presentations**

**Education Exhibits**

**Location:** CH Community, Learning Center

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**Participants**

Lana Beth Winkler MD (Presenter): Nothing to Disclose  
Jeffery Hogg MD: Nothing to Disclose

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**TEACHING POINTS**

1) Diaphragmatic hernias are a common finding on radiological imaging and can be attributed to a variety of causes including congenital, traumatic, or idiopathic. 2) Complications, such as small bowel obstruction and compromise of lung development, can occur as a result of diaphragmatic hernias. 3) Utilizing imaging clues, such as the "dependent viscera sign" and "collar sign", will help radiologists better identify this diagnosis. 4) Certain diaphragmatic abnormalities, such as phrenic nerve injury or paralysis, mimic diaphragmatic hernias on imaging, and differentiation may be made with clinical context.

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**TABLE OF CONTENTS/OUTLINE**

The learner will be prompted with questions followed by answers and explanations through a variety of diaphragmatic hernia presentations and mimics of diaphragmatic hernias. Topics of discussion include: - Pediatric presentation of congenital diaphragmatic hernias (imaged with prenatal ultrasound and MRI) - Adult presentation of congenital diaphragmatic hernias (Bochdalek and Morgagni hernias) - Traumatic diaphragmatic hernia/Diaphragm rupture (with images demonstrating "dependent viscera sign" and "collar sign") - Diaphragmatic paralysis due to phrenic nerve injury (mimic of a diaphragmatic hernia) - Complications (images demonstrating a small bowel obstruction) - Treatment

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**CHE163**

**An Overview of Uncommon Primary Pulmonary Tumors: An Imaging Spectrum Beyond Lung Cancer with Histopathological Correlation**

**Education Exhibits**

**Location:** CH Community, Learning Center

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**Participants**

Ameya Jagadish Baxi MBBS, DMRD (Presenter): Nothing to Disclose  
Carlos S. Restrepo MD: Nothing to Disclose  
Michael James McCarthy MD: Nothing to Disclose  
Amy Laura Mumbower MD: Nothing to Disclose  
Rashmi S. Katre: Nothing to Disclose  
Sonia Liliana Betancourt Cueliar MD: Nothing to Disclose  
Daniel Vargas MD: Nothing to Disclose  
Sachin Shyamsunder Saboo FRCR, MD: Nothing to Disclose

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**TEACHING POINTS**

The major teaching points of this exhibit : 1. To identify and illustrate spectrum of primary pulmonary tumors on CT and MRI other than lung cancers 2. To review the pathogenesis 3. To describe and illustrate typical and atypical CT (and MRI imaging) appearances of these tumors

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**TABLE OF CONTENTS/OUTLINE**

Knowledge of imaging appearance of primary pulmonary tumors is important for accurate diagnosis and treatment. Though the uncommon primary pulmonary tumors has similar radiological appearance, they differ in epidemiology, clinical outcome and management from lung cancers. Given the potential significant morbidity, it is important to understand and recognize them. We did retrospective analysis of histologically proven primary pulmonary tumors which were diagnosed during CT chest, PET CT and MRI. We also reviewed clinical features and laboratory work up of these patients. The CT scans were reviewed for the following features: lesion location; size, number, contour, contrast enhancement; mass effect, invasion of surrounding structures and presence or absence of calcification and metastasis. The primary pulmonary tumors other than lung cancer which we came across were carcinoid, sarcoma, chondroma, blastoma, chemoductoma, pericytoma, synovial sarcoma, epitheloid hemangioepithelioma and inflammatory fibroblastic tumor, tracheo-bronchial papillomas.
CHE164
Atlas of Tracheobronchial Positional Abnormalities

Education Exhibits
Location: CH Community, Learning Center

Selected for RadioGraphics

Participants
Guillaume Chassagnon (Presenter): Nothing to Disclose
Baptiste Morel MD: Nothing to Disclose
Elodie Carpentier: Nothing to Disclose
Hubert Ducou Le Pointe MD, PhD: Nothing to Disclose
Dominique Sirinelli MD: Nothing to Disclose

TEACHING POINTS
- Anatomy of the tracheobronchial tree has been described by Boyden et al in 1955 and several variants of bronchial position
  have been described. - Various theories for the pathogenesis of anomalous tracheobronchial development have been proposed.
  Anomalies resulting in anatomic variants of tracheobronchial anatomy are assumed to occur after the 28th day of gestation. -
  Congenital bronchial anomalies can be symptomatic, leading to recurrent pneumonia, hemoptysis or dyspnea. - Use of a
  uniform and comprehensive classification system is essential to describe congenital positional abnormalities of the
  tracheobronchial tree. - An abnormally positioned bronchus can be supernumerary or displaced. - A tracheal bronchus is the
  most frequent congenital bronchial positional anomaly and this term should only refer to a bronchus arising from the trachea or
  from the carina.

TABLE OF CONTENTS/OUTLINE
- Normal tracheobronchial anatomy - Embryology - Comprehensive classification of congenital tracheobronchial positional
  abnormalities: Pulmonary situs abnormalities Displaced bronchus Supernumerary bronchus Bridging bronchus Bronchial
  agenesis

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CHE165
Avoiding Collateral Damage: Review of Important Collateral Pathways in the Chest and Their Clinical Significance

Education Exhibits
Location: CH Community, Learning Center

Participants
Demetrios A. Raptis MD (Presenter): Nothing to Disclose
Sanjeev Bhalla MD: Nothing to Disclose
Constantine Apostolos Raptis MD: Nothing to Disclose

TEACHING POINTS
With the increased use of computed tomography angiography for evaluation of pulmonary embolism and aortic dissection,
radiologists often encounter other vascular findings within the thorax. This exhibit aims to: Review arterial, venous, and mixed
collateral vascular pathways. Review pathophysiology and CT findings of these pathways. Discuss relationship between radiologic
findings and patient’s symptoms.

TABLE OF CONTENTS/OUTLINE
Arterial to arterial collaterals in the setting of: Anomalous left coronary artery arising from the pulmonary artery Aortic
coarctation Blalock-Taussing Shunt Chronic PE Acute PE Absence of right pulmonary artery Venous to venous collaterals:
Anterior, middle, and posterior mediastinal arcades SVC and brachiocephalic obstruction (common and uncommon collaterals)
Type 2 hepatopulmonary syndrome Fontan Left sided SVC Mixed arterial and venous collaterals: Intralobar and extralobar
sequestration HHT pre/post-treatment Neovascularity in eisenmenger and pulmonary arterial hypertension Left SVC draining to
LA

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CHE166
Breaking Down the Wall: Malignant Neoplasms of the Chest Wall and Distinguishing Imaging Features

Education Exhibits
Location: CH Community, Learning Center

Certificate of Merit
Selected for RadioGraphics

Participants
Brett Wilson Carter MD (Presenter): Author, Reed Elsevier Consultant, St. Jude Medical, Inc
Marcelo Kuperman Benveniste MD: Nothing to Disclose
Sonia Liliana Betancourt Cuellar MD: Nothing to Disclose
Patricia Monique de Groot MD: Nothing to Disclose
James Sorensen: Nothing to Disclose
John Peter Lichtenberger MD: Author, Amirsys, Inc.
Gerald F. Abbott MD: Author, Thieme Medical Publishers, Inc Author, Amirsys, Inc

TEACHING POINTS
1. Neoplasms of the chest wall account for approximately 2% of all thoracic malignancies. 2. Although chest wall tumors may be
   initially identified on chest radiography, they are best evaluated with advanced cross-sectional imaging studies such as MDCT,
   MRI, and PET/CT. 3. Malignant osseous and soft tissue tumors of the chest wall demonstrate key features across multiple
   imaging modalities. 4. Utilization of clinical and radiologic information enables the generation of focused differential diagnoses.
TABLE OF CONTENTS/OUTLINE
1. Role of thoracic imaging in the evaluation of chest wall neoplasms
   Purpose of imaging
   Imaging modalities
   Imaging approach to chest wall tumors
2. Classification system of chest wall neoplasms
   Osseous Tumors
   Soft Tissue Tumors
3. Key radiologic and clinical features of malignant chest wall tumors
4. Treatment of chest wall neoplasms

CHE167
Calcifications in the Chest—To Worry or Not to Worry?

Education Exhibits
Location: CH Community, Learning Center

Certificate of Merit

Participants
Maria Cruz Ageitos Casais MD (Presenter): Nothing to Disclose
Sandra Baleato Gonzalez MD: Nothing to Disclose
Anxo Martinez De Alegria MD: Nothing to Disclose
Roberto Garcia Figueiras MD: Nothing to Disclose
Maria Virginia Trujillo Ariza MD: Nothing to Disclose

TEACHING POINTS
Calcifications located within the chest are a frequent and commonly overviewed finding in daily practice. But in some cases calcifications are the key feature that point out to the proper diagnosis. Radiologists must recognize them in each imaging technique and know its "to worry" and the "not to worry" features and locations. The purpose of this exhibit is:
- To illustrate the great variety of thoracic calcifications and describe its morphologic appearance
- To establish the "to worry" and "not to worry" specific features.
- To review the different benign and malignant entities that may present with calcified lesions and its causes.
- To classify calcifications according to its location within the chest.

TABLE OF CONTENTS/OUTLINE
1. Index
2. General overview of thoracic calcifications imaging
   - General physiopathology: What should I know?
   - How to recognize them in each technique: X-ray, US, CT, MRI
   - Morphologic patterns: benign and malignant features, Should I be worried?
3. Entities that may present with calcified lesions, classified depending on its location:
   - Calcifications within the soft tissues
   - Calcifications within the vessels
   - Calcifications within the mediastinum
   - Calcifications within the lung and pleura
4. Take home points

CHE168
Cardiopulmonary Syndromes: Conditions with Concomitant Cardiac and Pulmonary Abnormalities

Education Exhibits
Location: CH Community, Learning Center

Participants
Daniel Verdini MD (Presenter): Nothing to Disclose
Carlos S. Restrepo MD: Nothing to Disclose

TEACHING POINTS
1. Discuss the relationship of cardiac and pulmonary embryology to the pathophysiology of various cardiopulmonary syndromes.
2. Demonstrate the multimodality imaging findings of various cardiopulmonary syndromes.

TABLE OF CONTENTS/OUTLINE
Pathophysiology of various cardiopulmonary syndromes, with relation to embryology
Multi-modality imaging findings of various cardiopulmonary syndromes, including:
- Heterotaxia syndrome (situs abnormalities and cilia dyskinesia)
- Scimitar syndrome (partial anomalous venous return and hypogenetic lung)
- Partial anomalous venous return and ASD
- Proximal interruption of the pulmonary artery with pulmonary cysts
- Pulmonary sequestration and bronchogenic cyst
- Ring sling complex (cartilaginous tracheal ring and pulmonary artery sling)
- Tetralogy of Fallot with branch pulmonary artery stenosis

CHE169
Cavitary Pulmonary Lesions: Are There Holes in Our Approach?

Education Exhibits
Location: CH Community, Learning Center

Participants
Jonathan Hickle MD (Presenter): Nothing to Disclose
TEACHING POINTS

There is considerable overlap in the appearance of benign and malignant cavitary pulmonary lesions; CT features alone are not sufficiently reliable to distinguish malignant from benign cavitary lesions. An algorithmic approach combining CT appearance with key demographic and clinical features, can improve the radiologist’s assessment of cavitary lesions and can provide a practical approach to management. Immunocompromised patients, or those at risk for aspiration may present with infectious cavitary lung lesions that demonstrate malignant CT features. Both inflammatory and malignant lesions are FDG avid; the utility of PET in distinguishing malignant from benign inflammatory lesions is dubious.

TABLE OF CONTENTS/OUTLINE

- Review the pathophysiology of pulmonary cavitation.
- Case based review of common mimics of cavitary lesions.
- Review imaging predictors and features of malignancy and benignity described in the literature and discuss the limitations of this approach.
- Application of the described features in pathology or culture proven local cases including: Mycobacterium tuberculosis, MAC, mixed pulmonary abscess, Coxiella burnetti, aspergillus, sarcoidosis, non-small cell lung cancer, metastases, pulmonary infarction and vasculitis.
- Provide a suggested algorithm for evaluating cavitary pulmonary lesions.

CHE170

Clinical Advantages of the Diffusion Weighted MR Imaging on Chest Disorders: When and How Useful?

Education Exhibits

Location: CH Community, Learning Center

Participants

- Hidefumi Fujisawa MD (Presenter): Nothing to Disclose
- Kota Watanabe MD: Nothing to Disclose
- Kazuya Matsunari: Nothing to Disclose
- Sho Funaki: Nothing to Disclose
- Noriko Niiya: Nothing to Disclose
- Tamio Kushihashi MD: Nothing to Disclose

TEACHING POINTS

The aim of this exhibit is:

1. To review the diffusion weighted MR imaging (DWI) with various chest disorders including pulmonary, mediastinum, and chest wall.
2. To discuss whether DWI is useful on chest disorders.
3. To show the clinical utility cases of DWI and apparent diffusion coefficient (ADC) values in the diagnosis.

TABLE OF CONTENTS/OUTLINE

- Character of DWI on chest radiology
- Review of imaging findings CT and conventional MRI
- DWI
- ADC map
- Sample cases Low ADC value cases High ADC value cases Differential points between cystic and solid tumors on DWI
- DWI findings of the tumor recurrence or not
- Distinguishing point of benign and malignant tumors
- Distinguishing findings of necrotic tumor and abscess
- Decision in treatment effect using ADC values
- Future directions and summary

CHE171

Clinical Decision Making in Radiology- An Algorithmic Approach to Diagnose Lung Disease and Demonstrate its Function Using Venn Diagrams

Education Exhibits

Location: CH Community, Learning Center

Participants

- Sana Parsian MD (Presenter): Nothing to Disclose
- Xue Susan Bai MD: Nothing to Disclose
- Gregory Kiccka MD, PhD: Nothing to Disclose
- Jitesh Ahuja MD, MBBS: Nothing to Disclose
- Sudhakar N. Pipavath MD: Nothing to Disclose
- J. David Godwin MD: Shareholder, Cardiac Insight

TEACHING POINTS

1. Introduce a unique algorithm to approach imaging findings of lung disease.
2. This unique algorithm would:
   A. Identify imaging findings.
   B. Make an anatomic or morphologic diagnosis using the identified findings.
   C. Use specific imaging signs or clues, if present, to predict etiology.
   D. Use clinical findings and clinical signs or available additional clinical tools or clues to make a specific etiologic diagnosis.
3. Demonstrate the interplay of the various components of the algorithm using a Venn diagram.

TABLE OF CONTENTS/OUTLINE

1. How does the algorithm work?
   - Identify imaging findings
   - Make a morphologic or anatomic diagnosis based on the representative imaging findings
   - Identify radiologic signs or clues when present
   - Identify clinical findings and signs
   - Make an etiologic diagnosis
   - Display the components using a Venn diagram to understand their interplay
2. Demonstrate how this algorithm works using various examples of lung disease.
3. Quiz and interactive self-test using this algorithm with the provided examples.

CHE172

Emerging Clinical Applications of Digital Tomosynthesis of the Chest

Education Exhibits

Location: CH Community, Learning Center
Participants
Ji Yung Choo MD (Presenter): Nothing to Disclose
Jisung Han MD: Nothing to Disclose
Ki Yeol Lee MD, PhD: Nothing to Disclose
Eun-Young Kang MD: Nothing to Disclose
Whan Oh: Nothing to Disclose
Je Hyeong Kim: Nothing to Disclose
Seung Heon Lee: Nothing to Disclose

TEACHING POINTS
1. To understand the technical concept of low dose digital tomosynthesis of the chest and its implementation
2. To understand which type of clinical application can be performed under digital tomosynthesis in chest section
3. To recognise the limitations and benefits of digital tomosynthesis of the chest in radiation exposure and image acquisition

TABLE OF CONTENTS/OUTLINE
Our exhibit will be divided into 3 sections and presented with illustration and relevant cases:

1. Background and physics of digital tomosynthesis of the chest
2. Clinical application of digital tomosynthesis in airway abnormalities
   - Neoplastic and noneoplastic lesions involving the airways
     1. Lung cancer
     2. Benign tumor
     3. Evaluation of post-chemotherapy or operation status as a follow up tool
     4. Congenital anomaly of airways
     Post-operative evaluation
     1. Lobectomy, biolobectomy or pneumonectomy state
     2. Evaluation of dead space
     3. Localization of drain catheter
     Lung parenchymal lesion
     1. Interstitial lung disease
     2. Emphysema, bullae
     3. Nodule (solid, ground glass opacity nodule)
     4. Consolidations (Tuberculosis, pneumonia, lung cancer, etc.)
     Chest wall and bone lesion
     Pleura
     1. Pneumothorax with blebs
3. Benefits and limitation of tomosynthesis of the chest
   1) Radiation exposure
   2) Image acquisition

CHE173
Everything You Want to Know About Superior Vena Cava

Education Exhibits
Location: CH Community, Learning Center

Certificate of Merit
Selected for RadioGraphics

Participants
Desmin Milner MD : Nothing to Disclose
Sushilkumar K. Sonavane MD (Presenter): Nothing to Disclose
Abhishek Chaturvedi MD : Nothing to Disclose
Ahmed Kamel Abdel Aal MD, PhD: Consultant, St. Jude Medical, Inc Consultant, Baxter International Inc Consultant, C. R. Bard, Inc
Kaushik S. Shahir MD : Nothing to Disclose
Satinder Pal Singh MD : Nothing to Disclose

TEACHING POINTS
Review embryology and anatomy of superior vena cava (SVC)
Discuss indications, protocols for imaging evaluation with Contrast CT, Contrast and Non-contrast MRA
Review the common disease processes affecting the SVC
Briefly discuss intervention on SVC

TABLE OF CONTENTS/OUTLINE
Embryology and anatomy of SVC Role of imaging modalities
- CT with contrast
- MR Angiography with contrast
- Time resolved, first pass, steady state
- Noncontrast MR Angiography
- Catheter venogram
Discuss abnormalities with examples: Congenital: Duplication, Left SVC, Right upper lobe partial anomalous pulmonary venous return and sinus venosus atrial septal defect, Sub-aortic left innominate vein, lipoma Trauma: Hematoma Stricture: Catheterization, Radiation, Fibrosing mediastinitis

CHE174
Evil Humors: Thoracic Manifestations of Immunoglobulin Related Disease in Adults

Education Exhibits
Location: CH Community, Learning Center

Cum Laude

Participants
Matthew Harlan Lee MD (Presenter): Nothing to Disclose
Jeffrey P. Kanne MD : Research Consultant, Perceptive Informatics, Inc
Cristopher A. Meyer MD : Stockholder, Cellectar Biosciences, Inc

TEACHING POINTS
- Disorders of humoral immunity result in a variety of clinically significant immunoglobulin (Ig) related diseases.
- Identify representative Ig related diseases and their characteristic thoracic imaging findings.
- Demonstrate how familiarity with Ig
related diseases informs thoracic imaging findings and narrows differential diagnosis.

**TABLE OF CONTENTS/OVERSE**
- Introduction with overview of antibody-mediated immunity, specific Ig function, autoimmunity, and basic mechanisms underlying autoimmunity. - Illustrate Ig related diseases with overview and discussion of clinical manifestations, serologic profiles (i.e. increased/decreased Ig subtype), and typical radiographic and CT findings. Examples: Primary immune deficiency: Agammaglobulinemia, common variable immunodeficiency, IgA and IgG deficiency. Autoimmune: IgG4 and IgG3 related disease. IgA nephropathy. Goodpasture disease, pulmonary alveolar proteinosis. Allergy related: ABPA. Plasma cell disorder: Multiple myeloma/MGUS. Drug related: antibody therapies. Other: Amyloid, light chain deposition disorder. Summary: - A myriad of Ig related diseases have thoracic manifestations. - Recognizing the imaging findings of Ig related diseases and their specific serologic profiles aids in establishing a specific diagnosis or limiting differential diagnosis.

**CHE175**

**Funny Bones: Incidental Bone Findings on Chest Radiographs**

***Education Exhibits***
*Location: CH Community, Learning Center*

**Participants**
- Alan Matthew Ropp MD (Presenter): Nothing to Disclose
- Jay Patel MD : Nothing to Disclose
- Derik L. Davis MD : Nothing to Disclose
- Jean Jeudy MD : Nothing to Disclose

**TEACHING POINTS**
1. Describe cases of bone pathology incidentally encountered on chest radiographs. 2. Discuss clinically relevant information related to the processes. 3. Assess participant’s knowledge with CME style questions.

**TABLE OF CONTENTS/OVERSE**
Many interesting and important skeletal findings may be incidentally encountered while interpreting chest radiographs. These findings may present a diagnostic dilemma to the general radiologist. Chest radiograph case examples of various skeletal findings seen on imaging performed for unrelated diagnoses are presented, along with clinically relevant content and CME style questions. Malignancies ▪ Plasmacytoma, chondrosarcoma, metastatic disease Benign bone lesions ▪ Osteochondroma, osteochondromatosis, osteopiklisis, non-ossifying fibroma, and fibrous dysplasia Developmental/Congenital anomalies ▪ Pectus excavatum, carinatum, sternal foramen, cervical ribs, Klippel-Feil syndrome (Sprengel’s deformity), ankylosing spondylitis, melorheostosis, rib notchting (aortic coarctation), and hyperparathyroidism (rugger jersey spine)

**CHE176**

**Gender Matters: The Imaging Spectrum of Thoracic Cardiopulmonary Diseases Which Exclusively or Predominantly Affects Either Females or Males**

***Education Exhibits***
*Location: CH Community, Learning Center*

**Participants**
- Carlos S. Restrepo MD (Presenter): Nothing to Disclose
- Daniel Vargas MD : Nothing to Disclose
- Daniel Ocazionez MD : Nothing to Disclose
- Jorge Carrillo MD : Nothing to Disclose
- Santiago Martinez-Jimenez MD : Author, Amirsys, Inc
- Ameya Jagadish Baxi MBBS, DMRD : Nothing to Disclose

**TEACHING POINTS**
1. To identify the thoracic cardiopulmonary diseases that exclusively or predominantly affect either females or males. 2. To review the pathophysiology, and imaging manifestation of those conditions with a significant difference in distribution by gender.

**TABLE OF CONTENTS/OVERSE**
The pathophysiology, clinical and imaging manifestations of the following conditions will be reviewed: Diseases that exclusively or predominantly affect women: - Lymphangioleiomyomatosis (LAM), Benign metastasizing leiomyomas, intracardiac uterine leiomyoma, peripartum cardiomyopathy, amniotic fluid embolism, chronic eosinophilic pneumonia, Turner syndrome, Meigs syndrome, Catamenial pneumothorax, Pulmonary endometriosis, Giant cell arteritis, Takayasus arteritis. Diseases which exclusively or predominantly affect men: ▪ Mediastinal seminoma, mediastinal non-seminomatous tumor, Chronic granulomatous disease, Behcet disease, Hughes-Stovin syndrome, Kaposis sarcoma, Aortic coarctation, Bicuspid aortic valve, Plasmacytoma, Young syndrome.

**CHE177**

**Get in on the Act: Optimizing CT Detection of Subtle Pulmonary Nodules and Emphysematous Changes Utilizing MIP and MinIP Images**

***Education Exhibits***
*Location: CH Community, Learning Center*

**Participants**
- Jennifer Jaehee Choi MD (Presenter): Nothing to Disclose
- Kenneth Cooke MD : Nothing to Disclose

**TEACHING POINTS**
The objective of this exhibit is: 1) To review the principles behind the post processing techniques, maximum intensity projection (MIP) and minimum intensity projection (MinIP). 2) To review current common applications of MIP and MinIP. 3) To
interactively demonstrate how post processing techniques such as MIP and MinIP can significantly improve CT detection of subtle pulmonary nodules and emphysematous changes, respectively. 4) To demonstrate how MIP and MinIP can be easily integrated into daily workflow when interpreting CT examinations of the chest.

**TABLE OF CONTENTS/OUTLINE**

- Overview of principles of MIP and MinIP
- Current applications of MIP and MinIP
- Sample cases demonstrating how using MIP and MinIP can improve CT detection of lung nodules and emphysematous changes
- Cases will be presented in a video/PACS simulation format and the viewer will be asked to detect lung nodules, first on images from a chest CT scan followed by complementary MIP images.
- Implications for workflow

**CHE178**

**Getting a Taste for the Pulmonary Cheerio—Imaging Appearance and Differential Diagnosis**

**Education Exhibits**

Location: CH Community, Learning Center

Certificate of Merit

**Participants**

Travis S. Henry MD (Presenter): Spouse, Employee, F. Hoffmann-La Roche Ltd
Brent Little MD: Nothing to Disclose
Jonathan Hero Chung MD: Research Grant, Siemens AG Royalties, Amirsys, Inc
Eugene Aaron Berkowitz MD: Nothing to Disclose
Sanjeev Bhalla MD: Nothing to Disclose

**TEACHING POINTS**

1. The pulmonary cheerio is a commonly encountered sign/pattern that was originally described on CT in the context of lung adenocarcinoma (formerly bronchioloalveolar cell carcinoma). Many other entities - both malignant and benign - can present with a similar appearance. 2. While the pulmonary cheerio may look similar for different entities, the clinical context, pattern of cheerio distribution and ancillary lung findings can can often point to a specific diagnosis, or at least narrow the differential as discussed in this exhibit.

**TABLE OF CONTENTS/OUTLINE**

- Introduction
- Cased-Base Review of Causes of Pulmonary Cheerios:
  - Lung adenocarcinoma
  - Metastatic disease (adenocarcinoma ofGI primary; sarcoma; squamous cell carcinoma)
  - Pulmonary Langerhans cell histiocytosis
  - Wegener's granulomatosis
  - Tracheobronchial papillomatosis
  - Malignancy treated with VEGF inhibitors
  - Rheumatoid Nodules
  - Pulmonary meningothelial-like nodule
  - Septic emboli
- Narrowing the differential diagnosis using other clinical and radiologic clues.

**CHE179**

**How Does the Blood Get from Here to There? Illustration of Common Collateral Pathways Seen in the Thorax**

**Education Exhibits**

Location: CH Community, Learning Center

**Participants**

Omar Hasan MD (Presenter): Nothing to Disclose
Ashwani Kumar Sharma MD: Nothing to Disclose
Abhishek Chaturvedi MD: Nothing to Disclose
John C. Wandtke MD: Nothing to Disclose
Susan K. Hobbs MD, PhD: Nothing to Disclose

**TEACHING POINTS**

- Review of normal and variant venous anatomy in the thorax
- The location of venous occlusion plays a role in development of collateral vessels
- Arterial collaterals are less common, but can be appreciated on MR and CT

**TABLE OF CONTENTS/OUTLINE**

- Normal and variant venous anatomy of the thorax
- Localization of collaterals depends on the level of occlusion. We will review the collateral pathways associated with the following scenarios:
  - Axillary or subclavian vein occlusion
  - Superior vena cava occlusion
  - Inferior vena cava occlusion
  - Between renal and hepatic veins
- Normal and variant arterial anatomy of the thorax

**CHE180**

**How Well Do You Know Lines & Stripes? Review and Quiz for Students, Residents, and Beyond**

**Education Exhibits**

Location: CH Community, Learning Center

**Participants**

Jonathan Chung MD (Presenter): Nothing to Disclose
Roya Etemad-Rezai MD: Nothing to Disclose
Mark Landis MD, FRCP: Nothing to Disclose

**TEACHING POINTS**

Despite increases in CT use, radiography continues to be an efficacious and cost effective tool to evaluate mediastinal and parenchymal lung disease. This exhibit will revisit the fundamental lines and stripes of chest radiography and reinforce these
concepts in a quiz format using examples from our teaching center. After completion of this exhibit, the reader will have the tools to detect subtle abnormalities of both the frontal and lateral chest radiograph.

**TABLE OF CONTENTS/OUTLINE**

- Illustrated review of the normal lines and stripes of the chest radiograph.
- Series of frontal or lateral chest radiographs, each with an abnormality of one or more of the fundamental lines or stripes. These cases will be animated, showing the pertinent abnormality. Correlation with cross sectional imaging will be provided with each case.

**CHE181**

**Hyperpolarised Xenon MRI—A New Functional Imaging Technique in Respiratory Medicine**

**Education Exhibits**

**Location:** CH Community, Learning Center

**Participants**

Tahreema Nihad Hashmi Matin MBBS (Presenter): Nothing to Disclose
Xiaojun Xu MSC, DPhil: Nothing to Disclose
Nassim Parvizi MBBS, BSc: Nothing to Disclose
Tom Doel DPhil: Nothing to Disclose
Jennifer Lee: Nothing to Disclose
Najib Rahman MSC, DPhil: Nothing to Disclose
Anabel Nickol: Nothing to Disclose
Vincente Grau PhD: Nothing to Disclose
Fergus Vincent Gleeson MBBS: Alliance Medical Ltd Consultant

**TEACHING POINTS**

To describe hyperpolarised xenon MRI (Xe-MRI) at 1.5T, a novel regional functional imaging technique.

**TABLE OF CONTENTS/OUTLINE**

A. Limitations of current lung function assessment tools
B: Description of Xe-MRI technique including hyperpolarisation method, choice of sequences and typical examination pathway
C: Radiological features of Xe-MRI in healthy volunteers and patients with chronic respiratory disease
D: Description of novel Xe-MRI data analysis methodology including regional segmentation and multi-modality co-registration
E: Potential utility of Xe-MRI and role in clinical care

**Summary:**

Current methods for assessing lung function are inadequate. Imaging data from 30 prospectively enrolled healthy volunteers, and patients with chronic respiratory disease are used to illustrate the potential of Xe-MRI to offer comprehensive evaluation of regional lung function. Establishing Xe-MRI will lead to a better understanding of regional lung disease pathophysiology and enable individual-tailored treatments by improved assessment of therapeutic response.

**CHE182**

**Imaging Features of Neoplastic and Non-neoplastic Lesions of the Tracheobronchial Tree; Pictorial Review**

**Education Exhibits**

**Location:** CH Community, Learning Center

**Participants**

Shinsuke Shimoyama MD (Presenter): Nothing to Disclose
Hisanobu Koyama MD, PhD: Nothing to Disclose
Yoshiharu Ohno MD, PhD: Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd Research Grant, Terumo Corporation Research Grant, Fuji Yakuhin Co, Ltd Research Grant, FUJIFILM Holdings Corporation Research Grant, Guerbet SA
Mizuhoko Nishio MD, PhD: Research Grant, Toshiba Corporation
Tatsuya Nishii MD: Nothing to Disclose
Shinichiro Seki: Nothing to Disclose
Kazuro Sugimura MD, PhD: Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAIICHI SANKYO Group

**TEACHING POINTS**

Although neoplasms in the tracheobronchial tree are rare, a variety of tumors including primary and secondary malignant tumors as well as benign tumors are observed in routine clinical practice. On the other hand, many non-neoplastic lesions, e.g. relapsing polychondritis and infection disease, affect tracheobronchial tree and result in bronchial wall thickening and decreasing of the lumen. The diagnosis is sometimes difficult, however some neoplastic and non-neoplastic lesions of the tracheobronchial tree have specific findings. Therefore, the knowledge of radiological features of these lesions has a potential of lead to the diagnosis, and therefore the major teaching points of this exhibit are:

1. To review the imaging features of neoplastic and non-neoplastic lesions in the tracheobronchial tree at not only CT, but also MR imaging and PET or PET/CT.
2. To learn the more accurate diagnostic decision making using various modalities in routine clinical practice.

**TABLE OF CONTENTS/OUTLINE**

1. Imaging Features of Neoplasm in the Tracheobronchial Tree 1-1. Primary or Secondary Malignant Tumor 1-2. Benign Tumor

**CHE183**

**Imaging of Classic and Emerging Thoracic Oncologic Emergencies**

**Education Exhibits**

**Location:** CH Community, Learning Center
TEACHING POINTS

1. Patients with known primary thoracic malignancy or metastatic disease involving the thorax often experience urgent or emergent complications that are either a direct result of the underlying tumor or an indirect result related to therapy.
2. A number of novel chemotherapeutic agents are associated with unique thoracic complications.
3. Complications are often first identified on imaging studies. Awareness of such complications is crucial in order to minimize morbidity and mortality in oncologic patients.

TABLE OF CONTENTS/OUTLINE

1. Discuss potential urgent and emergent thoracic complications in oncologic patients.
2. Highlight, using case-based approach, the clinical presentations and imaging findings of thoracic oncologic emergencies. Particular focus is placed on cases in which imaging plays a significant role in diagnosis and guiding clinical management.
3. Well known urgent complications such as superior vena cava obstruction, pericardial tamponade, tumoral rupture and hemorrhage, massive hemoptysis as well as malignant airway obstruction due to central mass will be reviewed.
4. Illustrate examples of emerging oncologic thoracic emergencies related to novel chemotherapeutic agents such as development of spontaneous pneumothoraces and intratumoral pseudoaneurysms with potential to rupture.

CHE184
Imaging of Lung Transplant— Anatomical Considerations and Complications

TEACHING POINTS

1. Delineation of the anatomical considerations for pre-surgical planning.
2. Demonstration of the key imaging findings to aid early recognition of complications of lung transplantation in the acute post operative phase.
3. Depiction of system based approach to the broad spectrum of chronic post lung transplant complications.

TABLE OF CONTENTS/OUTLINE

1. Bronchial complications, anastomosis dehiscence and ischaemic airway
2. Vascular complications, arterial anastomosis stenosis
3. Infection, CMV and NTM
4. PTLD
5. Single lung transplant complications.
6. Acute and chronic rejection manifestations
7. Drug toxicity

CHE185
Imaging Spectrum of Fluid Containing Thoracic Lesions: An Organized Approach

TEACHING POINTS

This pictorial review of fluid containing thoracic lesions provides a framework for assessment of the various imaging features and directs integration of observations into a specific diagnosis. Sample cases will illustrate typical and atypical entities. Appropriate pitfalls and complications will be discusses.

TABLE OF CONTENTS/OUTLINE

Fluid containing thoracic lesions is a diverse group of pathologic conditions. Similar appearing lesions can represent vastly different pathophysiologic processes. This exhibit is highlighting a systematic approach and concepts helpful to formulate focused differential diagnosis and guide proper management. The lesions are organized in the following groups: Location relative to the chest wall, diaphragm, pleura and pericardium; distribution in the lung zones; position in mediastinum; presence of air-fluid or fluid-fluid levels; presence and appearance of a solid component; occurrence of loculation or septations; distribution of fluid within the lesion; lesion size; fluid characteristics pertinent to the modality (CT density, MRI signal intensity,
US echogenicity); appearance of the lesion wall; characteristics of blood flow in the lesion; reactive changes on the neighboring tissues; presence of underlying or predisposing lung disease.

**CHE186**

**Imaging the Central Airways Gently and Wisely by Using MRI**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

Pierluigi Ciet MD (Presenter): Nothing to Disclose
Diana Litmanovich MD : Nothing to Disclose
Phillip M. Boiselle MD : Nothing to Disclose
Edward Yungjae Lee MD, MPH : Nothing to Disclose
Piotr Alfred Wielopolski PhD : Nothing to Disclose
Harm Awm Tiddens MD : Nothing to Disclose

**TEACHING POINTS**

Central airways assessment is routinely performed with bronchoscopy, which requires sedation and does not allow exact airway measurements. Although cine-CT is used as a non-invasive alternative, its use is limited by radiation. MRI, as a radiation-free technique, is an attractive alternative for CT. We aim to give a comprehensive overview of MRI capabilities to assess central airways disease in pediatric and adult patients in order to assist radiologists in "imaging central airways gently and wisely".

**TABLE OF CONTENTS/OUTLINE**

We will describe and illustrate a practical approach to assess pediatric and adult central airways disease with MRI as follow: 1) central airways mechanics from a radiology perspective; 2) bronchoscopy, CT and MRI of central airways: techniques and pros/cons; 2) 2D vs. 3D MRI; 3) static vs. dynamic MRI; 4) spirometry-guided dynamic MRI; 5) contrast enhanced MRI of the central airways and 6) post-processing techniques: clinical and advanced settings. Finally, we will provide and illustrate diagnostic algorithms, protocols and clinical scenarios that will facilitate radiologists to 'wisely' select MRI over CT for studying central airways dimensions and dynamics.

**CHE187**

**Is it OK? Non-pathologic or Insignificant Chest CT Findings that Mimic Disease**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

Ji Hyun Hong MD (Presenter): Nothing to Disclose
Jae Sup Jun : Nothing to Disclose
Myeong Im Ahn MD, PhD : Nothing to Disclose
Jung Im Jung MD, PhD : Nothing to Disclose

**TEACHING POINTS**

There exist many kinds of non-pathologic or less significant findings that are commonly misread as rather significant diseases on chest CT scan. The educational goal of this exhibit is to familiarize radiologists to the characteristic CT appearances of non-pathologic and insignificant findings and to learn differential diagnostic points of each finding for the improvement of diagnostic accuracy when such cases are encountered.

**TABLE OF CONTENTS/OUTLINE**

The cases are to be presented in a quiz format. Each case has a literature review and differential diagnostic points. Included cases are as follows: - Contrast material (CM) filling of azygos arch valves - Nonfatal venous air embolism related to IV injection of CM - Distal thoracic duct - Axillary arch - Percutaneous fat collection in IVC - Percardial recess and sinus - Tracheal diverticulum - Focal fibroatelectasis related to spinal osteophytes - Subpleural tiny "hills" as a minor form of dependent atelectasis - Mucoid pseudotumor in the airway - Pseudothrombosis in SVC by interflowing of opacified and unopacified blood - Motion artifacts mimicking dissection of ascending aorta, bronchiectasis, or rib fracture

**CHE188**

**Lateral Chest Radiography: A Forgotten Art**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

Gitanjali Bajaj MBBS : Nothing to Disclose
Roopa Ram MD (Presenter): Nothing to Disclose
Angela V. Frost MD : Nothing to Disclose
Kedar Jambhekar MD : Nothing to Disclose
Carey Lee Guidry MD : Nothing to Disclose
Sanjaya Viswamitra MD : Nothing to Disclose
Tarun Pandey MD, FRCR : Nothing to Disclose

**TEACHING POINTS**

1. Review normal radiographic location of mediastinal, hilar and parenchymal structures on a lateral chest x ray 2. Develop a structured approach to interpreting normal and abnormal lateral chest radiographs. 3. Localize abnormality seen on lateral chest x ray to a specific mediastinal compartment and derive a reasonable list of differential diagnosis for each mediastinal compartment

**TABLE OF CONTENTS/OUTLINE**

1. Radiographs showing normal radiographic landmarks including bronchi, vasculature, parenchymal lobes and mediastinal compartments.
2. Radiographic signs, potential spaces and hidden areas on lateral chest x-ray.

3. Case examples showing correlation of imaging findings on lateral chest radiograph with frontal view and CT images.

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**CHE189**

**Lung Cancer Mimics: False Positive Fake-outs**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

- Saurabh Agarwal MD: Nothing to Disclose
- Carol C. Wu MD (Presenter): Author, Reed Elsevier
- Matthew David Gilman MD: Nothing to Disclose
- Sanjeev Bhalla MD: Nothing to Disclose
- Jo-Anne O. Shepard MD: Consultant, Agfa-Gevaert Group

**TEACHING POINTS**

1. Lung cancer has variable imaging manifestations including nodules, masses, focal or diffuse ground-glass opacities and consolidation.
2. A variety of disease entities mimic lung cancer and cause false-positive interpretation of imaging studies.
3. Awareness of lung cancer mimics help radiologists provide appropriate differential considerations and guide further diagnostic work-up.

**TABLE OF CONTENTS/OUTLINE**

- Review variable imaging appearance of lung cancer
  - Nodule/Mass
  - Endobronchial lesion
  - Consolidation, ground-glass opacity
- Interactive case-based quiz questions to illustrate lung cancer mimics and distinguishing features, if any
- Neoplasm other than lung cancer
  - Pulmonary lymphoma
  - Carcinoid tumor
  - Metastasis
  - Sarcoma
- Infection
  - Pneumonia
  - Abscess
  - Mycobacterial infection
  - Fungal infection
- Non-infectious benign entities
  - Hamartoma
  - Amyloidosis
  - Sarcoidosis
  - Necrobiotic Nodule
  - Organizing pneumonia
  - Rounded atelectasis
  - Lipoid Pneumonia
  - Granulomatosis with polyangiitis

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**CHE190**

**Minimal-invasive Lung Volume Reduction: Bronchoscopic Techniques and Impact of Quantitative CT Emphysema Evaluation**

*Education Exhibits*

*Location: CH Community, Learning Center*

*Certificate of Merit*

**Participants**

- Ulrich Grosse MD: Nothing to Disclose
- Juergen Hetzel: Nothing to Disclose
- Lutz Guendel: Employee, Siemens AG
- Sergios Gatidis: Nothing to Disclose
- Roland Syha: Nothing to Disclose
- Gerd Grozinger MD: Nothing to Disclose
- Christoph Schabel MD: Speaker, Siemens AG
- Claus Detlef Claussen MD: Nothing to Disclose
- Konstantin Nikolau MD: Speakers Bureau, Siemens AG, Speakers Bureau, Bracco Group, Speakers Bureau, Bayer AG
- Marius Horger MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

- A fundamental knowledge of the pathophysiology of lung emphysema is imperative for understanding the mechanisms of action of the various bronchoscopic lung volume reduction (LVR) techniques.
- Preinterventional CT imaging of the lung is mandatory to confirm the diagnosis of emphysema, establish the phenotype (heterogeneous vs. homogeneous) as well as to rule out contraindications (for example major fissure gaps for valve-based LVR therapy as they are an indirect sign of collateral ventilation).
- Quantitative CT assessment of the lung parenchyma can aid in the preinterventional target lobe/lobes selection and differentiate emphysema from severe bronchial obstruction with hyperinflation (e.g. asthma, bronchiolitis obliterans, etc.).
- Radiologists should be familiar with the appearance of various LVR-related complications.

**TABLE OF CONTENTS/OUTLINE**

- Definition, epidemiology and pathophysiology of emphysema
- Overview of currently used bronchoscopic LVR techniques
- Detailed presentation of the presumed mechanism of action of LVR - coils and valves and effects on lung volume as well as density
- Quantification of airflow redistribution
- Preinterventional imaging
- Overview Computed tomography including quantitative lung parenchyma analysis
- Postinterventional imaging
- LVR- related complications

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**CHE191**

**More Than Node Worthy: Imaging of the Internal Mammary Arteries, Veins and Lymph Nodes**

*Education Exhibits*

*Location: CH Community, Learning Center*
Participants
Sheila Kumar Kori MD : Nothing to Disclose
Sreevatsan Sridhar MD : Nothing to Disclose
Brent Little MD : Nothing to Disclose
Sanjeev Bhalla MD : Nothing to Disclose
Travis S. Henry MD (Presenter): Spouse, Employee, F. Hoffmann-La Roche Ltd

TEACHING POINTS
1. While they travel together, the internal mammary veins, arteries and lymph nodes represent three distinct functional systems that are affected by a variety of diseases and should be assessed individually. A basic familiarity of normal anatomy and the spectrum of pathology is essential for accurate interpretation of chest CT.
2. This image-rich educational exhibit will review the diverse pathology that can affect the internal mammary veins, arteries and lymph nodes including neoplastic, inflammatory/infectious, congenital, traumatic and iatrogenic conditions.

TABLE OF CONTENTS/OUTLINE
Outline: Normal anatomy (lymph nodes, arteries, veins) Lymphadenopathy - size criteria for enlargement; discuss exclusion from IASLC staging for lung cancer Reactive (infection) - empyema (bacterial, parasites, mediastinitis, other) Malignant (breast, lung/pleural; abdominal with review pathway of drainage from peritoneal cavity/liver) Arteries: -bypass graft (anatomy from subclavian, any variants?) -dilated - coarctation, interrupted aortic arch, BT shunt, unilateral vs bilateral -collateral supply to lungs (mycetoma, fibrosis) -traumatic pseudoaneurysm with active extravasation Veins: -dilated - collateral pathways SVC syndrome, varices -trauma -tumor -iatrogenic - catheter placement in internal mammary vein Conclusion

CHE192
Mounier-Kuhn Syndrome: Radiological Spectrum with Differential Diagnosis

Education Exhibits
Location: CH Community, Learning Center

Participants
Ameya Jagadish Baxi MBBS, DMRD (Presenter): Nothing to Disclose
Carlos S. Restrepo MD : Nothing to Disclose
Amy Laura Mumbower MD : Nothing to Disclose
Michael James McCarthy MD : Nothing to Disclose
Rashmi S. Katre : Nothing to Disclose
Santiago Martinez-Jimenez MD : Author, Amirsys, Inc
Ashish Rajendra Khandelwal MD : Nothing to Disclose
Aleema Patel MD : Nothing to Disclose

TEACHING POINTS
1. Study the pathophysiology of Mounier-Kuhn Syndrome
2. Study radiological spectrum and differential diagnosis

TABLE OF CONTENTS/OUTLINE
Mounier-Kuhn syndrome is characterized by tracheobronchial dilation due to atrophy of muscular and elastic tissues in trachea and main bronchial walls. It usually presents with recurrent pneumonias, fibrosis and other respiratory complications of pooled/stagnant secretions in dilated airways. Diagnosis of tracheal dilatation is often made by plain radiography although CT is more sensitive. In adults, the diagnostic criteria are: diameter of the trachea >30 mm; of the right main bronchus >20 mm; and of the left main bronchus >18 mm. MK syndrome has 3 subtypes. In type 1, there is a slight symmetric dilation in the trachea and main bronchi; in type 2, the dilation and diverticula are distinct; and in type 3, diverticular and saccular structures extend to distal bronchi. The other conditions which may cause tracheobronchial dilatation include: connective-tissue diseases, ataxia-telangiectasia, ankylosing spondylitis, Ehlers-Danlos syndrome, Marfan’s syndrome, Kenny-Caffey syndrome, Brachmann-de Lange syndrome, and cutis laxa. These diseases differ in epidemiology, clinical outcome, management and prognosis. Radiologists should be familiar with the imaging appearances of MK syndrome and understand its clinical significance.

CHE193
Multimodality Imaging of Pulmonary Artery Angiosarcoma—An Exhibit On The Radiologic Role of Evaluation and Palliation

Education Exhibits
Location: CH Community, Learning Center

Participants
Zachary R. Laste MD (Presenter): Nothing to Disclose
Rahul N. Sawlani MD : Nothing to Disclose
Kaushik S. Shahir MD : Nothing to Disclose
Dhiraj Baruah MD : Nothing to Disclose
Sushilkumar K. Sonavane MD : Nothing to Disclose
Lawrence R. Goodman MD : Nothing to Disclose

TEACHING POINTS
Angiosarcoma is a rare disease associated with significant morbidity and mortality. When localized in the pulmonary arteries, this disease can mimic pulmonary embolism in both clinical and radiologic presentation, delaying proper therapy. The aim of this exhibit is to demonstrate the role of CT, MRI, and PET imaging to distinguish these disease entities, as well as describe the role that interventional radiology can play in the palliative care of these patients. This review will increase radiologist’s awareness of the common imaging findings of pulmonary artery angiosarcoma as well as their potential role in these patients’ care.

TABLE OF CONTENTS/OUTLINE
a. Brief overview of pathophysiology of angiosarcoma
b. Overview of the imaging of findings of CT, MRI, and PET with multiple case examples
c. Description of the palliative measures interventional radiology can offer to these patients with case examples

**CHE194**

**Need-to-Know CT Anatomy of the Upper Thorax**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

Seul Ki Lee MD (Presenter): Nothing to Disclose
Dae Hee Han MD, PhD: Nothing to Disclose

**TEACHING POINTS**

1) In this exhibit, CT anatomy of several less-known yet critically important structures of the upper thorax is shown. 2) Relevant anatomical knowledge is also given

**TABLE OF CONTENTS/OUTLINE**

Anatomic structures: Thoracic duct, Vertebral vein, Internal mammary vessels above the parasternal level: Relation to the lateral margins of the costal cartilage and the brachiocephalic veins, Soft-tissue density of the sternoclavicular joint projected below the clavicle with correlation with cryosection anatomy, Cervical extension of the thymus: CT density in adolescent and adults, The locations of the phrenic, vagus, and recurrent laryngeal nerves on axial CT scans.

**CHE195**

**Past, Present and New Era of Imaging of Chronic Obstructive Pulmonary Disease**

*Education Exhibits*

*Location: CH Community, Learning Center*

 выбранный для RadioGraphics

**Participants**

Brian Daneshvar: Nothing to Disclose
Jadranka Stojanovska MD, MS (Presenter): Nothing to Disclose
Craig J. Galban PhD: Inventor, ImBio, LLC
Brian Dale Ross PhD: Co-founder, ImBio, LLC, Shareholder, ImBio, LLC Advisor, ImBio, LLC
Ella A. Kazerooni MD: Nothing to Disclose

**TEACHING POINTS**

1. Review classification, clinical and imaging features of severity and phenotypes of Chronic Obstructive Pulmonary Disease (COPD) 2. Review COPD imaging techniques used to evaluate COPD patients in the past (chest x-ray, chest CT) and in the presence (chest CT and CT density mask) with an emphasis on technical advances (Parametric Response Map) to improve COPD outcome 3. Discuss the clinical potential of COPD phenotype imaging in evaluating these patients and to correlate clinical and imaging findings

**TABLE OF CONTENTS/OUTLINE**

The spectrum of COPD phenotypes in different Global Obstructive Lung Disease (GOLD) stages with correlation between the current techniques and recent advancements such as Parametric Response Map (PRM) will be presented as clinical case series where PRM can solve the clinical conundrum. The following will be discussed: 1. Clinical significance, treatment and prognosis 2. Computed Tomography evaluation (protocols, imaging findings, and current post-processing technique) 3. Recent advances in post-processing Current CT quantitative imaging for COPD is an important tool for providing more accurate assessment of disease severity that guides clinical management. Bringing PRM into future practice may identify a patient’s specific COPD phenotype to direct targeted and personalized therapy.

**CHE196**

**Pipe Trouble: Pathology of the Tracheobronchial Tree**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

Minesh Patel MD (Presenter): Nothing to Disclose
Anna Knobel MD: Nothing to Disclose
Maciej Walczyszyn: Nothing to Disclose
Palka Wojciech MD: Nothing to Disclose
Robert William Perone MD: Nothing to Disclose

**TEACHING POINTS**

Review the anatomy of the tracheobronchial tree. Discuss the spectrum of anatomic variants and pathology associated with the tracheobronchial tree with radiologic and bronchoscopic correlation. Emphasize the importance of correlating radiologic findings with clinical history, bronchoscopy and in some cases, tissue sampling.

**TABLE OF CONTENTS/OUTLINE**

1. Normal anatomy and variants. 2. Imaging techniques. 3. Discuss and present cases of focal diseases and provide correlation with virtual and/or fiber-optic bronchoscopy including: Tracheal stenosis/stenosis, benign neoplasms, primary malignant neoplasms, secondary malignant neoplasms, tracheoesophageal fistula, tracheal diverticulum, trauma, foreign bodies. 4. Discuss and present cases of diffuse disease processes and provide correlation with virtual and/or fiber-optic...
CHE197

Pitfalls in Interpretation of Oncologic Thoracic PET/CT

Education Exhibits
Location: CH Community, Learning Center

Participants
Gustavo S.P. Meirelles MD, PhD (Presenter): Partner, DICOM Grid Stockholder, Fleury Group
Julia Capobianco MD: Nothing to Disclose
Marco Oliveira: Nothing to Disclose

TEACHING POINTS
The main teaching points of this exhibit are: - To describe and illustrate the main pitfalls and artifacts in the interpretation of oncologic thoracic PET/CT examinations, including false-negative and false-positive findings; - To present strategies for avoiding misinterpretation of common pitfalls and artifacts in oncologic thoracic PET/CT examinations.

TABLE OF CONTENTS/OUTLINE
1. Physiologic uptake of FDG
2. Normal variants
3. Artifacts: misregistration, truncation, FDG embolism and extravasation
4. Potential pitfalls
4.1 Brown-fat FDG uptake
4.2 Lipomatous hypertrophy of the interatrial septum
4.3 Pleural uptake related to talc pleurodesis
4.4 Teflon injection of the vocal cord
4.5 Radiation-induced injuries
4.6 Iatrogenic causes of FDG uptake
4.7 Muscular FDG uptake
4.8 G-CSF FDG uptake
5. False-negative results
5.1 Small lesions
5.2 Mucinous tumors
5.3 Adenocarcinomas in situ and minimally invasive (previously referred as bronchoalveolar carcinoma)
6. False-positive results
6.1 Infectious diseases
6.2 Atherosclerosis
6.3 Granulomatous diseases (sarcoid)
7. Summary

CHE198

Proton Therapy: What the Diagnostic Radiologist Needs to Know

Education Exhibits
Location: CH Community, Learning Center

Participants
Marcelo Kuperman Benveniste MD (Presenter): Nothing to Disclose
Daniel Richard Gomez MD: Nothing to Disclose
Brett Wilson Carter MD: Author, Reed Elsevier Consultant, St. Jude Medical, Inc
Sonia Liliana Betancourt Cuellar MD: Nothing to Disclose
Patricia Monique de Groot MD: Nothing to Disclose
Edith Michelle Marom MD: Nothing to Disclose

TEACHING POINTS
1- Radiotherapy plays a central role in the management of intrathoracic malignancies including lung, esophageal and breast neoplasms as well as thymic epithelial neoplasm, malignant pleural mesothelioma and lymphoma.
2- Different radiation techniques have been used to plan and deliver radiation to the tumor including 3D conformal radiation therapy (3D-CRT), intensity-modulated radiotherapy (IMRT) and stereotactic body radiotherapy (SBRT).
3- Advances in radiation technique have led to the use of proton therapy to treat thoracic malignancies. By exploiting the unique way in which protons deliver radiation, in select cases a high dose to the target volume can be maintained while reducing dose to surrounding structures, a phenomenon known as improving the therapeutic ratio.
4- We will review the different radiation delivery techniques and will focus on proton therapy delivery technique, its advantages and CT appearance at follow-up.

TABLE OF CONTENTS/OUTLINE
Discuss the physical basis of the potential advantages of proton therapy.
Describe the indications and benefits of proton therapy.
Describe the role of the diagnostic radiologist in evaluating images based on treatment modality.
Discuss radiologic manifestations of radiation-induced lung disease in proton therapy.

CHE199

Pulmonary Complications in Pregnancy: What Every Radiologist Should Know

Education Exhibits
Location: CH Community, Learning Center

Participants
Nik Kolicaj MD (Presenter): Nothing to Disclose
David L. Spizarny MD: Nothing to Disclose

TEACHING POINTS
The major teaching points of the educational exhibit are as follows: 1. Radiologists will be familiar with the clinical features and the multimodality imaging findings in amniotic fluid emboli, venous thromboembolism, tocolytic pulmonary edema, preclampsia-pulmonary edema, primary spontaneous coronary dissection, pulmonary hemorrhage, peripartum cardiomyopathy, asthma, and trophoblastic emboli causing edema and aspiration pneumonia. 2. Fetal radiation exposure. 3. The unique physiology of pregnancy which contributes to the pathophysiology of the pulmonary complications of pregnancy as seen on imaging.

TABLE OF CONTENTS/OUTLINE
Physiologic changes in pregnancy (i.e. respiratory rate, increased cardiac output, etc.) Fetal radiation exposure with different diagnostic procedures/imaging. Sample Cases (10 common/uncommon complications): Imaging findings Timing of complications
**CHE200**

**Pulmonary Disease in Dermatologic Disorders**

**Education Exhibits**

Location: CH Community, Learning Center

**Participants**

- Ashley Marie Stanley MD (Presenter): Nothing to Disclose
- Mohammad Sarwar MD: Nothing to Disclose
- Alfred Wang: Nothing to Disclose
- Arturo Dominguez: Nothing to Disclose
- Nagina Malguria MBBS: Nothing to Disclose
- Suhny Abbara MD: Research Consultant, Radiology Consulting Group

**TEACHING POINTS**

1. Understand that dermatologic diseases, which include genetic, inflammatory, infectious, and connective tissue disorders, often have simultaneous cardiopulmonary manifestations. 2. Through case presentation, we will systematically review the spectrum of thoracic findings on cross-sectional imaging that are associated with common dermatologic disorders. 3. Discuss a multidisciplinary approach to diagnosis: understand that the differential diagnosis of these thoracic findings is broad, but can often be narrowed when clinical findings are considered.

**TABLE OF CONTENTS/OUTLINE**

Cases will include:
- Infectious: o Kaposi Sarcoma o Disseminated Coccidiomycosis o Disseminated Varicella o Staph Scalded skin syndrome secondary to mediastinitis o Bacillary Angiomatosis o Connective Tissue Disease o SLE o Dermatomyositis o Scleroderma o Inflammatory o Sarcoidosis o Genetic: o Tuberous Sclerosis o Neurofibromatosis type 1 o Sturge Weber Syndrome

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**CHE201**

**Pulmonary Edema: Key Radiologic Features & Pathophysiology that Radiologists Need to Know**

**Education Exhibits**

Location: CH Community, Learning Center

**Participants**

- Masaki Matsuosako MD, PhD (Presenter): Nothing to Disclose
- Yasuuki Kurihara MD: Nothing to Disclose
- Takeshi Hara PhD: Nothing to Disclose
- Yuka Okajima MD, MPH: Nothing to Disclose
- Takeshi Wada MD: Nothing to Disclose
- Kazuhiko Hosoya: Nothing to Disclose
- Tsutomu Nihei: Nothing to Disclose

**TEACHING POINTS**

The purposes of this exhibit are: 1. To illustrate how to interpret imaging findings of pulmonary congestion and cardiogenic edema on chest radiographs. 2. To learn differences of pathophysiology and radiologic features between increased hydrostatic pressure edema and permeability edema. 3. To review clinical and radiologic manifestations of various types of pulmonary edema.

**TABLE OF CONTENTS/OUTLINE**


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**CHE202**

**Pulmonary Micronodules: New Entities Come into Play**

**Education Exhibits**

Location: CH Community, Learning Center

**Participants**

- Sarah Lafond MD (Presenter): Nothing to Disclose
- Juliana Marcela Bueno MD: Co-author, Oxford University Press

**TEACHING POINTS**

The purpose of this exhibit is to help the learner: Review the basic anatomy of the lung parenchyma as seen on HRCT. Gain understanding on pathophysiology of the different entities that manifest with pulmonary micronodules. Be able to apply an effective, up to date, diagnostic algorithm when approaching these entities based on imaging findings. This is important to re-evaluate since the last comprehensive review was performed nearly 10 years prior. Identify new pulmonary pathologies that should be included in the differential diagnosis of micronodules, including establishing the novel term ‘arterial tree-in-bud’ as a diagnostic consideration.

**TABLE OF CONTENTS/OUTLINE**

Review of the anatomic components of the lung parenchyma, specifically emphasizing the secondary pulmonary lobule, as seen...
Review of the anatomic components of the lung parenchyma, specifically emphasizing the secondary pulmonary lobule, as seen on HRCT. Diagrams HRCT images Anatomic-pathologic correlations of micronodular lung diseases. Examples of HRCT findings of each entity. Updated diagnostic algorithm to micronodular diseases.

**CHE203**

Quantification of Regional Lung Parenchyma Movement using Dynamic Respiratory CT

*Education Exhibits*

Location: CH Community, Learning Center

**Participants**

Hiroshi Moriya MD (Presenter): Nothing to Disclose
Manabu Nakagawa : Nothing to Disclose
Koutarou Sakuma : Nothing to Disclose

**TEACHING POINTS**

To visualize the quantified images of lung parenchyma movement by dynamic respiratory CT and 4D voxel-tracking method. To display the regional respiratory movement of cases with typical respiratory diseases.

**TABLE OF CONTENTS/OUTLINE**

(Objective) A range of 16 cm can be scanned in a single rotation with 320-row ADCT. Dynamic motion images are obtained by using continuous scanning. The purpose of this presentation is to visualize the quantified images of regional lung parenchyma movements. [CT scan] 320-row ADCT (Aquilion ONE), continuous dynamic volume scanning. [4D voxel-tracking method] PhyZidynamics; the 3-dimensional structures are tracked from dynamic volume data [voxel-to-voxel mapping]. [Methods] The respiratory phases are obtained from the motion of the diaphragm, and the temporal changes of the points, areas, and volumes associated with the respiratory phases are analyzed. [Cases] Lung cancer or mediastinum tumor patients with respiratory disorder (COPD, IPF, tracheobronchomalacia, etc.). [Conclusion] The difference in movement can be displayed by using dynamic volume scanning. These dynamic movements may be correlated with the regional lung function.

**CHE204**

Quantitative Computed Tomography Evaluation in Emphysema and Airway Diseases

*Education Exhibits*

Location: CH Community, Learning Center

**Participants**

Marcel Koenigkam Santos MD, PhD (Presenter): Nothing to Disclose
Valdair Francisco Mugila MD, PhD : Nothing to Disclose
Marcelo Bezerra Menezes : Nothing to Disclose
Elcio dos Santos Oliveira Vianna : Nothing to Disclose
Jose Badini Martinez : Nothing to Disclose
Jorge Elias MD, PhD : Nothing to Disclose

**TEACHING POINTS**

1. To understand the principles and techniques for quantitative computed tomography evaluation of emphysema and airway diseases 2. To review the role of the method as a biomarker in disorders such as chronic obstructive pulmonary disease (COPD), asthma and cystic fibrosis

**TABLE OF CONTENTS/OUTLINE**

A. Introduction B. Principles of CT quantification of emphysema and airway abnormalities C. Technical aspects of the method D. COPD E. Asthma F. Cystic fibrosis G. Summary

**CHE205**

Radiologic Review of Primary Mediastinal Nonseminomatous Germ Cell Tumors: Three Decades of Experience from a Large Referral Center with Emphasis on Surgical Management

*Education Exhibits*

Location: CH Community, Learning Center

**Participants**

Darel Edward Heitkamp MD (Presenter): Nothing to Disclose
Wahida Tania Rahman MD : Nothing to Disclose
Shawn D. Teague MD : Nothing to Disclose
Karen M. Rieger MD : Nothing to Disclose
Kenneth A. Kesler MD : Nothing to Disclose

**TEACHING POINTS**

1. Primary mediastinal nonseminomatous germ cell tumor (PMNSGCT) typically occurs in a predictable location within the thorax. This exhibit will familiarize the radiologist with the appearance of classic and atypical PMNSGCTs. 2. Radiology plays a vital role in the diagnosis and pre-surgical planning of these patients, as well as the post-surgical evaluation of potential complications and disease recurrence. 3. PMNSGCT represents a challenging subgroup of malignant germ cell tumors and survival depends on both successful chemotherapy and surgical resection. 4. An aggressive multidisciplinary approach that includes surgery after cisplatin-based chemotherapy can result in long-term survival, even in patients with persistent germ cell or non-germ cell cancer.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction: basic information related to PMNSGCT. 2. Current treatment paradigm (chemotherapy + surgery). The crucial role of radiology in diagnosis and treatment planning. Review of surgical approach and how it affects imaging appearance. 3. Imaging review of classic and atypical cases. Pretherapy and posttherapy appearance. Recurrence and posttherapy salvage
cases. Imaging of surgical devices and common complications. 4. Review of extensive single institution data including independent predictors of survival.

**CHE206**

**Reduced Dose, Low Dose, Ultra-low Dose... Can We Get Any Lower? A Practical Guide to Optimize the Radiation Dose Delivered in Chest Computed Tomography**

*Education Exhibits*

*Location: CH Community, Learning Center*

*Certificate of Merit*

**Participants**

- Marysa Schaal MD (Presenter): Nothing to Disclose
- Mickael Ohana MD, MSc: Nothing to Disclose
- Mi-Young Jeung MD: Nothing to Disclose
- Aissam Labani MD: Nothing to Disclose
- Catherine Roy MD: Nothing to Disclose

**TEACHING POINTS**

Determine the actual optimal radiation dose levels for chest CT. Learn how to efficiently use the dose reduction techniques. Be able to adapt the radiation dose delivered according to the indication and the patient's morphology. Become familiar with ultra-low dose (ULD) chest CT and be aware of its current and future applications.

**TABLE OF CONTENTS/OUTLINE**

1. Chest CT in 2014: what are the different radiation levels? 1.1. A little bit of physics: how to measure the radiation dose? 1.2. Current optimal radiation dose 1.2.1. Unenhanced chest CT 1.2.2. Enhanced chest CT 1.2.3. Chest CTA with ECG gating 1.3. Reduced dose and low dose chest CT 1.4. ULD chest CT 2. Dose reduction techniques: how to use them? 2.1. Iterative reconstruction 2.2. kV and tube current modulation 2.3. Others 3. Practical approach to radiation dose reduction in chest CT 3.1. Based on patient's morphology 3.2. Based on the indication 3.3. Practical examples 4. ULD chest CT today and in the near future 4.1. Nodule detection and follow-up 4.2. Screening 4.2.1. Lung cancer 4.2.2. Asbestos related disease 4.2.3. Tuberculosis 4.3. Other future applications 4.4. Actual limitations

**CHE207**

**Resident’s Guide to Post-therapy Changes in the Chest**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

- Rydhwana Hossain MD (Presenter): Nothing to Disclose
- Alan Clint Legasto MD: Nothing to Disclose

**TEACHING POINTS**

As post-therapy chest imaging is extremely common, it is imperative for radiologists in training to understand the post-surgical and post-radiation changes. Knowledge of the different types of surgeries as well as different manifestations of post radiation changes in the acute, transient and chronic stages, as well as its' differential diagnosis is also very important. Our exhibit will highlight the concept of post-therapy changes in the chest-both post-surgical and post-radiation.

**TABLE OF CONTENTS/OUTLINE**

1. Review various surgical options including- wedge resection, lobectomy, pneumonectomy, thoracoplasty, sleeve resection etc. 2. Review various radiation portals and beam arrangements for the treatment of thoracic malignancies. 3. Review the different manifestations of radiation induced lung disease in the acute, transient and chronic phases. 4. Differential diagnosis for post radiation changes of the chest.

**CHE208**

**Spectral Detector Computed Tomography (Dual-layer CT): Clinical Applications in Thoracic Imaging**

*Education Exhibits*

*Location: CH Community, Learning Center*

**Participants**

- Rong Rong MD: Institutional Grant support, Koninklijke Philips NV
- Prabhakar Rajiah MD, FRCR: Institutional Research Grant, Koninklijke Philips NV
- Luis Alberto Landeras MD (Presenter): Institutional Grant support, Koninklijke Philips NV

**TEACHING POINTS**

- To gain awareness of the basic principles of spectral computed tomography (CT) - Understand the essentials of spectral detector CT technology compared to other available spectral CT solutions - Demonstrate different applications of spectral detector CT imaging in the thorax

**TABLE OF CONTENTS/OUTLINE**


**CHE209**
State-of-the-Art Thoracic CT Imaging Techniques with 3rd Generation Dual Source CT

**Education Exhibits**
Location: CH Community, Learning Center

**Participants**
- Marcel L. Dijkshoorn RT (Presenter): Consultant, Siemens AG
- Ronald Booij RT: Nothing to Disclose
- Arlette Odink MD, PhD: Nothing to Disclose
- Marcel Van Straten PhD: Research collaboration, Siemens AG

**TEACHING POINTS**
1. To explain the application, benefits and pitfalls of spectral shaping with tin filtration.
2. To understand how detector comb filtering influences spatial resolution and noise.
3. To discuss dose reduction potential of organ based angular tube current modulation.
4. To demonstrate how ultrafast scan protocols minimize breathing and pulsation artifacts.
5. To understand improvements in dual energy application and be able to interpret specific dual energy artifacts.

**TABLE OF CONTENTS/OUTLINE**
- Introduction
- Spectral shaping with tin filtration
- Detector comb filtering
- Ultrafast scan protocols
- Organ based angular tube current modulation
- Sub-second full thorax imaging
- Dual Energy scanning and analysis

Summary: Third generation dual Source CT has a number of dedicated techniques to facilitate state-of-the-art thoracic imaging. The availability of these techniques provides solutions for optimizing image quality and reducing radiation dose. This exhibit will explain the individual scan techniques, pitfalls and illustrate which patient group or clinical questions benefit most per technique.

**CHE210**

The ABC's on CT: Ancillary Breast & Chest Masses

**Education Exhibits**
Location: CH Community, Learning Center

**Participants**
- Gabriela Gayer MD (Presenter): Nothing to Disclose
- Amsalu Dabela-Biketi MD: Nothing to Disclose

**TEACHING POINTS**
1. Review the spectrum of common and unusual CT findings in the breast and chest wall.
2. Refine the diagnostic approach to incidental breast and chest wall lesions on CT using attenuation characteristics and patient history.
3. Learn what to recommend for incidental breast and chest wall lesions on CT.

**TABLE OF CONTENTS/OUTLINE**
1. Incidental breast masses
2. Incidental chest wall masses
3. Diagnostic approach based on CT imaging features and pertinent history
4. Imaging algorithm for further workup
5. Challenge cases: congenital, infectious/inflammatory, neoplasm, iatrogenic
6. Summary

**CHE211**

The Dozen Key Imaging Signs of HRCT in Focal and Diffuse Lung Disease Every Radiology Resident Must Know

**Education Exhibits**
Location: CH Community, Learning Center

**Participants**
- Rammohan Vadapalli MD (Presenter): Nothing to Disclose
- Harshavardhan KR MD: Nothing to Disclose
- Abhijit Roychowdhury MD: Nothing to Disclose
- Pramod Kumar Reddy Kaila MD: Nothing to Disclose
- Abhinav Sriram Sriram Vadapalli: Nothing to Disclose

**TEACHING POINTS**
To list all the key imaging signs in HRCT useful for characterization of Focal and Diffuse Lung Disease and briefly explain the underlying Pathological Correlates—Every Resident must know. The Differential diagnosis of each of these signs, what they stand for and their specificity is highlighted. With Differential Diagnosis is discussed. A symptom or Clinical scenario specific Checklist approach every resident must follow when interpreting HRCT studies and observing these signs is showcased.

**TABLE OF CONTENTS/OUTLINE**
1. Halo sign
2. Reverse Halo sign
3. Fairy Ring sign
4. Dark Bronchus sign
5. CT Angiogram sign
6. GLOVED Finger sign
7. Crazy Paving Pattern
8. Tree in Bud sign
9. Signet ring sign
10. Split Pleura sign
11. Comet tail Sign
12. Feeding Vessel Sign
Each sign is defined its components clearly outlined by Diagramatic representation and Clinical illustrative HRCT images. The pathological Correlates of Every Imaging sign are highlighted. The Common and Uncommon pathologies which show the sign and Particular pattern are listed.

**CHE212**

The Paratracheal Pseudomass: An Atypical Appearance of Tracheal Diverticulum.

**Education Exhibits**
Location: CH Community, Learning Center

**Participants**
TEACHING POINTS

1. Definition of tracheal diverticula and types. 2. The epidemiology and pathophysiology of tracheal diverticula. 3. Awareness of the atypical appearance of infected or fluid filled tracheal diverticula in order to avoid misdiagnosis of neoplasm or lymphadenopathy and prevent unnecessary invasive work-up.

TABLE OF CONTENTS/OUTLINE

1. Brief review of the pathophysiology of tracheal diverticula. 2. Brief discussion of epidemiology. 3. Typical CT appearance of tracheal diverticulum. 4. Cases mimicking adenopathy or neoplasm 4.1. CT and other modality imaging (e.g. ultrasound and FDG-PET) appearance of filled tracheal diverticula 4.2. Patient symptomatology and presentation with filled tracheal diverticula.
TEACHING POINTS

The following teaching points will be emphasized:

Minimum intensity projection (MinIP) reformatting is a technique for depicting low attenuation or low signal intensity structures within a volume of tissue. This technique has particular utility in thoracic imaging in depicting a wide range of pathology, and can be applied to CT or MRI.

MinIP is commonly useful in depicting airways in order to show normal bronchi, variants of normal anatomy, and pathological conditions affecting the airways. Normal and variant anatomy and disease states of the bronchi will be reviewed.

MinIP is also useful in evaluating the pulmonary parenchyma in demonstrating areas of lucency or low signal intensity, which can either be due to air trapping or decreased perfusion. Various diseases which can result in oligemia or air trapping will be discussed.

MinIP can also be used to demonstrate other structures which are low in signal intensity or attenuation within a background of hyperattenuation or high signal, such as dissection flaps within a contrast-filled lumen.

TABLE OF CONTENTS/OUTLINE

Techniques for MinIP reformatting of imaging studies: the basics of MinIP. MinIP in the depiction of the airways. MinIP in the evaluation of the lung parenchyma. MinIP for demonstration of low attenuation or low signal intensity structures within a ‘bright’ background.

CHE216

Thoracic Manifestations of Hepatobiliary and Pancreatic Malignancies: How Do They Differ from Other Tumors?

Education Exhibits
Location: CH Community, Learning Center

Participants

Ross Holwerda MD (Presenter): Nothing to Disclose
Christopher Walker MD : Author, Amirsys, Inc Author, Reed Elsevier
Melissa L. Rosado De Christenson MD : Author, Thieme Medical Publishers, Inc Author, Amirsys, Inc Author, American Registry of Pathology Author, Oxford University Press
Santiago Martinez-Jimenez MD : Author, Amirsys, Inc
Jeffrey Russell Kunin MD : Investigator, Oncimmune LLC
Paul P. Pettavel MD : Nothing to Disclose

TEACHING POINTS

1. Metastases from hepatobiliary and pancreatic neoplasms often follow predictable patterns of spread in the thorax.
2. Knowledge of classic and atypical imaging appearances allows the radiologist to tailor his/her search pattern based on the specific malignancy, better evaluate disease progression, and avoid misdiagnosis of concurrent benign conditions.

TABLE OF CONTENTS/OUTLINE

1. Thoracic metastases from hepatobiliary and pancreatic neoplasms. 2. Typical and atypical patterns of metastatic spread and role of biomarkers in diagnosis and follow-up (e.g. AFP, CA19-9, CgA) - Hepatocelluar carcinoma - intracardiac tumor thrombus/tumor emboli, lymphadenopathy, hematogenous dissemination, diaphragm invasion - Hepatic angiosarcoma - nodules with surrounding ground glass opacity (CT halo sign) - Pancreatic adenocarcinoma - pulmonary nodules with or without cavitation, tumor emboli, consolidation, ground-glass opacities (lepidic tumor growth), and CT halo sign - Pancreatic neuroendocrine tumor - hypervascular metastases - Cholangiocarcinoma/gallbladder cancer - cavitary and noncavitary pulmonary nodules 3. Incidence of intrathoracic complications (e.g. pulmonary embolism incidence higher in hepatobiliary and pancreatic malignancies compared to other malignancies).

CHE218

Unilateral Pulmonary Edema

Education Exhibits
Location: CH Community, Learning Center

Participants

Kathleen Elizabeth Jacobs MD (Presenter): Nothing to Disclose
Paul Stark MD : Nothing to Disclose

TEACHING POINTS

• Unilateral pulmonary edema is a common cause of unilateral lung opacification and recognition of this entity is important for determining patient management.
• This presentation will review the etiologies of unilateral pulmonary edema and underlying pathophysiology.
• Select cases will be shown to highlight the radiologic appearance and natural progression of unilateral pulmonary edema.
• Additional differential considerations for unilateral lung opacification will also be discussed.

TABLE OF CONTENTS/OUTLINE

1. Objectives
   • Explore etiologies of unilateral pulmonary edema.
   • Discuss pathogenesis and natural progression of each entity.
   • Review differential considerations for unilateral lung opacification.
2. Pulmonary Edema Ipsilateral to Abnormality
   • Reexpansion pulmonary edema
   • Acute rejection post lung transplantation
   • Reimplantation response post lung transplantation
   • Unilateral pulmonary vein occlusion.
CHE219

What Could Happen after Lung Transplantation: Complications That Radiologists Should Know

Education Exhibits
Location: CH Community, Learning Center

Participants
Isaac Daimiel MD (Presenter): Nothing to Disclose
Gerardo Ayala Calvo: Nothing to Disclose
Sergio Alonso Charterina MD: Nothing to Disclose

TEACHING POINTS
- To review the main complications of pulmonary transplantation surgery depending on the time passed after the procedure.
- To illustrate radiological appearance of these complications and correlate them with clinical findings.

TABLE OF CONTENTS/OUTLINE

Nowadays lung transplantation is suggested as the best option of treatment for end stage pulmonary conditions such as idiopathic pulmonary fibrosis, chronic obstructive pulmonary disease, cystic fibrosis or pulmonary hypertension. The increasing survival in these patients is related to better immunosuppressive therapies, donor organ preservation and the improvement of surgical technique. Nevertheless, this is still susceptible to complications that must be detected early.

Depending on elapsed time after surgery different complications should be considered.

Acute conditions are within two months after surgical procedure and include pleural complications, reperfusion edema, acute rejection and bronchial anastomosis dysfunction.

After 2 months, we will consider entities such as cryptogenic organizing pneumonia, posttransplantation lymphoproliferative disorder, progressive upper lobe fibrosis or chronic lung allograft dysfunction.

Events related to immunosuppressive therapy like infections, recurrence of primary disease or pulmonary embolism can occur at anytime in the postoperative period.

CHE220

When a Harmonious Relationship Goes Wrong: Chest Manifestations in Disorders of Hepatopulmonary Axis

Education Exhibits
Location: CH Community, Learning Center

Participants
Rahul Dinkar Renapurkar MD (Presenter): Nothing to Disclose
Joseph Thomas Azok MD: Nothing to Disclose
Jason K. Lempel MD: Nothing to Disclose
Ruchi Yadav MD: Nothing to Disclose
Ahmed El-Sherief MD: Nothing to Disclose
Charles T. Lau MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is:
1) To discuss the general thoracic manifestations in chronic liver disease.
2) To highlight specific disorders which involve the hepatopulmonary axis.
3) To understand the role of imaging in evaluation of chest manifestations of disorders of hepatopulmonary axis.

TABLE OF CONTENTS/OUTLINE

A) General manifestations in chronic liver disease 1) Chest wall-Gynecomastia and collaterals 2) Mediastinum-Dilation of azygos system- Diaphragmatic lymphadenopathy 3) Transthoracic migration of ascitic fluid -Varices 4) Pulmonary and pleural-Pleural effusions -Pulmonary infections-Pulmonary Edema 4) Vascular-Portopulmonary hypertension -Hepatopulmonary syndrome
B) Chest manifestations in specific diseases involving the hepatopulmonary axis 1) Hepatitis C associated lung disease -Pulmonary fibrosis 2) Alpha 1 antitrypsin deficiency -Emphysema and bronchiectasis 3) Cystic fibrosis -Bronchiectasis 4) Hereditary hemorrhagic telangiectasia -Pulmonary AVMs 5) Sarcoidosis and other granulomatous diseases -Pulmonary nodules and lymphadenopathy 6) Infections such as Echinococcosis and E. histolytica -Pulmonary and pleural involvement 7) Neoplastic diseases such as Hepatocellular carcinoma and lymphoma 8) Drug reactions -Amiodarone -Complications of antiviral therapy

CHE221

When You See More Than What You Want to See: Management of Incidental Findings on CT

Education Exhibits
Location: CH Community, Learning Center

Participants
Rahul Dinkar Renapurkar MD (Presenter): Nothing to Disclose
Joseph Thomas Azok MD: Nothing to Disclose
Jason K. Lempel MD: Nothing to Disclose
Ruchi Yadav MD: Nothing to Disclose
Ahmed El-Sherief MD: Nothing to Disclose
Charles T. Lau MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is:
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2) To highlight specific disorders which involve the hepatopulmonary axis.
3) To understand the role of imaging in evaluation of chest manifestations of disorders of hepatopulmonary axis.

TABLE OF CONTENTS/OUTLINE

A) General manifestations in chronic liver disease 1) Chest wall-Gynecomastia and collaterals 2) Mediastinum-Dilation of azygos system- Diaphragmatic lymphadenopathy 3) Transthoracic migration of ascitic fluid -Varices 4) Pulmonary and pleural-Pleural effusions -Pulmonary infections-Pulmonary Edema 4) Vascular-Portopulmonary hypertension -Hepatopulmonary syndrome
B) Chest manifestations in specific diseases involving the hepatopulmonary axis 1) Hepatitis C associated lung disease -Pulmonary fibrosis 2) Alpha 1 antitrypsin deficiency -Emphysema and bronchiectasis 3) Cystic fibrosis -Bronchiectasis 4) Hereditary hemorrhagic telangiectasia -Pulmonary AVMs 5) Sarcoidosis and other granulomatous diseases -Pulmonary nodules and lymphadenopathy 6) Infections such as Echinococcosis and E. histolytica -Pulmonary and pleural involvement 7) Neoplastic diseases such as Hepatocellular carcinoma and lymphoma 8) Drug reactions -Amiodarone -Complications of antiviral therapy
or PET/CT of the Thorax

Education Exhibits
Location: CH Community, Learning Center

Certificate of Merit

Participants
Brett Wilson Carter MD (Presenter): Author, Reed Elsevier Consultant, St. Jude Medical, Inc
Myrna Cobos Barco Godoy MD, PhD: Nothing to Disclose
Gerald F. Abbott MD: Author, Thieme Medical Publishers, Inc Author, Amirsy, Inc
Matthew David Gilman MD: Nothing to Disclose
Edith Michelle Marom MD: Nothing to Disclose
Jane P. Ko MD: Editor, Reed Elsevier
Reginald F. Munden MD, DMD: Nothing to Disclose
Carol C. Wu MD: Author, Reed Elsevier

TEACHING POINTS
1. Unsuspected incidental findings in the chest and upper abdomen are frequently detected on CTs performed for lung cancer screening, coronary artery screening, and unrelated clinical indications or PET/CT performed for staging of malignancy. 2. Radiologists play an important role in reporting and assigning appropriate clinical significance to incidental findings. 3. Familiarity with up-to-date evidence and management guidelines for incidental findings involving the lungs, mediastinum, chest wall, and upper abdominal structures helps radiologists improve recommendations and clinical practice. 4. Appropriate recommendations for management of incidental findings can help facilitate timely evaluation and treatment of significant findings and prevent unnecessary diagnostic evaluations.

TABLE OF CONTENTS/OUTLINE
Interactive case-based quiz questions with chest CT or PET/CT images will be presented to illustrate incidental findings in the lungs, mediastinum, chest wall, and upper abdomen. For each incidental finding, the following will be discussed and reviewed:
- Important imaging features and clinical information to consider in characterizing the incidental finding.
- Latest literature regarding frequency and clinical significance of the incidental finding.
- Management guidelines from the ACR and/or other professional organizations.

CHE222
Where, Oh Where, is the Air? A Quiz-based Primer for Every Radiologist on Abnormal Air Seen on Chest Radiography

Education Exhibits
Location: CH Community, Learning Center

Selected for RadioGraphics

Participants
Daniel Robert L'Heureux MD (Presenter): Nothing to Disclose
Maria Daniela Martin MD: Nothing to Disclose
Palmi Nitin Shah MD: Nothing to Disclose

TEACHING POINTS
A diverse, multi-system spectrum of pathologies can be diagnosed or suspected by identifying abnormal air and its location on chest radiographs. The goal of this presentation is to expose the learner to many of the different manifestations of abnormal air seen on chest radiography to improve the learner’s diagnostic ability. The importance of maintaining a rigorous, systematic search pattern will also be reinforced, both by providing the search pattern followed by the authors and through the categorization of the diagnoses discussed.

TABLE OF CONTENTS/OUTLINE
a. Introduction to topic/goals.
   b. Reinforcement of search pattern with brief demonstration.
   c. Cases- majority of the presentation will follow a quiz-based format where the learner will be prompted with a question that is followed by the answer, the radiographic findings, and a teaching point. Correlation with advanced imaging, as indicated, will accompany the answer.
   Case examples will be categorized by location and will include, but are not restricted to: Mediastinum (pneumomediastinum, pneumopericardium, esophageal diverticulum), Lungs (pneumothorax, Macklin effect, empyema), Abdomen (portal venous gas, pneumoperitoneum, intramural gastric air, retroperitoneal air), MSK (vacuum phenomenon, paraspinal abscess), and Soft Tissues (subcutaneous emphysema, sternal dehiscence).

CHE223
Xenon Ventilation CT: Ventilation Changes After Treatment in Patients With Emphysema

Education Exhibits
Location: CH Community, Learning Center

Participants
Rex Kim Ping Wong MBBS, FRCP (Presenter): Nothing to Disclose
Gladys G. Lo MD: Nothing to Disclose
Bing Lam: Nothing to Disclose

TEACHING POINTS
To understand the indications, preparations, techniques, image reading and interpretation strategy and data post-processing techniques of Xenon ventilation CT. To demonstrate how this technique can provide a visual and quantitative assessment of lung ventilation on a regional basis.

TABLE OF CONTENTS/OUTLINE
A. Introduction Review the principle behind Xenon ventilation CT using dual energy technique.
   B. Technical Consideration Patient preparation, positioning, image acquisition parameters and data postprocessing.
   C. Image Interpretation Practical
approach to interpretation of CT data sets. D. Image Gallery Illustrative cases of ventilation changes in patients with emphysema before and after treatment.

**CHE224**

**Functional Imaging of the Pleura: Applications in Oncology**

_Education Exhibits_

_Location: CH Community, Learning Center_

**Participants**

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Jordi Broncano MD (Presenter)</td>
<td>Nothing to Disclose</td>
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<td>Antonio Luna MD</td>
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<td>Maria Jose Garcia-Veloso MD</td>
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<td>Roberto Garcia Figueiras MD</td>
<td>Nothing to Disclose</td>
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<td>Teodoro Martin MD</td>
<td>Nothing to Disclose</td>
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<td>Javier Sanchez MD, PhD</td>
<td>Research Consultant, Koninklijke Philips NV</td>
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<tr>
<td>Antonio Alvarez-Kindelan MD</td>
<td>Nothing to Disclose</td>
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**TEACHING POINTS**

1. To analyze the current functional imaging techniques available (18FDG PET/CT, CT perfusion and DWI and DCE-MRI) for the evaluation of pleural diseases, with a focus in their correct acquisition and post-processing.
2. To review the clinical applications of these techniques, for the evaluation of malignant pleural diseases and its mimics.

**TABLE OF CONTENTS/OUTLINE**


**CHE225**

**Got Milk? Role of Radiology in Diagnosis and Management of Chylothorax**

_Education Exhibits_

_Location: CH Community, Learning Center_

**Participants**

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Xue Susan Bai MD</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Sana Parsian MD (Presenter)</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Sandeep Vaidya MD</td>
<td>Nothing to Disclose</td>
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<td>Gregory Kicska MD, PhD</td>
<td>Nothing to Disclose</td>
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<td>Sudhakar N. Pipavath MD</td>
<td>Nothing to Disclose</td>
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<tr>
<td>J. David Godwin MD</td>
<td>Shareholder, Cardiac Insight</td>
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**TEACHING POINTS**

1. Review relevant anatomy and physiology of the lymphatic system. 2. Discuss the etiology of Chylothorax. 3. Illustrate the diagnosis of thoracic duct injuries specifically via lymphangiography and highlight percutaneous thoracic duct embolization for management of Chylothorax.

**TABLE OF CONTENTS/OUTLINE**


**CHE226**

**Mesothelioma: Radiologic Features, Differential Diagnosis and Management**

_Education Exhibits_

_Location: CH Community, Learning Center_

**Participants**

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<th>Name</th>
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<tr>
<td>Daniel Barnes MD (Presenter)</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Marcelo Antonio Sanchez Gonzalez MD</td>
<td>Nothing to Disclose</td>
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<td>Mariana Neilda Benegas Urteaga MD</td>
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<td>Oscar Sabino Chirife Chaparro MD</td>
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<td>Teresa Maria Caralt</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Rosario Jesus Perea MD, PhD</td>
<td>Nothing to Disclose</td>
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**TEACHING POINTS**

-Pleural mesothelioma is a rare neoplasm with high mortality. Asbestos exposure is decreasing but the incidence is expected to increase due to past exposures. -Radiologists must be aware detecting and managing malignant pleural thickening or effusion to avoid delays in diagnosis and treatment. - We observed that sarcomatoid mesothelioma is more aggressive that epithelioid mesothelioma, as different clinical studies suggests, and they have different radiological appearances -CT-guided biopsy is a good diagnostic technique, with similar performance to VTC with lower rate of track seeding. - New TNM allows some patients who would had received a palliative treatment before, at the present time may opt for a treatment with curative intent.

**TABLE OF CONTENTS/OUTLINE**

1) Introduction 2) Asbestos and mesothelioma Pleural plaques Prevalence of exposure Non exposed patients 3) Histological
CHE227

Pleural Lesions: A Pictorial Review of Common and Not So Common Pleural Lumps and Bumps

Education Exhibits
Location: CH Community, Learning Center

Certificate of Merit

Participants
Elena Scali MD: Nothing to Disclose
Anto Sedlic MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. To present an overview of thoracic pathology presenting as pleural lesions
2. To review the radiographic and cross-sectional imaging findings of common and uncommon pleural lesions including neoplastic, infectious, and post-traumatic etiologies.
3. To describe the imaging appearances that favor a pleural location for lesions identified on radiography

TABLE OF CONTENTS/OUTLINE
• Radiographic patterns that aid in localization of lesions to the pleura
• Differentiating pleural from chest wall lesions and pulmonary mimics of pleural lesions
• Common traumatic findings, including pleural hematoma and extrapleural thoracic injuries such as rib fractures, soft tissue hematomas, and splenosis that may mimic pleural lesions
• Non-traumatic pleural lesions including primary pleural neoplasm, metastatic pleural lesions, acute and chronic pleural findings in infection, and pleural lesions seen in occupational diseases such as asbestos related pleural plaques
• Role of the radiologist in the interdisciplinary approach in the diagnosis of pleural lesions, identifying suspicious lesions with aggressive features suggesting chest wall invasion or bone destruction as well as benign lesions in avoiding unnecessary biopsy

CHE228

Chronic Thromboembolic Pulmonary Hypertension (CTEPH): Radiological Approach with Dual-energy CT Pulmonary Angiography. A One-stop Assessment

Education Exhibits
Location: CH Community, Learning Center

Certificate of Merit

Participants
Mariana Nelida Benegas Urteaga MD (Presenter): Nothing to Disclose
Marcelo Sanchez MD: Nothing to Disclose
Marta Burrel MD, PhD: Nothing to Disclose
Josep Gutiriz MD: Nothing to Disclose
Marta Barrufet MD: Nothing to Disclose
Teresa Maria de Caralt: Nothing to Disclose
Rosario Jesus Perea MD, PhD: Nothing to Disclose

TEACHING POINTS
1. To describe the CT findings of chronic thromboembolic disease at Dual CT angiography
2. To provide a differential diagnosis of pulmonary embolism and focal iodine defects in perfusion maps of dual CT
3. To explain that Dual-energy CT offers a "one-stop" assessment of anatomy and perfusion in CTEPH

TABLE OF CONTENTS/OUTLINE
1. Introduction
2. Dual energy CT pulmonary angiography technique
3. CT angiography features a. Direct signs b. Indirect signs i. Related to pulmonary hypertension ii. Related to systemic collateral supply
5. Iodine maps of dual CT
7. Other thoracic iodine defects: emphysema, constrictive bronchiolitis
8. Pre and post thromboendarterectomy evaluation
9. Conclusions

CHE229

Physiological Variation in Lung Density: Potential Limitation for CT Lung Perfusion

Education Exhibits
Location: CH Community, Learning Center

Participants
Shabnam Homampour (Presenter): Nothing to Disclose
Laura Jimenez-Juan MD: Nothing to Disclose
Chris Dey MD, FRCR: Nothing to Disclose
Hatem Mehrez PhD: Employee, Toshiba Corporation
Narinder S. Paul MD: Research funded, Toshiba Corporation

TEACHING POINTS
1. Different approaches to perform CT lung perfusion
2. Emerging role of CT lung perfusion in assessing lung physiology and pathological changes
3. Physiological confounders in assessing CT lung perfusion
4. The critical influence that changes in lung density with breathing have on CT lung perfusion

TABLE OF CONTENTS/OUTLINE
1. Review different models used in CT lung perfusion
2. Present a synopsis of current literature outlining clinical utility of CT lung perfusion
3. Demonstrate the importance of lung parenchyma density in lung analyses using animal (swine) and human data with qualitative and quantitative evaluation displayed on perfusion maps as illustrated in the attached images

CHE230

Pulmonary Angiography for Pulmonary Embolism with Computed Tomography: Maximizing Clinical Value

Education Exhibits
Location: CH Community, Learning Center

Participants
Claude Emmanuel Guerrier MS (Presenter): Nothing to Disclose
Han Kim MD : Nothing to Disclose
Barun Aryal BS : Nothing to Disclose
Danh Truong : Nothing to Disclose
Weonpo Yarl : Nothing to Disclose
edward prevatt : Nothing to Disclose
Matthew Kahari : Nothing to Disclose
Andre J. G. Duerinckx MD, PhD : Nothing to Disclose
Genelle Gittens-Backus : Nothing to Disclose
Faezeh Razjouyan MS : Nothing to Disclose
Weonpo Yarl : Nothing to Disclose
Bonnie Clarissa Davis MD : Nothing to Disclose

TEACHING POINTS
- Optimized pulmonary computed tomography angiography (PCTA) for pulmonary embolism detection is a complex undertaking involving selection of contrast volume, injection timing, scanning parameters, and interaction with patient (breath-holding).
- Breathing techniques and cardiac gating can optimize CTA image quality by decreasing various respiratory and motion artifacts.
- The controversial clinical significance of small subsegmental pulmonary emboli.
- The prognostic value of right ventricular function assessment.
- The emerging technology of lung perfusion imaging using dual energy computed tomography.
- New imaging techniques play an important role in guiding treatment decisions as well as future research investigations.

TABLE OF CONTENTS/OUTLINE
1. Review how to optimize CTA image quality with the strategic use of intravenous contrast, scanning parameters, breathing techniques, and electrocardiographic gating.
2. Review the value of different treatment possibilities of small subsegmental pulmonary embolism and recommendations to initiate anticoagulation.
3. Review approaches to right ventricular function evaluation.
4. Review the ability of new CT technologies to add new information (lung perfusion), improve spatial resolution, and reduce radiation dosage.

CHE231

Pulmonary Ischemia and Pulmonary Infarction in Non-contrast and Non-vascular Chest CT: The "Bubbly" Lung Sign

Education Exhibits
Location: CH Community, Learning Center

Participants
Hannes Kroll MD (Presenter): Nothing to Disclose
Patrick T. Norton MD : Nothing to Disclose
Michael Hanley MD : Nothing to Disclose
Juliana Marcela Bueno MD : Co-author, Oxford University Press

TEACHING POINTS
After viewing this exhibit, the learner will: 1 Recognize the typical appearance of pulmonary ischemia and pulmonary infarction in CT studies of the chest non targeted to pulmonary artery assessment 2 Know when to suspect an occult pulmonary embolism in non-contrast and non-CTPA studies, by recognition of main imaging characteristics of lung ischemia/infarction 3 Differentiate alveolar occupation seen in non-ischemic entities, from that seen in lung parenchymal ischemia/infarction. The "bubbly lung" sign. 4 Understand the importance of early recognition of these imaging findings in the non-angiographic chest CT of patients who present with non-specific respiratory symptoms and misleading clinical signs.

TABLE OF CONTENTS/OUTLINE
1 Anatomy of the lung, emphasizing why it is easily prone to ischemia 2 Radiologic-pathologic correlation of lung parenchymal ischemia 3 Main imaging findings of lung ischemia/infarction in non-contrast chest CT: how to recognize it. 3' The "bubbly lung" sign 4 Case examples

CHE232

The Post Surgical Lung: A Pictorial Review of Frequent Surgical Techniques in the Treatment of Lung Cancer

Education Exhibits
Location: CH Community, Learning Center

Participants
Joshua F. Smith MD (Presenter): Nothing to Disclose
Sarah Lafond MD : Nothing to Disclose

Table of Contents/Outline
- Anatomy of the lung, emphasizing why it is easily prone to ischemia
- Radiologic-pathologic correlation of lung parenchymal ischemia
- Main imaging findings of lung ischemia/infarction in non-contrast chest CT: how to recognize it.
- The "bubbly lung" sign
- Case examples
TEACHING POINTS
Multiple reviews of pulmonary surgical techniques have been published for surgeons, but very few recent articles in the radiologic literature are dedicated to explaining the basic surgical techniques used in the treatment of lung cancer to radiologists. After viewing this exhibit, the learner will: 1. Learn the most frequent surgical techniques used in the treatment of lung cancer according to the stage of disease 2. Understand the importance of time in the interpretation of post-surgical images and how it influences the radiographic appearance of the surgical bed 3. Recognize normal and abnormal findings after surgery on a timeline review 4. Recognize the most common post-surgical complications, according to time elapsed after surgery.

TABLE OF CONTENTS/OUTLINE
1. Most common surgical techniques used in the treatment of lung cancer (wedge resection, segmentectomy, sleeve lobectomy, lobectomy, pneumonectomy) 1’. Anatomic illustration and imaging correlation of these techniques 2. Timeline review of imaging findings: what to expect over time 3. Sample cases: expected and unexpected findings. Main complications.

CHE233
Tubes, Lines and Medical Devices in the Intensive Care Unit (ICU). What Should We Know for an Accurate Interpretation?

Education Exhibits
Location: CH Community, Learning Center

Participants
Simon Long MD (Presenter): Nothing to Disclose
David Hilton Ballard MS: Nothing to Disclose
Luciana Previgliano MD: Nothing to Disclose
Carlos Humberto Previgliano MD: Nothing to Disclose
Alberto Andres Simoncini MD: Nothing to Disclose
Guillermo P. Sangster MD: Nothing to Disclose
Eduardo C. Gonzalez-Toledo MD: Nothing to Disclose

TEACHING POINTS
Following completion of this educational activity the learner will be able to: 1. Recognize different types of lines, tubes and medical devices used in ICU patients. 2. Identify the correct and incorrect positioning of these devices for a prompt report 3. Discuss ACR practice guidelines for daily portable chest radiograph.

TABLE OF CONTENTS/OUTLINE
Chest radiograph is a crucial tool for diagnosis and follow up of critically ill in the ICU. In addition, allows to evaluate a broad range of monitoring equipment and to detect complications. Medical devices malpositioning is a serious condition, and often unrecognized. A collective of patients with adequately and malpositioned medical devices encountered in clinical practice form the basis of this pictorial essay. The following imaging findings are depicted: 1. Normal appearance, function and position of: a. Airway b. Vascular c. Pleural d. Cardiac e. Gastrointestinal f. Miscellaneous medical devices 2. Malpositioning and potential complications.

EDE001-b
Breast Case of the Day

Education Exhibits
Location: NA

Participants
Co-Moderator
Susan O. Holley MD, PhD Research Consultant, Seno Medical Instruments, Inc
Co-Moderator
Michelle V. Lee MD Nothing to Disclose
Evgenia Jane Karimova MD: Nothing to Disclose
Matthew S. Clower MD: Nothing to Disclose
Rachel Uttech Loomans MD: Nothing to Disclose
Hillary Linwen Shaw MD: Nothing to Disclose

TEACHING POINTS
1) Identify, characterize, and analyze abnormal findings on multimodality breast imaging studies. 2) Develop differential diagnostic considerations based on the clinical information and imaging findings. 3) Recommend appropriate management for the patients based on imaging findings.

EDE002-b
Cardiac Case of the Day

Education Exhibits
Location: NA

Participants
Moderator
Matthew D. Cham MD Nothing to Disclose
Javier Sanz MD: Nothing to Disclose
Baskaran Sundaram MBBS: Nothing to Disclose
Adam Jacob MD: Nothing to Disclose
Mary Margaret Salvatore MD: Nothing to Disclose
Neil Lester MD: Nothing to Disclose
Anastasia Louise Hryhorczuk MD: Nothing to Disclose
Neil Malhotra MD: Nothing to Disclose
TEACHING POINTS

1) Review the diagnosis of a specific condition by using either a single-modality or multimodality approach; identify state-of-the-art imaging and methods of treatment for various pathologic conditions; and assess new research on applications of various imaging and therapeutic modalities.

EDE003-b

Chest Case of the Day

Education Exhibits

Location: NA

Participants

Moderator
Alvaro Huete Garin MD Nothing to Disclose
Nicole L. Restauri MD : Nothing to Disclose
Peter B. Sachs MD : Advisor, Koninklijke Philips NV
Daniel Vargas MD : Nothing to Disclose
Thomas Dale Suby-Long MD : Nothing to Disclose
Kristopher W. Cummings MD : Research Consultant, Biomedical Systems Research Consultant, Medtronic, Inc
Maria Jose Baladron MD : Nothing to Disclose
Santiago E. Rossi MD : Advisory Board, Koninklijke Philips NV Speaker, Pfizer Inc Royalties, Springer Science+Business Media Deutschland GmbH
Nadeem Parkar MD : Nothing to Disclose
Talha S. Allam MD : Nothing to Disclose
Hillary L. Purdy MD : Nothing to Disclose
Sanjeev Bhalla MD : Nothing to Disclose

TEACHING POINTS

1) To analyze interesting chest cases. 2) To understand appropriate differential diagnosis. 3) To understand the clinical significance of the diagnosis presented.

EDE004-b

Emergency Radiology Case of the Day

Education Exhibits

Location: NA

Participants

Moderator
Guillermo P. Sangster MD Nothing to Disclose
Alberto Ivo Carbo MD : Nothing to Disclose
Simon Long MD : Nothing to Disclose
Husein Imtiaz Poonawala MD : Nothing to Disclose
Ana Andrade MD : Nothing to Disclose
Lucas Tomas Jensen MD : Nothing to Disclose
Javier Vallejos MD, MBA : Nothing to Disclose
Carlos Capunay MD : Nothing to Disclose
Peeyush Bhargava MD, MBA : Nothing to Disclose
Maureen Gail Heldmann MD : Nothing to Disclose
Gustavo A. Poggio MD : Nothing to Disclose
Julie Babb MD : Nothing to Disclose

EDE005-b

Gastrointestinal Case of the Day

Education Exhibits

Location: NA

Participants

Moderator
Vincent M. Mellnick MD Nothing to Disclose
Amy Kiyo Hara MD : Nothing to Disclose
Christine Marie Peterson MD : Nothing to Disclose
Christine O. Menias MD : Nothing to Disclose
Dennis M. Balfe MD : Nothing to Disclose
Douglas Robert Kitchin MD : Nothing to Disclose
Perry J. Pickhardt MD : Co-founder, VirtuoCTC, LLC Stockholder, Cellec
tar Biosciences, Inc
Rex Albert Parker MD : Nothing to Disclose
Whitney A. Manlove MD : Nothing to Disclose
Michael Jyh-Gang Chiang MD : Nothing to Disclose
Jerry Tsu-Yuen Loo MD : Nothing to Disclose
Jennifer Lynn Kissane MD : Nothing to Disclose
Matthew Harlan Lee MD : Nothing to Disclose

TEACHING POINTS

1) Each GI case of the day will be taken from disorders of the luminal GI tract as well as the liver, spleen, pancreas, and biliary system. The findings may be uncommon manifestations of common diseases or common manifestations of uncommon diseases.
EDE006-b

Genitourinary Case of the Day

Education Exhibits

Location: NA

Participants

Moderator
Frederico Ferreira Souza MD: Nothing to Disclose
Corey Seth Orton MD: Nothing to Disclose
Timothy James Ragland MD: Nothing to Disclose
Katherine Leigh Ragland MD: Nothing to Disclose
Keith Perry Russell MD: Nothing to Disclose
Cyrillo Rodrigues Araujo MD: Nothing to Disclose
Scott A Prechter MD, Pharm D: Nothing to Disclose
Andrew Dennis Smith MD, PhD: Research Grant, Pfizer Inc President, Radiotics LLC President, Liver Nodularity LLC President, Color Enhanced Detection LLC Pending patent, Radiotics LLC Pending patent, Liver Nodularity LLC Pending patent, Color Enhanced Detection LLC
Manohar Roda MD: Nothing to Disclose
Erik Daniel Weiss MD: Nothing to Disclose
Dmitriy Nicolas Kazimirko MD: Nothing to Disclose
David Ray MD, MS: Nothing to Disclose
Lindsey Denise Halley MD: Nothing to Disclose
Khalid Saleh MD: Nothing to Disclose

EDE007-b

Interventional Radiology Case of the Day

Education Exhibits

Location: NA

Participants

Moderator
Paula Novelli MD: Nothing to Disclose

EDE008-b

Musculoskeletal Case of the Day

Education Exhibits

Location: NA

Participants

Moderator
William F. Conway MD, PhD: Nothing to Disclose
Russell William Chapin MD: Nothing to Disclose
Alexander Macrae Harvin MD: Nothing to Disclose
Matthew Richard Gillott MD: Nothing to Disclose
Robert Hedrick Hazelrigg MD: Nothing to Disclose
Patrick Ryan Mullin DO: Nothing to Disclose
Kevin Gabriel Garrett MD: Nothing to Disclose
Michael McDonald Davis MD: Nothing to Disclose

EDE009-b

Neuroradiology Case of the Day

Education Exhibits

Location: NA

Participants

Moderator
Thiru A.P. Sudarshan DMRD, FRCR: Nothing to Disclose
Avinash K. Kanodia MD: Nothing to Disclose
Matthew John Budak MD, FRCR: Nothing to Disclose
Jonathan Weir-McCall MBBCh, FRCR: Nothing to Disclose

EDE010-b

Nuclear Medicine Case of the Day

Education Exhibits

Location: NA

Participants
EDE011-b

Obstetrical Imaging Case of the Day

*Education Exhibits*

*Location: NA*

**Participants**

Moderator
Karen Y. Oh MD Nothing to Disclose
Thomas Gibson MD : Nothing to Disclose
Bryan Robert Foster MD : Nothing to Disclose
Amaya Marie Basta MD : Nothing to Disclose
Kathy Jane Snyder MD : Nothing to Disclose
Aaron Kirsch MD : Nothing to Disclose
Roya Sohaey MD : Nothing to Disclose

**TEACHING POINTS**

1) The five submitted Obstetrical Imaging cases will offer challenging ultrasound and MR images to practice visual interpretation skills, promote medical knowledge review and enhance ability to summarize important findings to achieve a diagnosis.

EDE012-b

Pediatric Case of the Day

*Education Exhibits*

*Location: NA*

**Participants**

Moderator
Lynn A. Fordham MD Nothing to Disclose
Tae Il Han : Nothing to Disclose
Cassandra Marie Sams MD : Nothing to Disclose
James H. Scatliff MD : Nothing to Disclose

**TEACHING POINTS**

1) Challenge yourself with unknown pediatric cases. 2) Review test cases and similar cases. 3) Increase depth of knowledge in Pediatric Imaging.

EDE013-b

Physics Case of the Day

*Education Exhibits*

*Location: NA*

**Participants**

Moderator
Charles E. Willis PhD Nothing to Disclose
Alexander Samuel Pasciak MSc, PhD : Founder, Fluoroscopic Safety, LLC
Jerry A. Thomas MS : Stockholder, General Electric Company Stockholder, Hologic, Inc Stockholder, Stryker Corporation
Speaker, Medical Technology Management Institute
Robert MacDougall MSc : Nothing to Disclose
Beth A. Harkness MS : Nothing to Disclose
Austin Clark Bourgeois MD : Nothing to Disclose
Yong C. Bradley MD : Nothing to Disclose
Matt Vanderhoek PhD : Nothing to Disclose
Alan Cebula MS : Nothing to Disclose

EDE014-b

Ultrasound Case of the Day

*Education Exhibits*

*Location: NA*
EDE015-b

Molecular Imaging Case of the Day

Education Exhibits

Location: NA

Participants

Moderator
Nirvikar Dahiya MD, Nothing to Disclose
Kathryn Ann Robinson MD, Nothing to Disclose
Manjiri K. Dighe MD, Research Grant, General Electric Company
Jason Michael Wagner MD, Nothing to Disclose
Michael David Beland MD, Nothing to Disclose
Scott W. Young MD, Nothing to Disclose

EDE100

Image Interpretation Exhibit in Digital Format

Education Exhibits

Location: NA

Participants

Jeffrey C. Weinreb MD, Nothing to Disclose

TEACHING POINTS

This is the companion electronic exhibit to the Image Interpretation Session, scheduled for Sunday, November 30, 4:00 - 5:45 pm, in Arie Crown Theater. Several of the case histories to be discussed in the Sunday session will be on display electronically beginning Sunday at 8:00 am. After the session concludes, the accompanying discussion for each case will be revealed. The exhibit will remain on display for self-study until 12:30 pm, Friday, December 5.

The learning objectives for this presentation are: 1) Identify key abnormal findings on radiologic studies that are critical to making a specific diagnosis. 2) Construct a logical list of differential diagnoses based on the radiologic findings, focusing on the most probable differential diagnoses. 3) Determine which, if any, additional radiologic studies or procedures are needed in order to make a specific final diagnosis. 4) Choose the most likely diagnosis based on the clinical and the radiologic information.

ERE001-b

Code Blue: Imaging Features of Cardiac Arrest on CECT

Education Exhibits

Location: ER Community, Learning Center

Participants

Kelly A. Covey MD (Presenter), Nothing to Disclose
Sean Carlson DO, Nothing to Disclose
Michael Markovic MD, Nothing to Disclose
Thomas Bernard Poulton MD, Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To review the imaging findings of cardiac arrest / impending cardiac arrest on CECT. 2. To present a typical case of cardiac arrest on CECT secondary to a ruptured abdominal aortic aneurysm. 3. To emphasize the importance of recognizing CECT signs of cardiac arrest / impending cardiac arrest.

TABLE OF CONTENTS/OUTLINE

Introduction Review imaging findings of cardiac arrest / impending cardiac arrest on CECT Case presentation of ruptured abdominal aortic aneurysm with classic findings of cardiac arrest on CECT Discussion Proposed pathophysiology of the imaging findings Clinical importance of recognizing cardiac arrest / impending cardiac arrest on CECT Summary
Normal and Abnormal Imaging Findings after the Liposuction

Education Exhibits
Location: ER Community, Learning Center

Participants
Yong Eun Chung MD, PhD (Presenter): Nothing to Disclose
Hye-Jeong Lee MD: Nothing to Disclose
Je Sung You: Nothing to Disclose
Myeong-Jin Kim MD, PhD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To review the definition, techniques and types of liposuction. To understand normal imaging findings after liposuction. To review imaging findings of complication due to liposuction. The major teaching points of this exhibit are Liposuction is less invasive procedure which can be performed in obese patients and there are several different techniques and types. Subcutaneous emphysema, fat infiltration and fluid collection are normal findings immediate after liposuction. Complications related to liposuction are vascular injury, abdominal wall defect, bowel wall injury, infection and pulmonary embolism.

TABLE OF CONTENTS/OUTLINE
1. Definition of liposuction
2. Image illustration of techniques of liposuction: SAL (suction-assisted liposuction), UAL (Ultrasound-) VAL (Vaser-), PAL (Power-), LAL (Laser-)
3. Image illustration of types of liposuction: Dry, Wet, Super wet, tumescent
4. Normal imaging findings after liposuction
5. Imaging findings of complication due to liposuction: active bleeding or hematoma, ventral herniation of bowel, perforation of bowel, necrotizing fasciitis, pulmonary embolism

ERE004-b
Bullet Characteristics in Forensic Radiology

Education Exhibits
Location: ER Community, Learning Center

Participants
Dominic Gascho (Presenter): Nothing to Disclose
Garyfalia Ampanozi MD: Nothing to Disclose
Sebastian Eggert: Nothing to Disclose
Sabine Franckenberg MD: Nothing to Disclose
Stephan Bolliger: Nothing to Disclose
Sebastian Winkhofer MD: Nothing to Disclose
Steffen Ross MD: Nothing to Disclose
Lukas Ebner MD: Nothing to Disclose
Michael J. Thali MD: Nothing to Disclose
Patricia Mildred Flach MD: Nothing to Disclose

TEACHING POINTS
• Vast artifacts on computed tomography (CT) may contrariwise not be present on magnetic resonance imaging (MR) - dependent on the bullets compounds • Ferromagnetic bullets present with extensive susceptibility on postmortem MR • Non-ferromagnetic bullets allow for radiological interpretation with scarce or no artifacts on postmortem MR • Projectile movement and migration may be caused by (postmortem) MR in ferromagnetic bullets • Projectile migration may occur along wound channel within a body cavity, e.g in ricochet • Significant focal heating effects have not been detected during autopsy in forensic cases

TABLE OF CONTENTS/OUTLINE
• Introduction - Morgues and Forensic institutes worldwide increasingly use postmortem imaging for quality improvement or even as replacement for autopsy. Forensic caseload frequently presents with lodged projectiles and uncertainty remains whether to perform postmortem MR • Review of literature of (ante- and postmortem) CT and MR • Discussion of ballistic properties regarding artifacts • Discussion of ballistic properties regarding projectile migration, movement and dislocation • Discussion of ballistic properties regarding thermic effects • Potential implication for patient care • Case-based review of postmortem cases (scanned on a 3 T) displaying the above reviewed imaging features in correlation to autopsy

ERE005-b
Queer the Pitch: How to Detect Internal Drug Couriers—From Customs through Hospitals to Forensics

Education Exhibits
Location: ER Community, Learning Center

Certificate of Merit

Participants
Patricia Mildred Flach MD (Presenter): Nothing to Disclose
Dominic Gascho: Nothing to Disclose
Patrick Laberke: Nothing to Disclose
Lukas Ebner MD: Nothing to Disclose
Steffen Ross MD: Nothing to Disclose
Garyfalia Ampanozi MD: Nothing to Disclose
Wolf Schweitzer MD: Nothing to Disclose
Michael J. Thali MD: Nothing to Disclose
Andrew Thompson: Nothing to Disclose
Thomas D. Ruder MD: Nothing to Disclose
TEACHING POINTS

- Learn about specific radiological signs on DR and CT and how to diagnose drug swallowers
- The manufacture and density appearance on CT are elaborated
- The diagnostic gap between the authorities procedures at airports to radiological imaging at hospitals and morgues are described
- The problems of different jurisdictions and penalties (e.g. UK, US, Switzerland, Asia) are made aware
- Pictorial review on clinical cases (Methamphetamine, Cocaine) and postmortem cases with focus on radiological detection and pitfalls is presented
- The audience will learn about the pearls on DR and CT in drug couriers
- A protocol regarding low dose DE-CT will be available for the reader

TABLE OF CONTENTS/OUTLINE

- Definition of body packers, pushers and stuffers
- Customs procedures and body scans at the airport
- Review of literature of different imaging modalities
- Description of a drug loo
- Radiological diagnostic signs on DR and CT
- Pitfalls and complications in internal swallowers detection / liquid cocaine
- Postmortem cases with autopsy and imaging
- Density of the packs regarding the inside substance and why not to rely on density measurements
- Outlook - low dose CT and micro-dose CT in suspects
- Outlook - DE-CT / spectral CT

ERE006-b
Transitioning to Electronic Books: Designing Interactive Multimedia on the Ipad for the Medical Student Radiology Rotation Using a Competency-based Curriculum

Education Exhibits
Location: ER Community, Learning Center

Participants
Amir Taherian BS (Presenter): Nothing to Disclose
Paul S. Babyn MD: Nothing to Disclose

TEACHING POINTS

- Standardize rotational assessment in Medical Imaging using pre and post-tests as measures of knowledge retention. Promote efficient imaging management skills and image ordering based on evidence-based medicine, using clinical vignettes.

TABLE OF CONTENTS/OUTLINE

- Title: Transitioning to Electronic Books: Designing Interactive Multimedia on the Ipad for the Medical Student Radiology Rotation using a Competency-Based Curriculum
- Outline: with increased student enrollment, and often limited clinician access, students may not be exposed to a standardized experience in medical imaging. Our goal is to expose patients to the scope of radiology, clarify potential misconceptions about medical imaging that form the basis of clinician-radiologist interactions and describe risks and benefits of imaging, utilizing pre- and post-tests. Implementing a tablet-based radiology residency education curriculum will improve: Motivation to study (and total time spent studying); Preparation for the elective post-test; And active learning during the 2 week competency based elective. The free iBook has a visually rich layout with high resolution images, videos, multimedia, interactive quizzes, PACS scrolling, links to websites as well as other apps on the iPad, 3D models, and notes for radiology fact recalls.

ERE007-b
Blast Injuries: From IED Blasts to Boston Marathon Bombing

Education Exhibits
Location: ER Community, Learning Center

.Selected for RadioGraphics

Participants
Ajay K. Singh MD (Presenter): Nothing to Disclose
John D. York MD: Nothing to Disclose
Laura Louise Avery MD: Nothing to Disclose
Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

TEACHING POINTS

- This poster describes: 1. The imaging features of high intensity blast injuries from improvised explosive devices in Iraq and Afganistan. 2. The imaging features of low intensity blast injuries from Boston marathon bombing 3. The physics of the various blast injuries (primary, secondary, tertiary and quaternary blast wave injuries)

TABLE OF CONTENTS/OUTLINE


ERE009-b
MDCT Findings of Soft Tissue Barotrauma: Striking, Subtle, and Mimics

Education Exhibits
Location: ER Community, Learning Center

Participants
Jonathan Holstad MD (Presenter): Nothing to Disclose
Brett Douglas MacAdam MD, MS: Nothing to Disclose
Dahua Zhou MD: Nothing to Disclose

TEACHING POINTS
Purpose: 1. Review the classical physics of barotrauma and applied pathophysiology. 2. Discuss high-yield body MDCT findings in victims of soft tissue barotrauma. 3. Highlight the clinical prognostic importance of soft tissue barotrauma.

TABLE OF CONTENTS/OUTLINE

Physics/Pathophysiology of Barotrauma
Classical physics: pressure = force/area. Pascal’s Law states pressure applied to a closed body of fluid will be evenly distributed. While pressure is proportional to density it is independent of size and shape of the container. A force to the chest or abdomen acts as a shockwave. For example, if energy is transmitted throughout mesenteric fat a floating loop of bowel will experience an equal force on all sides. Clinical and Prognostic Importance of Soft Tissue Barotrauma. Clinical exam is surprisingly insensitive for pressure-related injuries. A “seatbelt sign” can be helpful on physical exam, however most attention is directed to fractures or solid organ injury. The radiologist plays a key role in completing the patient’s clinical picture. Barotrauma victims frequently suffer from multiple solid organ injuries and risk a “satisfaction of search” error. Tracheal injury may complicate oxygenation. Traumatic flank hernias include a risk of bowel entrapment. Bowel contusions may progress to ischemia. Representative Cases and Mimics Conclusion

ERE010-b
Will the Real SCIWORA Please Stand Up? Exploring the Lexicon of Clinicoradiologic Mismatch in Closed Spinal Cord Injuries

Education Exhibits
Location: ER Community, Learning Center

Participants
Wendy Kim MD (Presenter): Nothing to Disclose
David Dreizin MD : Nothing to Disclose
Jane Kim MD : Nothing to Disclose
Narendra S. Shet MD : Nothing to Disclose
Alexis Rose Boscak MD : Nothing to Disclose
Deborah Stein MD, PhD : Nothing to Disclose
Stuart E. Mirvis MD : Nothing to Disclose

TEACHING POINTS
After viewing this exhibit, the learner should be able to: Understand the epidemiology, pathophysiology, and imaging characteristics of SCIWORA (spinal cord injury without radiographic abnormality) Explain the evolution of the different variations and sub-classifications of the term SCIWORA Describe key issues regarding prognostication, triage, and management as directed by MRI evaluation

TABLE OF CONTENTS/OUTLINE
Introduction Terminology and controversy: SCIWORA, SCIWORET, SCIWOCTET, SCIWOPRA, SCIWONA Prognostication and triage within the context of MRI Intrinsic cord pathology: Transient or recurrent SCIWORA Multilevel or tandem SCIWORA Cord edema Cord hemorrhage Extraneural pathology Discoligamentous and capsular injury Epidural hematomas Follow up imaging/Outcome Clinical relevance and conclusion

ERE100
Acute Pancreatitis: Imaging Indications and Potential Complications

Education Exhibits
Location: ER Community, Learning Center

Participants
Jason DiPorce MD (Presenter): Nothing to Disclose
Yehuda Malul : Nothing to Disclose
Nadia Caplan : Nothing to Disclose
Harold Jacob : Nothing to Disclose

TEACHING POINTS
1. Acute pancreatitis is a clinical diagnosis with diagnostic criteria that do not include imaging. Therefore, radiology examinations should be interpreted in the presence of these clinical data to avoid mistakes in misdiagnosing mimickers.
2. Indications for imaging of acute pancreatitis should focus on evaluation for etiology and potential complications.

TABLE OF CONTENTS/OUTLINE
Expected imaging findings in uncomplicated pancreatitis with focus on differential mimickers Indications for imaging- underlying mass, anatomic, autoimmune etiology, complication evaluation Complications a. Pseudocysts b. Abscess c. Necrosis d. Hemorrhage e. Splenic artery aneurysm f. Splenic vein thrombosis g. Fistula formation for example to kidney and pleura

ERE101
Beyond Simple Cholecystitis: Unusual Gallbladder and Gallstone Related Emergencies

Education Exhibits
Location: ER Community, Learning Center

Participants
Daniel Ariel Krieger MD : Nothing to Disclose
Meir Hillel Scheinfeld MD, PhD : Nothing to Disclose
Mike Spektor MD : Nothing to Disclose
Jeffrey Michael Levsy MD, PhD : Nothing to Disclose
Dameon R. Duncan MD, MBA : Nothing to Disclose
Robert Joshua Dym MD (Presenter): Nothing to Disclose

TEACHING POINTS
While cholecystitis is generally uncomplicated and straightforward, it may also present in advanced stages or other unusual forms. In addition to directly obstructing the cystic or common duct, gallstones may indirectly obstruct the common duct (Mirizzi syndrome), stomach (Bouveret syndrome) or small bowel (gallstone ileus). Postoperative complications after cholecystectomy include abscess and bile leak, and more rarely, cholecystitis of the cystic duct remnant and abscess due to dropped gallstones.

TABLE OF CONTENTS/OUTLINE

Introduction Advanced cholecystitis Emphysematous cholecystitis Gangrenous cholecystitis Hemorrhagic cholecystitis Gallbladder perforation Cholecystitis with fistula to colon Xanthogranulomatous cholecystitis Unusual presentations of cholecystitis Cholecystitis within a hernia Ischemic cholecystitis after TACE Gallbladder volvulus Gallbladder trauma Unusual gallstone obstructions Gallstone ileus Bouveret syndrome Mirizzi syndrome Post-operative complications Acute -Abscess -Bile leak Delayed -Dropped gallstones with abscess -Cholecystitis of cystic duct remnant Conclusion

ERE103

Cross-sectional Imaging of Traumatic and Non Traumatic Adrenal Emergencies

Education Exhibits
Location: ER Community, Learning Center

Participants
Michael Nathan Patlas MD, FRCPC (Presenter): Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose
Felipe Munera MD: Nothing to Disclose
Ania Zofia Kielar MD: Nothing to Disclose
Alia M. Rozenblit MD: Nothing to Disclose
Luigia Romano MD: Nothing to Disclose
Douglas S. Katz MD: Nothing to Disclose
Jorge S. Soto MD: Nothing to Disclose

TEACHING POINTS
To illustrate critical imaging findings in traumatic and nontraumatic adrenal emergencies. To discuss advantages of different cross-sectional modalities for diagnosis of acute adrenal abnormalities. To review management options with emphasis on interventional radiology.

TABLE OF CONTENTS/OUTLINE

Multiple traumatic and nontraumatic adrenal emergencies are encountered during imaging of critically ill patients. Traumatic adrenal hematomas are markers of severe polytrauma and can be easily overlooked due to multiple concomitant injuries. Acute nontraumatic abnormalities are usually detected during evaluation of nonspecific abdominal pain or presentations related to acute adrenal insufficiency or paroxysmal hypertension. A high index of suspicion is required for the establishment of timely diagnosis in cases of adrenal hemorrhage or infection. Cross-sectional imaging findings of the following traumatic and nontraumatic adrenal emergencies will be illustrated and reviewed: Traumatic adrenal hematoma; Spontaneous adrenal hemorrhage related to benign and malignant tumors and iatrogenic causes; Waterhouse-Friderichsen syndrome; Adrenal infections (Histoplasmosis, Candidiasis); Large symptomatic adrenal cysts; Symptomatic pheochromocytoma. Differential diagnosis and management options will be discussed.

ERE104

Cross-sectional Imaging, with Surgical Correlation, of Patients Presenting with Complications after Remote Bariatric Surgery without Bowel Obstruction

Education Exhibits
Location: ER Community, Learning Center

Participants
Ania Zofia Kielar MD (Presenter): Nothing to Disclose
Suzanne T. Chong MD: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose
Michele Riordon MD, FRCPC: Nothing to Disclose
Michael Nathan Patlas MD, FRCPC: Nothing to Disclose
Jean-Dennis Yelle MD, FRCPC: Nothing to Disclose
Jason Robins MD: Nothing to Disclose

TEACHING POINTS
Lack of bowel distension is not indicative of a normal study Internal hernias can present with intermittent pain without overt obstruction Key imaging findings on CT can allow early diagnosis of post bariatric complications before symptoms become life threatening

TABLE OF CONTENTS/OUTLINE

Bariatric surgery is becoming a commonplace hospital procedure performed in North America. Patients may undergo a number of surgical intervention, including Roux-en-y gastric bypass, sleeve gastrectomy and gastric banding. If complications occur, they often present with bowel obstruction. However, patients can have important abnormalities in the absence of dilated loops. This educational poster will review non-obstructive complications of bariatric surgery which need to be identified early to alleviate symptoms, improve weight loss goals and prevent future ischemic or obstructive complications. This includes: 1. Dehiscence of Roux-en-y of sleeve gastrectomy staple lines 2. Internal hernia through Petersen's defect without obstruction: Specific focus on a. SMV "beak sign" b. Perpendicular crossing of vessels with respect to bowel loops c. Location and aggregation of bowel loops in abnormal locations 3. Slipped band after restrictive-type banding surgery 4. Malabsorption syndromes

ERE105

CT Imaging of Large Vessel Injury in Blunt Abdominal Trauma

Education Exhibits
Location: ER Community, Learning Center
Certificate of Merit
Selected for RadioGraphics

Participants
Anthony Samuel Armetta MD (Presenter): Nothing to Disclose
Arthur Baghdanian MD: Nothing to Disclose
Armonde Baghdanian MD: Nothing to Disclose
Christina Alexandra Lebedis MD: Nothing to Disclose
Stephan W. Anderson MD: Nothing to Disclose
Jorge A. Soto MD: Nothing to Disclose
Faisal Khosa FFR(RCSI), FRCP: Nothing to Disclose
Waqas Shuaib MD: Nothing to Disclose

TEACHING POINTS
To review vascular injuries that are commonly overlooked in the interpretation of blunt abdominal trauma CT examinations. To understand the broad spectrum of vessel injury which may occur in the setting of blunt trauma. To explain pearls and pitfalls in CT diagnosis, which we will illustrate based on 10 years of combined experiences from two urban level-one trauma centers.

TABLE OF CONTENTS/OUTLINE
1. Case examples of large vessel injury in blunt abdominal trauma. For example: injuries to the abdominal aorta, portal vein, celiac axis, superior and inferior mesenteric vessels, renal vessels, etc.
2. Description of major and associated imaging findings of each case.
3. Discussion of pearls and pitfalls in the diagnosis of selected cases. For example: protocol variables that may add to or detract from the identification of a traumatic vascular injury.

ERE106
CT of Miscellaneous Regional and Diffuse Small Bowel Disorders in the Emergency Setting: Beyond Ischemia and Inflammatory Bowel Disease

Education Exhibits
Location: ER Community, Learning Center

Participants
Douglas S. Katz MD (Presenter): Nothing to Disclose
Sushma Gaddam BS: Nothing to Disclose
Simon Onderi MD: Nothing to Disclose
Christopher D’Arcy Schein MD: Nothing to Disclose
Ritu Bordia MBBS: Nothing to Disclose
John J. Hines MD: Nothing to Disclose
Bruce Richard Javors MD: Nothing to Disclose
Francis Joseph Scholz MD: Owner, FSpoon Company

TEACHING POINTS
The purpose of this exhibit is to review the CT findings of a variety of regional and diffuse small bowel disorders, ranging from relatively common to rare, which are above and beyond ischemia and inflammatory bowel disease. These disorders often have non-specific CT appearances, although there may be clues on the images to narrow the differential diagnosis. In selected cases, such as small bowel intramural hematoma and sclerosing peritonitis, the CT findings may be highly specific. Patients presenting with regional or diffuse acute as well as subacute small bowel disorders on CT may be particularly problematic in the emergency setting, and need to be placed in the specific clinical context. Correlation with the history, clinical findings, and laboratory findings in each specific case is critical.

TABLE OF CONTENTS/OUTLINE
Conditions to be discussed and demonstrated on CT will include: peritonitis; chemotherapy and radiation therapy enteritis; sclerosing peritonitis; infections (including C. difficile, TB, MAI, Whipple's disease); celiac disease; angioedema related to ACE inhibitors and other causes; intramural hematoma; eosinophilic enteritis; lupus and other vasculitis; and amyloid. The imaging literature of these disorders will be briefly reviewed, and clues to narrowing the differential diagnosis will also be provided.

ERE107
CT of Small Bowel Diverticulosis and Diverticulitis: Findings, Complications, and Implications for the Emergency Radiologist

Education Exhibits
Location: ER Community, Learning Center

Participants
Douglas S. Katz MD (Presenter): Nothing to Disclose
John J. Hines MD: Nothing to Disclose
Mariam Moshiri MD: Consultant, Reed Elsevier Author, Reed Elsevier
Puneet Bhargava MD: Editor, Reed Elsevier
Ahmed Fadl MD: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose
James Burnett Gardner MD: Nothing to Disclose
David Jordan Malloy BA: Nothing to Disclose

TEACHING POINTS
Small bowel diverticulosis is frequently missed, particularly on CT examinations performed in the emergency setting, and although usually incidental, may have implications for patient management in the near future. Small bowel diverticulosis is an uncommon but not rare disorder which the emergency radiologist needs to recognize on CT. The diagnosis needs to be established prospectively, particularly on CT examinations performed for imaging of the acute abdomen and pelvis, as this is not a diagnosis which generally can be established clinically. A variety of manifestations and complications can be diagnosed
utilizing CT, and the radiologist needs to be aware of this spectrum of findings.

TABLE OF CONTENTS/OUTLINE
A series of CT examinations from several institutions will be presented, demonstrating examples of small bowel diverticulosis and diverticulitis of the duodenum, jejunum, and ileum. Meckel's diverticulosis and diverticulitis as demonstrated on CT will be discussed and reviewed. The use of coronal reformations will be discussed. The CT findings of small bowel diverticulosis and diverticulitis range from obvious to subtle. Complications, including perforation, obstruction, abscess formation, lith formation, and 'enterolith ileus', will be demonstrated and discussed. The relevant clinical and imaging literature will be briefly reviewed.

ERE108
Diagnosis and Management for Acute Gastrointestinal Bleeding: Role of Radiologists

Education Exhibits
Location: ER Community, Learning Center

Participants
Akitoshi Inoue MD (Presenter): Research Grant, Bayer AG
Akira Furukawa MD, PhD: Nothing to Disclose
Shinichi Ohta MD, PhD: Nothing to Disclose
Serikjan Toleubay: Nothing to Disclose
Masashi Takahashi MD: Nothing to Disclose
Kiyoshi Murata MD: Nothing to Disclose
Shuzo Kanasaki MD: Nothing to Disclose
Michio Yamasaki MD: Nothing to Disclose

TEACHING POINTS
Acute gastrointestinal (GI) bleeding is a life-threatening condition and correct diagnosis of its site and cause is required for immediate and timely management. The purposes of this presentation are:
1. To learn clinical manifestations of GI bleeding
2. To review diagnostic modalities for GI bleeding, including various types of endoscopies, angiography, scintigraphy, and CT, with the special emphasis on techniques, findings, and role and usage of CT in diagnostic algorithm.
3. To learn treatment approach for various types of GI bleeding and discuss the key for appropriate management decision

TABLE OF CONTENTS/OUTLINE
1. Clinical manifestations
2. Diagnostic modalities for acute GI bleeding
3. CT protocol and timing of examination for positive results
4. CT findings of GI bleeding with correlating to management decision - Active bleeding: extravasation, pseudoaneurysm
- Previous bleeding: clot, high density stool 5. IR procedure for GI bleeding: vasoconstriction, embolization with various materials, etc. 6. Case review -Acute upper GI bleeding: Ulcer, neoplasm, iatrogenic bleeding - Acute lower GI bleeding: Diverticular hemorrhage, acute hemorrhagic rectal ulcer 6. Discussion of diagnostic algorithm for GI bleeding with the emphasis on CT and the process of management decision 7. Summary

ERE109
Don't Have the Stomach For It: CT of Gastric Emergencies

Education Exhibits
Location: ER Community, Learning Center

Selected for RadioGraphics

Participants
Preethi Guniganti MD: Nothing to Disclose
Courtney H. Bradenham MD: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose
Vincent M. Melnick MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. The stomach is commonly a site of disease in the emergency department patient presenting with epigastric pain. Although traditionally evaluated with fluoroscopy, gastric emergencies are now more commonly seen on CT. 2. CT technique considerations when evaluating the stomach include the use of positive or neutral contrast as well as the use of arterial and portal venous phase imaging, such as when searching for a source of gastrointestinal bleeding. 3. The emergency radiologist must know the normal appearance of the stomach on CT, along with the typical appearance of infectious, inflammatory, and complications of surgery and/or malignant disease.

TABLE OF CONTENTS/OUTLINE
1. CT Protocol considerations
   a. Use of multiple contrast phases
   b. Oral contrast
2. Normal gastric anatomy on CT
3. Emergent conditions of the stomach on CT
   a. Inflammation/Infection
   b. Gastritis
   c. Peptic ulcer disease
   d. Ischemia
   e. Obstruction
   f. Volvulus
   g. Peptic ulcer disease
   h. Malignancy
   i. Foreign Bodies
   j. Perforation/Fistulae
   k. Benign ulcers
   l. Malignant ulcers
4. Surgical complications
5. Penetrating trauma
6. Hemorrhage

ERE110
Dual Energy/Spectral CT: Novel Applications in Emergency Abdominal Imaging

Education Exhibits
Location: ER Community, Learning Center

Participants
David M. Thomas BSC (Presenter): Nothing to Disclose
Patrick McLaughlin FR(CRCSI): Nothing to Disclose
Tim O'Connell MD, Meng: President, Resolve Radiologic Ltd
Lucy Jan-Luck Louis MD: Nothing to Disclose
Silvia D. Chang MD: Nothing to Disclose
Rushaid Aljurayyan: Nothing to Disclose
Hossain Abu Alola: Nothing to Disclose
Ismail Tawakol Ali MBChB, MD: Nothing to Disclose
Savvas Nicolaou MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1) To introduce Dual Energy/Spectral CT, and discuss its benefits over single source CT. 2) To discuss the applications of DECT in emergency abdominal imaging. 3) To introduce future uses for DECT.

TABLE OF CONTENTS/OUTLINE
- What is Dual Energy/Spectral CT? How it works the physics behind it. Differences between Dual Energy and Spectral CT
- Benefits vs Single Source CT Color Iodine overlay maps, quantification of iodine Characterization and composition of tissue Bone Iodine subtraction for vascular analysis Virtual Non-Contrast imaging, and how it works Monoenergetic imaging
- Applications of DECT in emergency abdominal imaging (images and examples for each) Bone Iodine subtraction for vascular analysis Aneurysms Contrast extravasation for non contained vascular injuries Characterization of renal calculi: Uric acid versus calcium Oxalate stones Bowel Ischemia Trauma: Pancreatic Injuries Calculation of VNC for reduction of dose and clinical applications in vascular, renal, pancreatic, liver and bowel analysis. - Future applications of DECT/Spectral

ERE111
Ectopic Pregnancy: Multimodality Imaging, Mimics & Complications

Participants
Ashley Elizabeth Prosper MD (Presenter): Nothing to Disclose
Nicole French Darcy MD: Nothing to Disclose
Shannon M. Navarro MPH, MD: Nothing to Disclose
Daphne Kim Walker MD: Nothing to Disclose

TEACHING POINTS
Review the types of ectsopics: incidence, clinical symptoms, risk factors, pathophysiology and outcomes Present the spectrum of findings on US: ACR appropriateness criteria for first line imaging, pearls and pitfalls Mimics of ectopic pregnancy Multimodality case review Treatment, including the radiologist’s role Complications of therapy, partially treated and misdiagnosed cases

TABLE OF CONTENTS/OUTLINE
- Schematic review of the anatomy of the uterus, uterotubal junction and ovary
- US case review with typical findings across the spectrum of ectsopics
- Review of US mimics: endometrioma, tuboovarian abscess, ruptured corpus luteum cyst and dermoid
- US pearls and pitfalls: interstitial line sign, hemoperitoneum, intradecidual sign, pseudosacs, tubal ring sign
- Case examples aided by cross-sectional imaging
- Imaging findings in cases complicated by early misdiagnosis, partial treatment and failed therapy
- Cases aided by image guided therapy

ERE112
Fallopian Tube Torsion: Turning our Attention to a Mimicker of Ovarian Pathology

Participants
Elizabeth Lee MD (Presenter): Nothing to Disclose
Timothy J. Higgins MD: Nothing to Disclose
Andrew Ross MD: Nothing to Disclose

TEACHING POINTS
Fallopian tube torsion is a rare (reported incidence of 1 in 1.5 million women) but possibly underreported cause of acute pelvic pain. Imaging findings suggesting this diagnosis include an elongated, tubular cystic mass, adjacent inflammatory changes, and normal appearing ovaries. Although typically absent, the presence of arterial and venous blood flow does not exclude this diagnosis due to the dual blood supply of the fallopian tubes.

TABLE OF CONTENTS/OUTLINE
A series of three cases of isolated fallopian tube torsion will be presented. Their pertinent imaging findings will be displayed. The pathophysiology, typical presentation and treatment of fallopian tube torsion will be discussed. Imaging characteristics which may suggest the diagnosis will be reviewed.

ERE113
Foreign Bodies from Mouth to Anus: Identification, Management, and Potential Complications

Participants
Amit Bipin Desai BA (Presenter): Nothing to Disclose
Joel P. Thompson MD: Nothing to Disclose
Akshya Gupta MD: Nothing to Disclose
Rachel Shields MD: Nothing to Disclose
Ravinder Sidhu MD: Nothing to Disclose
Shweta Bhatt MD, MBBS: Nothing to Disclose

TEACHING POINTS
Teaching points: 1. Practice identification of common and uncommon foreign bodies in the chest, abdomen, and pelvis using a quiz format. 2. Highlight potential complications for each type of foreign body ingestion, inhalation, or insertion. 3. Provide an
overview of management for commonly identified foreign bodies. 4. Review follow-up imaging options for identifying complications.

**TABLE OF CONTENTS/O U T L I N E**

While foreign body inhalations and ingestions are relatively rare, familiarization with the symptoms and radiographic appearance of foreign bodies can be crucial in providing appropriate patient care. Common and uncommon foreign bodies will be reviewed in a fun quiz format, categorized by: • The call from the ED: acute presentations of foreign body insertion, ingestion, or inhalation. A subset of this category will highlight post-dental procedure foreign bodies. Complications arising from missed foreign bodies will also be presented. • The call from the OR: highlighting a systematic search routine for retained surgical foreign bodies and missing teeth/dental devices after intubation. • The call from the floor: reviewing appropriate indications, time periods, and imaging modalities for complication management, such as esophageal perforation, free intraperitoneal air, bowel obstruction, and infection.

**ERE114**

**Foreign Body Induced Perforation of the Gastrointestinal Tract: Imaging Findings**

*Education Exhibits*

*Location: ER Community, Learning Center*

**Participants**

- Yun Mao MD (Presenter): Nothing to Disclose
- Duangkamon Prapruttam MD: Nothing to Disclose
- Sandeep Subhash Hedgire MD: Nothing to Disclose
- Jennifer W. Uyeda MD: Nothing to Disclose
- Mukesh Gobind Harisinghani MD: Nothing to Disclose

**TEACHING POINTS**

1. Ingested or inserted foreign bodies in children or adults can present to the emergency radiology for accurate location and to determine extent of damage induced by them. 2. Perforation occurs in < 1% of ingested foreign bodies and commonly misdiagnosed. 3. Sharp & blunt foreign bodies both can lead to perforation. 4. The perforation tends to occur in regions of acute angulation, such as ileocecal and rectosigmoid regions.

**TABLE OF CONTENTS/O U T L I N E**

1. Ultrasound is sensitive in finding hyper-reflective foreign bodies but is of limited value in small/sonolucent foreign bodies 2. X ray can only detect metallic FB, but can give clues such as pneumoperitoneum is seldom to be observed because they may be covered and limited by fibrin and adjacent loops. 3. Direct and indirect signs of FB perforation on CT 4. For detecting thin high-density FB and very small quantities of extraluminal gas, an unenhanced entire gut CT scan without oral contrast need be performed and its multiple planer reconstruction, especially coronal image should be evaluated scrupulously.

**ERE115**

**Hepatobiliary and Gastrointestinal Oncologic Emergencies: Cross-Sectional Imaging Findings and Clinical Implications**

*Education Exhibits*

*Location: ER Community, Learning Center*

**Participants**

- Vijayanadh Ojili MD (Presenter): Nothing to Disclose
- Arpit M. Nagar MBBS: Nothing to Disclose
- Barjinder S. Sandhu MD: Nothing to Disclose
- Venkata S. Katabathina MD: Nothing to Disclose
- Abhijit Sunnapwar MD: Nothing to Disclose
- Amol Suryakant Katkar MD: Nothing to Disclose
- Hugh White MD: Nothing to Disclose
- Kedar Nath Chintapalli MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: 1. To describe the imaging manifestations of hepatobiliary and gastrointestinal oncologic emergencies and discuss the clinical implications of specific imaging findings. 2. To discuss the role of imaging and image-guided interventions in the management of these patients.

**TABLE OF CONTENTS/O U T L I N E**

1. Introduction, etiopathogenesis and clinical presentation of hepatobiliary and gastrointestinal oncologic emergencies. 2. Role of cross-sectional imaging modalities (particularly CT). 3. Imaging spectrum of hepatobiliary and gastrointestinal oncologic emergencies (rupture, intra-tumoral haemorrhage, venous thrombosis, infection, intussusception and sequelae of mass effect including bowel and biliary obstruction etc).

**ERE116**

**Jaundice in the Emergency Department: Fifty Shades of Yellow**

*Education Exhibits*

*Location: ER Community, Learning Center*

**Certificate of Merit**

**Participants**

- Refky Nicola DO, MS: Nothing to Disclose
- Vincent M. Mellnick MD: Nothing to Disclose
- Christine O. Menias MD: Nothing to Disclose
- Daniel C. Oppenheimer MD (Presenter): Nothing to Disclose
TEACHING POINTS

1. Review the pathophysiology of jaundice. 2. Illustrate the role of Nuclear medicine, CT, US, and MRCP in identifying the cause of jaundice in the emergency patient. 3. Discuss the differential diagnosis and management of obstructive and non-obstructive jaundice in the acute setting.

TABLE OF CONTENTS/OUTLINE

1. Describe the normal physiology of bilirubin and pathophysiology of jaundice. 2. Discuss the appropriateness of various imaging modalities such as HIDA scan, CT, US, and MRCP in establishing the etiology of acute jaundice. 3. Present the differential diagnosis of jaundice with regards to the benign and malignant causes such as choledocholithiasis, ascending cholangitis, recurrent pyogenic cholangitis, post-operative biliary stricture, sclerosing cholangitis, pancreatic duct carcinoma, cholangiocarcinoma, hepatocellular carcinoma, and hepatic metastases. 4. Review the interventional techniques of managing acute jaundice and the limitations.

ERE117

Massive Nontraumatic Hemorrhage in the Abdomen and the Pelvis: What the Radiologists Need to Know

Education Exhibits
Location: ER Community, Learning Center

Participants
Takehiko Gokan MD (Presenter): Nothing to Disclose
Nobuyuki Takeyama MD: Nothing to Disclose
Noritaka Seino: Nothing to Disclose
Sinya Ikeda: Nothing to Disclose
Hiroto Sasamori: Nothing to Disclose

TEACHING POINTS

To understand clinical manifestations, causes, and MDCT features of massive nontraumatic hemorrhage in the abdomen and the pelvis. To understand MDCT anatomy of the peritoneum, retroperitoneum, and abdominal wall. To understand the role of interventional therapy for management of this condition.

TABLE OF CONTENTS/OUTLINE

The cases will be presented in a quiz format. Key differential diagnostic points, pitfalls, and therapeutic management will be highlighted in the discussion of each case. 1. To review the MDCT anatomy of peritoneum, retroperitoneum, and abdominal wall. 2. Cases of the hemorrhage Hemorrhagic diathesis or coagulopathy: administration of anticoagulants, disseminated intravascular coagulopathy (DIC), antiphospholipid syndrome, end-stage kidney disease etc. Vascular lesion: aneurysm, pseudoaneurysm, segmental arterial mediolysis Tumor-associated hemorrhage: Tumor site in liver, spleen, kidney, adrenal gland, peritoneum etc. Gynecologic condition: ruptured ovarian cyst, ectopic pregnancy, HELLP syndrome etc. Iatrogenic injury: complication of surgery, interventional procedure etc. 3. Review and discussion for the management of the hemorrhage.

ERE118

More than Just Typical Acute Appendicitis on MDCT: Uncommon Conditions Related to Appendix

Education Exhibits
Location: ER Community, Learning Center

Participants
Kyung Jin Lee MD (Presenter): Nothing to Disclose
Hyun Cheol Kim: Nothing to Disclose
Seong Jong Yun: Nothing to Disclose
Sang Won Kim MD: Nothing to Disclose
Dal Mo Yang: Nothing to Disclose
Wook Jin: Nothing to Disclose
Seong Jin Park MD, PhD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To demonstrate uncommon clinical presentation of appendicitis 2. To discuss equivocal appendicitis and its solution 3. To illustrate uncommon complications related with acute appendicitis 4. To review several alternative diseases or conditions which mimic acute appendicitis

TABLE OF CONTENTS/OUTLINE

1. Uncommon clinical presentation of appendicitis (a) Appendicitis in unusual locations (b) Chronic appendicitis (c) Nonsurgical resolution of appendicitis 2. Equivocal appendicitis (a) What is the equivocal CT interpretation? (b) How can we clarify the equivocal CT interpretation? (c) Complementary role of ultrasound 3. Uncommon complications related with appendicitis (a) Gastrointestinal tract involvement (b) Genitourinary tract involvement (c) Other unusual complications 4. Tumors or inflammatory diseases affecting appendix

ERE119

Name That Nephrogram: Asymmetric Renal Enhancement in the Acute Care Setting

Education Exhibits
Location: ER Community, Learning Center

Certificate of Merit

Participants
Kristina Nowitzki MD, PhD (Presenter): Nothing to Disclose
Hao Steven Lo MD: Nothing to Disclose
TEACHING POINTS

While asymmetric renal enhancement is commonly encountered on contrast-enhanced CT in the emergency setting, it can represent a wide range of etiologies requiring divergent, and often urgent, clinical management. In a series of cases, this exhibit will familiarize radiologists with patterns of abnormal enhancement and associated findings, contributing to more confident, specific diagnosis.

TABLE OF CONTENTS/OUTLINE

1. Introduction highlighting normal renal enhancement physiology including normal CT nephrogram phases.
2. Cases organized in a quiz format, with etiologies including a) obstructive, b) vascular, c) traumatic, d) infectious/inflammatory, and e) neoplastic. Individual case discussions will encompass diagnostic imaging features, common clinical presentations and current management considerations.

ERE120

Ovarian Torsion: Clinical Indication, Diagnostic Features on CT and MRI, and Differential Diagnosis

Education Exhibits
Location: ER Community, Learning Center

Participants
Yoshifumi Noda MD (Presenter): Nothing to Disclose
Satoshi Goshima MD, PhD : Nothing to Disclose
Hiroshi Kondo MD : Nothing to Disclose
Haruo Watanabe MD : Nothing to Disclose
Hiroshi Kawada MD : Nothing to Disclose
Nobuyuki Kawai MD : Nothing to Disclose
Yukichi Tanahashi MD : Nothing to Disclose
Masayuki Kanematsu MD : Nothing to Disclose

TEACHING POINTS

1. For patients in whom there is significant clinical concern of ovarian torsion, transvaginal ultrasound remains an examination of choice though. However, CT and MRI are increasingly used as the initial diagnostic modalities, so radiologist should recognize the causes and imaging findings of ovarian torsion. 2. Radiologists play an important role in making an accurate diagnosis of ovarian torsion on CT and MRI. Understanding and recognizing characteristic features of ovarian torsion is crucial for the accurate diagnosis and description of adequate differential diagnosis for acute pelvic pain.

TABLE OF CONTENTS/OUTLINE

- Review the various clinical manifestations for ovarian torsion.
- Describe and illustrate the common CT and MR Imaging presentations of ovarian torsion based on the etiologies.
- Discuss the pathophysiology of ovarian torsion, characteristic imaging features, and the appropriate risk factors.

ERE121

Resident Primer in Acute Enterocolitis: Is It Ischemic, Infectious or Inflammatory?

Education Exhibits
Location: ER Community, Learning Center

Selected for RadioGraphics

Participants
Sarah Wallace Cater MD : Nothing to Disclose
Brandon Childers MD : Nothing to Disclose
Pamela Tecce Johnson MD (Presenter): Research funded, Becton, Dickinson and Company

TEACHING POINTS

- Enteritis and colitis are common causes of acute abdominal pain.
- Their differential diagnosis is broad, including infectious, inflammatory and ischemic etiologies, each with different management strategies.
- The purpose of this exhibit is to review the multidetector computed tomography (MDCT) appearance of common infectious, inflammatory, and ischemic forms of acute enteritis and colitis with emphasis on distinguishing clinical and imaging features.

TABLE OF CONTENTS/OUTLINE

Infectious enteritis and colitis Risk factors Clinical presentation Causes (bacteria, virus, parasite) Distribution patterns according to cause Bowel and mesenteric findings Inflammatory causes - Crohn's disease and ulcerative colitis (UC). Demographics Clinical presentation Differences in distribution Gastrointestinal findings including features unique to each Mesenteric findings Extragasstrointestinal manifestations Ischemic enterocolitis Risk factors Clinical presentation CT findings in bowel and mesentery (arterial vs venous compromise, time course) Vascular findings Prognosis

ERE122

Resident Primer in Acute Vascular Pathology: Distinguishing Abdominal Pseudoaneurysms from Aneurysms and Implications for Patient Management

Education Exhibits
Location: ER Community, Learning Center
Participants
Minghao Lu BA : Nothing to Disclose
Pamela Tecce Johnson MD (Presenter): Research funded, Becton, Dickinson and Company
Clifford Raabo Weiss MD : Research collaboration, Siemens AG
Franco Verde MD : Nothing to Disclose

TEACHING POINTS
Visceral pseudoaneurysms (PSAs) are important vascular lesions with high morbidity and mortality if complicated by rupture. These vascular lesions may form from numerous etiologies, which themselves are associated with considerable morbidity and mortality (e.g. penetrating trauma, pancreatitis). The purpose of this educational exhibit is to review visceral pseudoaneurysms and aneurysms, from the clinical presentation to CT imaging appearance, and discuss management algorithms.

TABLE OF CONTENTS/OUTLINE
Pathophysiology of abdominal pseudoaneurysms vs true aneurysms CT technique and interpretative pearls utility of dual phase imaging importance of multiplanar review for detection and characterization findings that aid in distinguishing pseudoaneurysm from true aneurysm MDCT case review splenic artery pseudoaneurysm superior mesenteric artery pseudoaneurysm gastroduodenal pseudoaneurysm renal pseudoaneurysm aortic pseudoaneurysm, including mycotic Management visceral pseudoaneurysms require emergent repair, usually interventional

ERE123
Spectrum of MR Imaging findings of the Acute Abdomen in Pregnancy: Diagnostic Impact of Diffusion-weighted Image

Education Exhibits
Location: ER Community, Learning Center

Participants
Yuka Okajima MD, MPH (Presenter): Nothing to Disclose
Ayako Tamura MD : Nothing to Disclose
Saya Horiiichi MD : Nothing to Disclose
Noriko Tanio MD : Nothing to Disclose
Takuya Ueda MD : Nothing to Disclose
Yasuyuki Kurihara MD : Nothing to Disclose
Gensuke Akaike MD : Nothing to Disclose
Takeshi Wada MD : Nothing to Disclose
Tsutomu Nihei : Nothing to Disclose

TEACHING POINTS
The purposes of this exhibit are: 1. To learn a spectrum of diseases and complications during pregnancy 2. To demonstrate MR imaging findings and diagnostic points in assessment of the acute abdomen in pregnancy 3. To discuss the value of diffusion-weighted images (DWI)

TABLE OF CONTENTS/OUTLINE

ERE124
Take Me to Your Leader: What to Know About Adult Intussusception

Education Exhibits
Location: ER Community, Learning Center

Participants
Matthew Harlan Lee MD (Presenter): Nothing to Disclose
Meghan G. Lubner MD : Nothing to Disclose
Christine O. Menias MD : Nothing to Disclose
Sanjeev Bhalla MD : Nothing to Disclose
Douglas Robert Kitchin MD : Nothing to Disclose
Perry J. Pickhardt MD : Co-founder, VirtuoCTC, LLC Stockholder, Cellectar Biosciences, Inc

TEACHING POINTS
- Review causes of intussusception in adults. - Identify characteristic clinical and imaging features of enterocentric, ileocolic, and colocolic intussusception. - Establish a differential diagnosis for pathologic lead points in adults based on patient history (i.e. cancer diagnosis), clinical presentation, and region of involvement.

TABLE OF CONTENTS/OUTLINE
- Introduction and overview of adult intussusception. - Illustrate causes of intussusception (e.g. malignant, benign neoplastic, congenital, acquired) in adults and describe typical US, fluoroscopic, and CT findings. Examples: • Enterocentric: Metastases (e.g. lung cancer, sarcoma), adenocarcinoma, GIST, PTLD, lipoma, Peutz-Jeghers polypl, gastric heterotopia, idiopathic. • Ileocolic: PTLD/Lymphoma, inflammatory polypl, Meckel diverticulum. • Colocolic: Primary colorectal cancer, metastases (melanoma), lipoma, villous adenoma. Summary: - Albeit a rare cause of obstruction, adult intussusception is usually associated with a pathologic lead point. - CT is the primary imaging modality to evaluate symptomatic intussusception. - Colocolic intussusception may be a harbinger of underlying malignancy - some series report malignant causes of intussusception greater in colonic than small bowel intussusception. - Patient history informs diagnosis in the setting of intussusception.

ERE125
The Acute Abdomen in Recent Postpartum Females: An Imaging Solution to a Clinical
Conundrum

Education Exhibits
Location: ER Community, Learning Center

Certificate of Merit

Participants
Dinushi S. Perera MD (Presenter): Nothing to Disclose
Kheng L. Lim MD: Nothing to Disclose

TEACHING POINTS
1. To review the various causes of acute abdominopelvic symptoms in recent postpartum females presenting emergently.
2. To demonstrate the imaging features of these causes for abdominopelvic pain and other symptoms.
3. To discuss the clinical management of the imaging diagnosis.

TABLE OF CONTENTS/OUTLINE

ERE126

Updates and New Concepts of Imaging of Acute Intestinal Ischemia

Education Exhibits
Location: ER Community, Learning Center

Participants
Teresa I-Han Liang MD (Presenter): Nothing to Disclose
Jun Wang BSc: Nothing to Disclose
HeeJun Kang: Nothing to Disclose
William ChunKi Lau MD: Nothing to Disclose
Savvas Nicolaou MD: Nothing to Disclose

TEACHING POINTS
1. Review the pathophysiology and clinical manifestations of acute intestinal ischemia (AII)
2. Discuss the imaging modalities used for diagnosis of AII
3. Describe the spectrum of imaging findings of AII

TABLE OF CONTENTS/OUTLINE
- Review the pathophysiology, anatomy, and clinical presentation of AII
- Review the utility and limitations of imaging modalities used for assessment of AII such as radiographs, ultrasound, angiography, MR angiography and with emphasis on MDCT as the main imaging modality
- Demonstrate the spectrum of imaging examples of AII including arterial embolic ischemia, arterial thrombus ischemia, venous ischemia and nonocclusive ischemia
- Discuss an imaging-based management algorithm
- Review imaging examples of pitfalls and mimics associated with AII
- Discuss new imaging techniques applicable for imaging of AII including use of new dose reduction techniques such as Iterative reconstruction, kVp modulation and dual-energy CT

Major teaching points:
- AII is not caused by a single entity, but by a multitude of causes, and it is imperative to differentiate them on imaging to aid in management decisions
- Key MDCT findings include: mesenteric stranding, identification of embolic clot focal loss of mural enhancement, target sign, pneumatosis, portal venous gas, and change in number and caliber of mesenteric vessels

ERE127

What's On Tap? A Urinary Tract On-Call Primer for Residents

Education Exhibits
Location: ER Community, Learning Center

Participants
Nicole Kurzbard MD (Presenter): Nothing to Disclose
Maitraya K. Patel MD: Nothing to Disclose
Michael John Nguyen MD: Nothing to Disclose
Anokh Pahwa MD: Nothing to Disclose
Daniel Jason Aaron Margolis MD: Research Grant, Siemens AG
Cecilia Matilda Jude MD: Author, UpToDate, Inc

TEACHING POINTS
Urinary tract symptoms and signs are common presenting complaints in the acute care setting. In these patients, significant urinary tract pathology may be first diagnosed by residents on call. After reviewing this presentation, participants will be able to: Identify common and uncommon non-traumatic acute urinary tract pathology on multi-modality imaging; Discuss imaging
signs of urinary tract pathology; Recommend appropriate imaging modalities for evaluation of acute urinary symptoms; Recognize urinary pathology requiring immediate management.

**TABLE OF CONTENTS/OUTLINE**

Disease categories include: Obstruction: nephroureterolithiasis, ureteropelvic junction obstruction; Infection: pyelonephritis, xanthogranulomatous pyelonephritis, granulomatous disease, urachal remnant infection, cystitis; Vascular: renal papillary necrosis, renal cortical necrosis, renal hemorrhage, renal artery occlusion, renal vein thrombosis, arteriovenous malformation; Neoplasm (presenting with hemorrhage/obstruction): angiomyolipoma, oncocytoma, transitional cell carcinoma, renal cell carcinoma. Variants and complications of disease entities are reviewed, such as emphysematous pyelonephritis/cystitis, renal abscess and pyonephrosis. Multimodality imaging and interventional radiology management are highlighted.

**ERE128**

**Advanced Techniques and Updated Imaging of Non-Cardiac Chest Pain in the Emergency Department**

**Education Exhibits**

Location: ER Community, Learning Center

**Participants**

- **HeeJun Kang**: Nothing to Disclose
- **Teresa I-Han Liang MD (Presenter)**: Nothing to Disclose
- **William Chun Ki Lau MD**: Nothing to Disclose
- **Savvas Nicolaou MD**: Nothing to Disclose

**TEACHING POINTS**

1. Review the different causes, pathophysiology, and clinical manifestations of non-cardiac chest pain (NCCP)
2. Discuss the imaging modalities and spectrum of imaging findings for NCCP
3. Review new advances in imaging and dose reduction techniques which can be applied to imaging of NCCP
4. Review role of Triple-Rule-out protocol as an "one-stop-shop" in evaluation of acute chest pain syndrome

**TABLE OF CONTENTS/OUTLINE**

- Review the different causes and pathophysiology, anatomy, and clinical presentations of NCCP
- Review the utility and limitations of imaging modalities used for assessment of NCCP, such as radiographs and angiography, with emphasis on MDCT as the main imaging modality
- Demonstrate the spectrum of imaging examples of NCCP including acute aortic syndrome, aortitis, and pulmonary embolism
- Review imaging examples of pitfalls and mimics associated with NCCP
- Discuss new imaging techniques applicable for imaging of NCCP such as Dual-energy CT, and review and demonstrate the utility of novel dose reduction techniques such as Ultra-High Pitch imaging, Iterative reconstruction, tube current and kVp modulation, and cardiac bowtie filters
- Discuss the literature evidence and demonstrate the effectiveness of "Triple-Rule-Out" protocol as a potential "one-stop-shop" method in evaluation of acute chest pain syndrome

**ERE129**

**Emergency Thoracic Sonography: The Essentials**

**Education Exhibits**

Location: ER Community, Learning Center

- 🏆 Cum Laude
- 🏆 Selected for RadioGraphics

**Participants**

- **Sirote Wongwaisayawan MD**: Nothing to Disclose
- **Rathachai Kaewlai MD (Presenter)**: Nothing to Disclose
- **Rudeekorn Suwannanon MD**: Nothing to Disclose
- **Sorravit Sawatmongkornkul**: Nothing to Disclose

**TEACHING POINTS**

The major teaching points of this exhibit are:

1. Sonographic artifacts arising from the pleural line and dynamic signs can be used to diagnose pneumothorax, pulmonary edema, pneumonia and other acute pathologies that abut pleural surface
2. Sonographic signs of pneumothorax include loss of lung sliding, multiple A lines and lung point
3. Sonographic B lines, when diffuse and bilateral, are likely caused by pulmonary edema in an acute setting. When they are focal, localized interstitial process is considered
4. Acute rib, sternal and clavicular fractures are shown as a cortical step off with localized tenderness on sonography

**TABLE OF CONTENTS/OUTLINE**

- Utility of thoracic sonography in emergency setting
- Sonographic techniques
- Normal sonographic appearances: lung sliding and artifacts (A line, comet tails), bone surface
- Abnormal sonographic appearances: lung point and artifacts (B line, E line)

**ERE130**

**Getting to the Heart of the Matter: Cardiac Findings on Non-Gated Chest CTA in the ED**
Education Exhibits
Location: ER Community, Learning Center

Participants
Diamanto Rigas MD (Presenter): Nothing to Disclose
Robin Beth Levenson MD: Nothing to Disclose
Karen Sisi Lee MD: Nothing to Disclose

TEACHING POINTS
1. To review various cardiac imaging findings that one may see on non-gated chest CTA in Emergency Department (ED) patients and demonstrate case examples. 2. To raise radiologist awareness and understanding about these findings to help expedite diagnosis.

TABLE OF CONTENTS/OUTLINE

ERE131
Seeing is Believing: Deadly Type A Aortic Dissection
Education Exhibits
Certificate of Merit

Participants
Sergio Klimkowski MD: Nothing to Disclose
Sushilkumar K. Sonavane MD (Presenter): Nothing to Disclose
Travis S. Henry MD: Spouse, Employee, F. Hoffmann-La Roche Ltd
Jubal Robert Watts MD: Nothing to Disclose
Kaushik S. Shahir MD: Nothing to Disclose
Satinder Pal Singh MD: Nothing to Disclose

TEACHING POINTS
Accurate identification and fast communication is a key in saving lives in patients with type A dissection especially when accompanied with complications. CTA helps in emergent surgical planning. Prospective gating is helpful in easy detection of dissection and differentiation from motion related artifact.

TABLE OF CONTENTS/OUTLINE
1. Review pathophysiology and types of aortic intramural hematoma (IMH) and dissection 2. Optimization of CTA protocol 3. Imaging pitfalls and ways to avoid them 4. Demonstrate with examples various complications of Stanford Type A aortic dissection where emergent surgery saved life or patient could not survive such as
   - Aortic disruption
   - Pseudoaneurysm
   - Pericardial hematoma
   - Aortic insufficiency
   - Coronary artery occlusion- ostial narrowing, dissection
   - Pulmonary artery narrowing from shared sheath hematoma

ERE132
Thoracic CT Findings in Drowning Victims after Cardiopulmonary Resuscitation: Dead or Alive?
Education Exhibits
Location: ER Community, Learning Center

Participants
Nanae Tsuchiya: Nothing to Disclose
Sadayuki Murayama MD, PhD (Presenter): Nothing to Disclose
Yoshiharu Ohno MD, PhD: Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd Research Grant, Terumo Corporation Research Grant, Fuji Yakuhin Co, Ltd Research Grant, FUJIFILM Holdings Corporation Research Grant, Guerbet SA
Yasutaka Nakano MD, PhD: Nothing to Disclose
Masahiro Okada MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the thoracic CT findings in severe drowning 2. To review the postmortem CT findings in drowning victims 3. To correlate the imaging features with the clinical presentation

TABLE OF CONTENTS/OUTLINE
1. Definition and pathophysiology of drowning 2. Clinical evaluation of severity in drowning victims: a classification system of six grades 3. Thoracic CT findings after drowning - Lung opacities: reflect aspiration and pulmonary edema A. Diffuse ground-glass opacities (GGO) B. Air-space consolidation: seen in severe drowning C. Multiple lobular opacities: the most common pattern after drowning D. Interlobular septal thickening: reflects pulmonary edema - Pleural effusion: seen in severe drowning 4. Postmortem CT findings after drowning - Fluid collection in airways, pan-sinus fluid, mastoid cell fluid - Cardiopulmonary resuscitation (CPR) related findings (intravascular gas, rib fracture) - Postmortem changes (hypostasis, hyperattenuating aortic
wall, and dilatation of the heart) 5. Pitfalls - Decompression disease - Immersion pulmonary edema (IPE) - Pulmonary edema due to airway obstruction

**ERE133**

**CSI Radiology: A Précis of Radiologic Identification (RADid) for the Practicing Radiologist**

**Education Exhibits**

Location: ER Community, Learning Center

**Participants**

Gary Martin Hatch MD (Presenter): Nothing to Disclose
Jamie Marie Elfrnitz MD: Nothing to Disclose
Sean Michael Biggs MD, MS: Nothing to Disclose
Thomas D. Ruder MD: Nothing to Disclose
Patricia Mildred Flach MD: Nothing to Disclose
Chandra Gerrard BS, RT: Nothing to Disclose
Kurt B. Nolte MD: Nothing to Disclose

**TEACHING POINTS**

Social, psychological and legal issues form the moral imperative to accurately identify the dead. Radiologists possess unique knowledge and skills which can improve the likelihood of identification (ID). A Radiologist’s understanding of the range of normal and abnormal findings and appreciation of the prevalence of both, may provide crucial evidence for the confirmation or exclusion of ID. A Radiologist's mastery of image reformatting and rendering can enable comparative matching of exams and structures that is simply impossible in other's hands. Even one identification made by a Radiologist, which otherwise could not have been made, provides service of incalculable value to the community and surviving relatives.

**TABLE OF CONTENTS/OUTLINE**

1. Methods of identification (ID)
2. ID - a multidisciplinary endeavor
3. Why identify the dead?
4. Scenarios requiring ID
5. Performing radiologic ID (RADid)
   - Guidelines
   - Biologic profiling
   - New considerations for the Radiologist
   - Lines of evidence
   - Advanced visualization and RADid.
6. Case examples
7. Value added by Radiologists
8. Making your expertise available
9. Further Reading
10. References

**ERE134**

**An Approach to Imaging the Upper Airway in the Emergency Setting**

**Education Exhibits**

Location: ER Community, Learning Center

Certificate of Merit

**Participants**

Kathryn Darras MD (Presenter): Nothing to Disclose
Gordon Ted Andrews MD: Nothing to Disclose
Tim O'Connell MD, Meng: President, Resolve Radiologic Ltd
Ana-Maria Bilawich MD: Nothing to Disclose
Patrick McLaughlin FFR(RCSI): FMRCEUS, FRACR
Savvas Nicolaou MD: Nothing to Disclose

**TEACHING POINTS**

1. To review the anatomy of the upper airway.
2. To discuss the best protocols for imaging suspected airway pathology in the emergency setting.
3. To provide a rapid and thorough approach to evaluate the airway on MDCT, including potential pitfalls as well as pearls from our experience at a quaternary care trauma centre.
4. To review the pathogenesis, MDCT appearance, differential diagnosis, and management of traumatic and non-traumatic airway emergencies.
5. To highlight the ways in which the radiologist’s interpretation can maximally benefit the surgical team.

**TABLE OF CONTENTS/OUTLINE**

1. Review of upper airway anatomy
2. Protocol selection based on clinical context
   2.1. Penetrating trauma
   2.2. Blunt trauma
3. Inflammatory / infectious etiologies
4. Approach to upper airway evaluation on MDCT
   4.1. Crush injuries
   4.2. Hyoid bone fracture
   4.3. Infection
     4.3.1. Immunocompetent
     4.3.2. Immunocompromised
5. Foreign body
6. Review of key information to relay to clinical team

**ERE135**


**Education Exhibits**

Location: ER Community, Learning Center

**Participants**

Kathryn Darras MD (Presenter): Nothing to Disclose
Gordon Ted Andrews MD: Nothing to Disclose
Tim O'Connell MD, Meng: President, Resolve Radiologic Ltd
Ana-Maria Bilawich MD: Nothing to Disclose
Patrick McLaughlin FFR(RCSI): FMRCEUS, FRACR
Savvas Nicolaou MD: Nothing to Disclose
TEACHING POINTS

1. Review the pathophysiology and epidemiology of cervical spine fractures. 2. Define C-spine instability clinically and radiologically and define the role of MDCT and MRI and MRI prognostic indicators in recovery of neurological function. 3. Discuss how cervical spine fractures can lead to permanent neurological deficits. 4. Recognize the role of new CT measurements of the cervical spine in diagnosis of neck injuries 5. Review the Subaxial Injury Classification (SLIC) and Severity score, and discuss its utility in cervical trauma.

TABLE OF CONTENTS/OUTLINE

- Relevant C-spine anatomy
- Epidemiology and pathophysiology of cervical spine fractures. Types of c-spine fractures, and SLIC classification and severity score. Consequences of missed c-spine fracture diagnoses.
- Review imaging modalities for the cervical spine. Role of MDCT in clearing the c-spine in the obtunded patient. MRI prognostic indicators in determining neurological recovery.
- Review new CT based measurements that aid in the detection of c-spine injuries in the acute setting. Case studies of several types of C-spine injuries. Summary, and discussion about future direction for detecting cervical spine fractures in the acute setting.
- Provide a Clinical Protocol Guideline in the assessment of C-spine injuries and detection of instability.

ERE136

Don’t Traumatize Me! Non-Traumatic Causes of Intracranial Hemorrhage

Education Exhibits

Location: ER Community, Learning Center

Participants

Gunja Paresh Parikh MD (Presenter): Nothing to Disclose
Elana Beth Smith MD : Nothing to Disclose
Neha Gowali MD : Nothing to Disclose
Rita A. Yeretsian MD : Nothing to Disclose
Neil B. Horner MD : Nothing to Disclose

TEACHING POINTS

1. Learn the imaging features that differentiate the etiologies of non-traumatic intracranial hemorrhage.
2. Review patient presentation and pathophysiology of non-traumatic causes of intracranial hemorrhage.
3. Demonstrate how recognizing different patterns of non-traumatic intracranial hemorrhage will affect patient management.

TABLE OF CONTENTS/OUTLINE

Information will be presented in quiz format utilizing cross-sectional and angiographic images. The following entities will be discussed:
1. Hypertensive Bleed
2. Aneurysm
3. Cerebral Amyloid Angiopathy
4. Vascular Malformations
5. Dural Sinus Thrombosis
6. Hemorrhagic Mases
7. Hemorrhagic Transformation of Infarct
8. Other rare causes of intracranial hemorrhage including PRES and reversible cerebral vasoconstriction syndrome

ERE137

Easily Missed Findings in the Emergency Department on Routine Non-contrast Head CTs with Potential for Significant Consequences

Education Exhibits

Location: ER Community, Learning Center

Selected for RadioGraphics

Participants

Mariya Kobi MD (Presenter): Nothing to Disclose
Neal Viradia MD : Nothing to Disclose
Alexander Benjamin Baxter MD : Nothing to Disclose
Mark Philip Bernstein MD : Nothing to Disclose
Aspan Singh Olson MD, MS : Nothing to Disclose
John Michael McMenamy MD : Nothing to Disclose

TEACHING POINTS

1. Review of easily missed findings on non-contrast CT head. 2. Present teaching points on how to avoid the errors.

TABLE OF CONTENTS/OUTLINE

ERE138

Emergency Room CT in Children with Seizure: Subtle CT Findings

Education Exhibits
Location: ER Community, Learning Center

Selected for RadioGraphics

Participants
Alex C. Wu MD : Nothing to Disclose
Milad Yazdani MD : Nothing to Disclose
Neil Vachhani MD : Nothing to Disclose
Unni K. Udayasankar MD, FRCR (Presenter): Nothing to Disclose

TEACHING POINTS

Non contrast head CT is often the initial modality of choice in children with new onset seizure presenting to the Emergency Room. However, many structural intracranial pathologies have subtle imaging features and could be overlooked. The purpose of this exhibit is to present the emergency radiologist with a set of challenging cases to help them improve their diagnostic skills and accuracy.

TABLE OF CONTENTS/OUTLINE

The cases will be presented in a Quiz format starting with noncontrast head CT followed by MRI. The list of cases will include the following:

- Malformation of cortical development
- Encephalomalacia (post trauma, infection)
- Cortical based tumors
- Tuberous sclerosis
- Heterotopia
- Infection: Encephalitis/meningitis, TB, Neurocysticercosis
- Arteriovenous malformation
- Cavernous malformation
- Arachnoid cysts
- Hemimegalencephaly
- Sturge Weber Syndrome

ERE139

Fluid Collection in the Retropharyngeal Space: A Wide Spectrum of Various Emergency Diseases in Children and Adults

Education Exhibits
Location: ER Community, Learning Center

Certificate of Merit

Participants
Hirotaka Ikeda MD (Presenter): Nothing to Disclose
Tsuneo Yamashiro MD : Nothing to Disclose
Atsuko Fujikawa MD : Nothing to Disclose
Hayato Tomita : Nothing to Disclose
Yoshiko Yakushiji Kurihara MD : Nothing to Disclose
Yasuo Nakajima MD : Nothing to Disclose

TEACHING POINTS

Fluid collection in the retropharyngeal space (RPS), including retropharyngeal abscess and several non-infectious diseases, appears in various diseases that should be treated in different clinical departments. Since emergency conditions causing neck pain can demonstrate this finding on CT or MRI, radiologists are required to differentiate these diseases to facilitate proper treatment.

The purpose of this exhibit is:
1. To review the normal anatomy of the RPS
2. To review diseases that demonstrate fluid collection in the RPS in children and adults

TABLE OF CONTENTS/OUTLINE

1. Normal anatomy of the RPS
2. Fluid collection in the RPS in children
   a) Infectious conditions; retropharyngeal abscess, cervical lymphadenitis, foreign body ingestion
   b) Malignancies; lymphoma, leukemia
   c) Kawasaki disease
   d) Congenital disease; pyriform sinus cyst
3. Fluid collection in the RPS in adults
   a) Infectious conditions (ENT); retropharyngeal abscess, cellulitis, foreign body ingestion
   b) Infectious conditions (orthopedics); osteomyelitis
   c) Non-infectious conditions (ENT); lymphangiomata, laryngeal edema
   d) Non-infectious conditions (orthopedics); calcific tendinitis of the longus colli muscle, compression fracture
   e) Malignancies and tumor-related conditions
4. Indications for imaging modalities regarding treatment options

ERE140

Harder to Breathe: Imaging of Acute and Subacute Laryngeal Conditions with
Clinicoradiological Correlation

Education Exhibits
Location: ER Community, Learning Center

Participants
Marie Kim MD (Presenter): Nothing to Disclose
Akifumi Fujita MD : Nothing to Disclose
Joan M. Cheng MD : Nothing to Disclose
Hiroyuki Fujii MD : Nothing to Disclose
Osamu Sakai MD, PhD : Speaker, Bracco Group Speaker, KYORIN Holdings, Inc Speaker, Eisai Co, Ltd

TEACHING POINTS
Acute and subacute causes of upper airway narrowing can have a nonspecific and varied presentation, ranging from vague neck pain and shortness of breath to more obvious signs such as stridor. Given the nonspecific clinical presentation, imaging studies may sometimes be obtained prior to endoscopic evaluation. Additionally, endoscopic examinations cannot assess submucosal or extra-laryngeal causes of upper airway narrowing, necessitating radiologic assessment.

The purpose of this exhibit is to:
1. Review various acute and subacute pathologies that cause laryngeal and airway compromise
2. Provide a clinicoradiological correlation of various disorders
3. Review of key imaging findings to narrow the differential diagnosis

TABLE OF CONTENTS/OUTLINE
1. Radiological anatomy of the larynx and trachea
2. Acute and subacute laryngeal abnormalities
   a. Infectious / inflammatory conditions
      -Epiglottitis
      -Croup
      -Retropharyngeal abscess
      -Hypopharyngeal abscess
      -Submandibular abscess
      -Odontogenic infection / oral floor abscess
      -Thrombophlebitis
   b. Angioedema
   c. Trauma
   d. Iatrogenic: post-extubation tracheal stenosis
   e. Tumors: advanced head and neck cancer

ERE141
Imaging Features of Oral and Maxillofacial Conditions in the Emergent Setting: What the Radiologist Should Know

Education Exhibits
Location: ER Community, Learning Center

Participants
Ai Masukawa MD (Presenter): Nothing to Disclose
Takayuki Kurinobu MD : Nothing to Disclose
Hitoshi Takeuchi MD : Nothing to Disclose
Junko Araki : Nothing to Disclose
Shichiro Katase : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review traumatic and nontraumatic oral and maxillofacial conditions on X-ray photography and computed tomography in the emergent setting To assess oral and maxillofacial disease in the acute setting, X-ray photography is the first-line modality, and computed tomography plays an important secondary role. 2. To understand important imaging findings for selection of treatment methods The radiologist needs to understand what the clinician wants to know and fulfills an important function in guiding appropriate patient management.

TABLE OF CONTENTS/OUTLINE
1. Traumatic
   • tooth fracture
   • tooth luxation
   • bleeding from the tongue
   • maxillofacial fracture
   • dislocation of temporomandibular joint
2. Nontraumatic
   • neck abscess caused by oral conditions
   • salivary stone and sialadenitis
   • odontogenic maxillary sinusitis
   • ...
ERE142

Multi-Detector Computed Tomography of Globe Injuries—Imaging Review, Pearls and Pitfalls

Education Exhibits
Location: ER Community, Learning Center

Participants
Scott David Steenburg MD (Presenter): Nothing to Disclose
Ryan Whitesell MD: Nothing to Disclose
Danny Lynn Leatherwood MD: Nothing to Disclose
E. Michael Harned MD: Nothing to Disclose
Stephen Francis Kralik MD: Nothing to Disclose
Darren P. O’Neill MD: Nothing to Disclose

TEACHING POINTS
- MDCT is the imaging modality of choice for imaging patients with acute polytrauma. - Though MDCT is often obtained to evaluate for facial fractures, injuries to the globe may also be detected and may not be clinically apparent. - MDCT signs of significant globe injuries may be subtle. - MDCT has only modest accuracy for open globe injuries compared to ultrasound and clinical exam.

TABLE OF CONTENTS/OUTLINE
- Review epidemiology of globe injuries. - Review of normal globe anatomy. - Review imaging modalities and strategies used for suspected globe trauma (ultrasound, MRI and CT). - Imaging review of frequently encountered pathology using an interactive quiz based format. - Subtle MDCT signs of significant globe injuries will be emphasized. - Pathology to be included: vitreous hemorrhage, corneal lacerations, open globe rupture, globe foreign bodies, penetrating globe injuries, ocular detachments (including traumatic cataract, lens subluxation and dislocation). - Accompanying PDF slides demonstrate much of the pathology that will be reviewed and presented in the presentation.

ERE143

Pain in the Neck: What the ER Radiologist Needs to Know about Non-Traumatic Neck Emergencies

Education Exhibits
Location: ER Community, Learning Center

Certificate of Merit

Participants
Melissa Mei Chen MD (Presenter): Nothing to Disclose
Carlos S. Restrepo MD: Nothing to Disclose
Alejandro Lopez-Araujo MD: Nothing to Disclose
Bundhit Tantiwongkosi MD: Nothing to Disclose
Aimee Pamela Carswell MD: Nothing to Disclose
Julia L. Humphrey MD: Nothing to Disclose
Fang Yu MD: Nothing to Disclose
Daniel Verdi MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review important anatomic landmarks in the neck crucial to the evaluation of neck emergencies. 2. To demonstrate multimodality imaging findings of non-traumatic common ER, critical and life threatening neck emergencies. 3. To briefly review pathophysiology and clinical management in some of the more critical emergencies.

TABLE OF CONTENTS/OUTLINE
1. Review of important anatomic landmarks in the neck 2. Infection -Epiglottitis -Peritonsillar abscess -Retropharyngeal space infection -Lemierre syndrome: Pharyngitis/tonsillar abscess with secondary venous thrombosis -Discitis/osteomyelitis -Tuberculous lymphadenopathy: Scrofula 3. Tumor -Neck tumors causing airway compression -Post-radiation carotid vascular complications (Carotid blowout syndrome) 4. Other -Ingested foreign bodies -Tracheo-esophageal fistula secondary to lye ingestion 5. CONCLUSION: -Knowledge of the anatomic neck spaces is critical in evaluating life threatening neck emergencies, particularly with infection. -Understanding the pathophysiology of neck pathology is crucial in recognizing the pertinent imaging findings.

ERE144

Postoperative CT of the Mandible Following Trauma: Review of Normal Appearances and Common Complications

Education Exhibits
Location: ER Community, Learning Center

Participants
Michael Jason Reiter DO (Presenter): Nothing to Disclose
Ryan Becton Schwope MD: Nothing to Disclose
Paul Joseph Shogan MD: Nothing to Disclose
Jonathan Kini: Nothing to Disclose
Jared Theler: Nothing to Disclose

TEACHING POINTS
The major teaching points of this exhibit are:
1. Closed treatment of nondisplaced mandibular fractures is valid for patients who accept MMF. However, ORIF is preferred to avoid the drawbacks and inconveniences of MMF and is recommended for displaced fractures.
2. Repair of condylar fractures is controversial without consensus amongst surgeons. However, fractures with severe condylar process displacement should undergo fixation.
3. Two basic types of fracture fixation are load-bearing and load-sharing osteosynthesis which differ with regards to how much of the functional load the plate assumes.
4. 1 or 2 plates may be used to fixate condylar fractures depending on the fracture morphology and amount of bone available to hold the screws.
5. Nonunion, malocclusion, infection and fixation failure are potential complications.

TABLE OF CONTENTS/OUTLINE

1. Indications for surgical intervention
   a. Symphysis
   b. Body
   c. Angle
   d. Ramus
   i. Condylar
   ii. Coronoid
2. Operative approaches
   a. Body/Symphysis
   b. Angle
   c. Ramus
   2. Goals of surgical repair on CT
   a. Overview
   b. Body/Symphysis
   c. Angle
   d. Coronoid
   e. Condylar
   i. Intracapsular
   ii. Extracapsular
4. Commonly complications
   a. Nonunion
   b. Malocclusion
   c. Infection
   d. Fixation failure

ERE145

Spinning Out of Orbit! Traumatic and Non-Traumatic Orbital Emergencies

Participants

Elana Beth Smith MD (Presenter): Nothing to Disclose
Gunja Paresh Parikh MD: Nothing to Disclose
Adam Eugene Flanders MD: Nothing to Disclose
Neeta Rao MD: Nothing to Disclose
Neil B. Horner MD: Nothing to Disclose

TEACHING POINTS

1. Review the anatomy of the orbit
2. Learn to recognize the imaging features of entities with the potential to cause visual loss/disturbances, orbital pain/swelling, restricted ocular motility, and proptosis
3. Demonstrate complications that can result from orbital emergencies

TABLE OF CONTENTS/OUTLINE

1. Introduction
2. Optimizing CT protocol
   a. 2 mm true axials
   b. 0.625mm reconstructions
   c. 3D renderings of inlet, outlet, and

ERE146

Convergence of Radiology and Orthopedics: Understanding Pelvic Ring Fractures and How to Report Them on Trauma CT Examinations

Participants

Brian Scott Martell MD (Presenter): Nothing to Disclose
Scott David Wuertz MD, MS: Nothing to Disclose
Leon Lenchik MD: Nothing to Disclose
Anna N Miller MD: Nothing to Disclose

TEACHING POINTS

1. Accurate reporting of pelvic ring fractures on trauma CTs is essential for optimal patient management.
2. Young and Burgess classification is based on direction of force while Tile classification is based on stability.
3. To provide value to orthopedic surgeons, radiologists should recognize important CT imaging findings for both systems.
4. Radiologists should have a basic knowledge of fracture management to help assess for complications on the postoperative CTs.

TABLE OF CONTENTS/OUTLINE

1. Introduction
2. Optimizing CT protocol
   a. 2 mm true axials
   b. 0.625mm reconstructions
   c. 3D renderings of inlet, outlet, and

ERE147

'Emsbracing Dual Energy CT with Both Hands': Application of Dual Energy CT in Acute Hand Pathology

Education Exhibits
Location: ER Community, Learning Center

Participants

Brathaban Rajayogeswaran MBCh (Presenter): Nothing to Disclose
Neal Chhaya MBBS, FCR : Nothing to Disclose
Savvas Nicolaou MD : Nothing to Disclose
Hugue A. Ouellette MD : Nothing to Disclose

TEACHING POINTS

The use of Dual Energy CT in acute hand pathology in the Emergency Department. How to use the DE bone marrow oedema, tendon and gout application to problem solve. Limitations of Dual Energy CT and reduction of application artefacts.

TABLE OF CONTENTS/OUTLINE

Hand pathology counts for 10% of hospital Emergency Department (ED) visits. There are new and exciting Dual Energy CT (DECT) applications which can be utilised at initial presentation. DECT scan with DE bone marrow application, which has an estimated dose <0.05 mSv, can make a less convincing fracture easier to identify. Tendon injuries can also be interrogated, the tendon application allows them to be traced along their course through the hand. Diagnostic dilemma of acute joint pathology, infection or crystalline arthropathy can be addressed with the gout application identifying urate within a joint, reducing the need for an invasive procedure. The principles of Dual Energy CT. Dose of Dual Energy CT in the hand and estimated fatality risk of solid cancer. Exciting new DE bone marrow oedema with colour overlay maps and comparison with virtual non calcium subtraction technique. How the collagen application can be utilised to identify tendon injuries. Managing the diagnostic dilemma of acute joint pathology. Limitations of Dual Energy CT and reducing DECT application artefacts.

ERE148

Proximal Humeral Fractures: What an Emergency Radiologist Needs to Know

Education Exhibits
Location: ER Community, Learning Center

Participants

Heeseop Shin MD (Presenter): Nothing to Disclose
Arash Bedayat MD : Nothing to Disclose
Christopher Alfred Cerniglia DO, MEng : Nothing to Disclose
Hao Steven Lo MD : Nothing to Disclose

TEACHING POINTS

Review major classification systems of proximal humeral fractures, with major emphasis on the most commonly used Neer classification system. Review mechanisms of injury and characteristics of each fracture pattern on imaging. Learn to distinguish injuries that warrant additional imaging versus those that warrant surgical intervention.

TABLE OF CONTENTS/OUTLINE

1. Major classification systems of proximal humeral fractures.
   - Major emphasis on Neer classification system.
   - Mechanisms of injury for each fracture pattern.
2. Review imaging characteristics of each fracture pattern.
   - Key findings and recommendations to include in the report with emphasis on those that trigger additional evaluation with CT, MR, or angiography.
   - Important soft tissue injuries that require surgical intervention.
   - Associated injuries that raise suspicion for underlying proximal humeral fractures when the latter is not evident.
3. Review treatment of each fracture pattern.
   - Examples of surgical intervention.

ERE149

"Soft Calls": A Review of Non-osseous Radiographic Findings in Upper and Lower Extremity Trauma

Education Exhibits
Location: ER Community, Learning Center

Participants

Jennifer Fay True MD (Presenter): Nothing to Disclose
Gustav A. Blomquist MD : Nothing to Disclose
TEACHING POINTS

1) State the importance of soft tissue evaluation in the radiographic analysis of extremity trauma.
2) Recognize radiographic findings and explain the importance of joint effusion, lipohemarthrosis, focal soft tissue swelling, abnormal opacity within and displacement of fat pads, soft tissue gas and foreign bodies.
3) Describe the pitfalls and limitations of soft tissue findings.

TABLE OF CONTENTS/OUTLINE

Review multiple types of common soft tissue findings seen in the emergency radiology setting such as: joint effusion, lipohemarthrosis, focal soft tissue swelling and abnormal opacity within the fat pad, soft tissue gas, etc.

Review the importance of these findings. For example:

- Joint effusion: May indicate radiographically occult or subtle fracture or intra-articular soft tissue injury.
- Lipohemarthrosis: Specific type of joint effusion indicating presence of an intra-articular fracture.
- Focal soft tissue swelling and abnormal opacity within fat pad: May indicate adjacent fracture and/or tendon/ligament tear.
- Soft tissue gas: Indicates presence of open fracture or penetrating injury.

Show multiple examples of each finding utilizing mainly radiographs, CT, and ultrasound.

ERE150
"You're Pulling My Leg": A Resident's Guide to Avulsion Injuries in the Emergency Radiology Setting

Education Exhibits
Location: ER Community, Learning Center

Participants
Jennifer Fay True MD (Presenter): Nothing to Disclose
James T. Lee MD: Nothing to Disclose
Sarah Milam Deraney MD: Nothing to Disclose
Andres R. Ayoob MD: Nothing to Disclose
Gustav A. Blomquist MD: Nothing to Disclose
David James Nickels MD: Nothing to Disclose
Gary Louis Merhar MD: Nothing to Disclose
Barbara Kenney Pawley MD: Nothing to Disclose

TEACHING POINTS

* Give a brief overview of radiographic analysis of common avulsion injuries in the acute trauma setting.
* Give a brief description of why these injuries are important to recognize early in extremity trauma such as associated soft tissue/ligamentous injuries.
* Describe the pitfalls and limitations of diagnosing avulsion injuries especially in the pediatric patient.

TABLE OF CONTENTS/OUTLINE

* Review imaging findings of common avulsion injuries seen in the emergency radiology setting including those of the ankle, elbow, pelvis, etc.
* Review common ossification centers and the risk of false positive findings.
* Review the pitfalls and limitations of pediatric avulsion fracture imaging utilizing multiple imaging examples.

ERE151
Dual Energy CT Characterization of Incidental Findings in the Emergency Department: Initial Impressions and Correlation with Other Imaging Modalities

Education Exhibits
Location: ER Community, Learning Center

Participants
Jeremy Robert Wortman MD (Presenter): Nothing to Disclose
Urvi Pravin Fulwadhva MD: Nothing to Disclose
Paul Michael Bunch MD: Nothing to Disclose
Gregory Aaron Bonci MD: Nothing to Disclose
Aaron D. Sodickson MD, PhD: Research Grant, Siemens AG

TEACHING POINTS

1) Dual energy CT allows for the creation of virtual non-contrast (VNC) and iodine overlay images, which can quantify the enhancement of a lesion with a single acquisition. 2) Analysis of iodine overlay and VNC images can accurately characterize a variety of incidental lesions encountered with routine CT imaging in the Emergency Department, including adrenal, renal, splenic, and pancreatic lesions. 3) Routine dual energy CT imaging and post-processing can be performed in the Emergency Department setting, and has the potential to eliminate the need for follow-up imaging in many patients.

TABLE OF CONTENTS/OUTLINE

1) Dual energy CT technology
   - Illustrate the basic principles of material decomposition with dual energy CT.
2) Applications to incidental lesions in the Emergency Department
- Review of common incidental lesions encountered with routine CT imaging in the Emergency Department, and potential applications of dual energy post-processing techniques.
- Case based review correlating dual energy CT post-processing analysis of common incidental lesions encountered in the Emergency Department with other imaging modalities including multi-phase CT, MRI, and ultrasound.

ERE152

Dual Energy CT to Detect Active Extravasation in the Emergency Room Setting: Advantages over Conventional Contrast-Enhanced CT

Education Exhibits
Location: ER Community, Learning Center

Cum Laude

Participants
Gregory Aaron Bonci MD (Presenter): Nothing to Disclose
Jeremy Robert Wortman MD: Nothing to Disclose
Urvi Pravin Fulwadhva MD: Nothing to Disclose
Aaron D. Sodickson MD, PhD: Research Grant, Siemens AG

TEACHING POINTS
Dual energy (DE) imaging is based on the principle that different materials exhibit distinct absorption characteristics at different x-ray energies. DE three-material decomposition enables calculation of iodine content in tissues, which may be displayed as an iodine map or removed to display a virtual noncontrast (VNC) image. Areas of contrast extravasation questioned or not optimally visualized on conventional CT imaging can be reliably identified based on the presence of iodine content. This allows for confident diagnosis without the need for additional non-contrast or delayed post-contrast scans.

TABLE OF CONTENTS/OUTLINE
1. Dual Energy Physics Principles of DE CT and three-material decomposition. Generation of VNC imaging and determination of iodine content. 2. Applications in the ER Setting The identification of active extravasation is of particular importance in the emergency setting. Hyperdense foci on CT that represent active hemorrhage may be confused for enhancing tissue or pre-existing high density, especially when noncontrast phases are unavailable. Areas where dual energy imaging can be of most utility are solid organ bleeding, trauma, and vascular injury. We routinely employ DE post-processing for ER abdomen/pelvis CT to clarify iodine content and in turn better guide management.

ERE153

Enhancing Your Practice with Dual Energy CT in the ER

Education Exhibits
Location: ER Community, Learning Center

Selected for RadioGraphics

Participants
Urvi Pravin Fulwadhva MD (Presenter): Nothing to Disclose
Aaron D. Sodickson MD, PhD: Research Grant, Siemens AG

TEACHING POINTS
Dual energy (DE) CT can add value through: A. Improved visualization of existing image content B. Creation of new image content not otherwise available C. Opportunities to reduce radiation exposure, IV contrast volume, or imaging utilization

TABLE OF CONTENTS/OUTLINE
1. Physics review of x-ray spectra and tissue absorption at different x-ray energies 2. DE data acquisition and postprocessing including material characterization, 3 material decomposition, virtual monochromatic imaging. 3. Demonstrate potentially game-changing applications (organized per teaching point category letters) via relevant clinical case examples: A: Improved iodine visualization to improve detection and highlight subtle enhancement differences; bone removal in vascular imaging; virtual monochromatic imaging to maximize subtle attenuation differences B: Virtual noncontrast (VNC) and iodine map images for definitive iodine characterization; renal stone characterization; gout identification; bone marrow edema detection; metal artifact suppression C: Avoid further workup by definitive characterization of incidentals; VNC to eliminate noncontrast phases; reduce IV contrast or salvage poorly enhanced scans using low kVp/keV 4. Workflow and post-processing considerations in building a DE program, and needs for successful integration into clinical routine

ERE154

Muscle Edema: Fingerprints for the Emergency Radiology

Education Exhibits
Location: ER Community, Learning Center

Participants
Joan C. Vilanova MD, PhD (Presenter): Nothing to Disclose
Sandra Baleato Gonzalez MD: Nothing to Disclose
Joaquim Barcelo MD: Nothing to Disclose
Xavier Tomas-Battle MD: Nothing to Disclose
Miguel Villalon MD: Nothing to Disclose
Maria Boada MD: Nothing to Disclose

TEACHING POINTS
To understand the pathophysiology of muscle edema To recognize additional radiographic clue findings within a muscle edema, in clinical correlation, for life-threatening conditions To establish a differential diagnosis for certain emergency situations
TABLE OF CONTENTS/OUTLINE
It will be shown the radiographic pattern (US, CT, MRI) of muscle edema, especially on MRI. A proper algorithm for potential critical conditions related to muscle edema will be provided. Additional functional imaging on MRI (DWI and contrast enhanced acquisition) are helpful to demonstrate certain etiology causes, which will be described. It will be demonstrated the potential causes of muscle edema: traumatic, infectious, autoimmune, inflammatory, neoplastic, neurologic or iatrogenic. It will be emphasized the conditions that could require prompt medical or surgical management. It is necessary to accurately diagnose and detect promptly these conditions to establish the correct diagnosis. Radiologists should be familiar with certain specific patterns of muscle edema to manage serious critical situations.

ERE155
Scan More and Save More: How to Finish the Trauma Panscan in a Shorter Time?

Education Exhibits
Location: ER Community, Learning Center

Participants
Nagaharu Takakura : Nothing to Disclose
Junichi Matsumoto MD (Presenter): Nothing to Disclose
Brandon D. Lohman: Nothing to Disclose
Masaru Sato: Nothing to Disclose
Yasushi Nakamori : Nothing to Disclose
Yasuo Nakajima MD : Nothing to Disclose
Yasuhiro Taira MD : Nothing to Disclose

TEACHING POINTS
Trauma panscan is now essential screening method but to take time for scanning may be harmful for severely injured patients. In this exhibit you will learn; How to decrease the time for trauma panscan; time for moving from emergency room to the CT, putting the patient on the scanner off the stretcher, scanning, taking the patient from the scanner onto the stretcher, and coming back to the ER. You can learn how to make them shorter for every step. How effective and how difficult those tricks are with grading systems for every step. Discussion will also include topics about trauma panscan for hemodynamically unstable patients and the panscan as a part of the primary survey.

TABLE OF CONTENTS/OUTLINE
Introduction: Significance of trauma panscan. How to reduce the time for panscan; hardware setting, special device for transfer, scanning protocols, and team approach. All tricks are shown with degrees of effectiveness and difficulty. Discussion Conclusion and future directions.

ERE157
MR Imaging Diagnostic Pitfall for Acute Abdomen of Children and Pregnant Women

Education Exhibits
Location: ER Community, Learning Center

Participants
Yukichi Tanahashi MD : Nothing to Disclose
Satoshi Goshima MD, PhD : Nothing to Disclose
Yuki Yoshiyasu MD (Presenter): Nothing to Disclose
Hiroshi Kondo MD : Nothing to Disclose
Yoshifumi Noda MD : Nothing to Disclose
Nobuyuki Kawai MD : Nothing to Disclose
Hiroshi Kawada MD : Nothing to Disclose
Haruo Watanabe MD : Nothing to Disclose
Kota Sakurai : Nothing to Disclose
Masayuki Kanematsu MD : Nothing to Disclose

TEACHING POINTS
Various situations can cause acute abdomen in children and pregnant women. Understanding and recognizing the MR imaging features of acute abdomen is beneficial for an accurate diagnosis and determination of appropriate treatments without iodinated radiation exposure.

TABLE OF CONTENTS/OUTLINE
Review the various clinical manifestations of acute abdomen in children and pregnant women.
Illustrate key MRI findings of acute appendicitis, ovarian torsion, rupture of ovarian tumor, acute pancreatitis, acute cholangitis, and infectious uterine fibroid.
Discussion of common diagnostic problems and clinical implications associated with acute abdomen in children and pregnant women.
Review the clinical indications and treatment choices of major diseases and discuss the role of radiologists to choose appropriate treatment, especially for pregnant women.

ERE158
MRI Protocol and Typical Presentations of Appendicitis on MRI in Pregnant and Non-pregnant Women in the Acute Setting

Education Exhibits
Location: ER Community, Learning Center

Participants
Jennifer Wang BS (Presenter): Nothing to Disclose
Sarah Anne Barrett MBCh : Nothing to Disclose
Ahmad M. Aljefri MBBS : Nothing to Disclose
TEACHING POINTS

1. Review the value of MRI in diagnosing appendicitis in pregnant and non-pregnant women.
2. Discuss MRI techniques/protocols, tips and tricks for visualization of the appendix in pregnant and non-pregnant women.
3. Use a case-based approach to illustrate the MRI techniques to evaluate appendicitis in a spectrum of pregnant and non-pregnant women, including some examples of alternative diagnosis.

TABLE OF CONTENTS/OUTLINE

1) Anatomy of the appendix. Pathophysiology of appendicitis. Value of each imaging modality (U/S, CT, MR). MRI indication/significance in pregnant and non-pregnant women. 2) Advantages and limitations of using MRI, and MRI interpretation of the appendix. 3) MRI protocol/techniques for visualizing appendix in pregnant women (time of acquisition, best sequence to visualize the appendix, cecal tilt angle, diffusion-weighted imaging.) 4) MRI utility in ruling in/out other medical conditions associated with acute RLQ abdominal pain (ectopic pregnancy, ovarian torsion, IBD, degenerating fibroids).

ERE159

The Unexpected When you are Expecting: MR Imaging Evaluation of Nonobstetric Abdominal Pain during Pregnancy

Education Exhibits
Location: ER Community, Learning Center

Participants
Bianca Guedes Ribeiro MD (Presenter): Nothing to Disclose
Leonardo Kayat Bittencourt MD, MSc : Nothing to Disclose
Joao Romulo Baptista Costa : Nothing to Disclose
Deborah Monteiro Soares MD : Nothing to Disclose
Romulo Varella MD : Nothing to Disclose
Natalia Sabaneff MD : Nothing to Disclose
Felipe Azevedo Costa Mattos : Nothing to Disclose
Gustavo Oliveira Ferreira Da Cunha : Nothing to Disclose

TEACHING POINTS

Abdominal pain is a common complaint during pregnancy and nonobstetric causes can require an urgent surgical approach. Normal pregnancy factors, such as dislocation of abdominal and pelvic structures by the uterus may delay a precise diagnosis, which can be harmful to both mother and fetus. The most frequent conditions are acute appendicitis, biliary disease, intestinal obstruction, pancreatitis, upper tract infection and abdominal trauma. Less common causes but also important include urinary lithiasis, ovarian torsion, epiploic appendagitis. US can be inconclusive in the evaluation of the pregnant woman. MR is a non-invasive and non-ionizing imaging modality, with excellent tissue contrast and no evidence of deleterious effects to the fetus.

TABLE OF CONTENTS/OUTLINE

1. Anatomic review of the pregnant pelvis; 2. Routine for the evaluation of the pregnant patient with abdominal pain; 3. Indications and contraindications of MRI during pregnancy; 4. MRI acquisition protocol for the pregnant patient; 5. The main imaging findings of abdominal pain during pregnancy: Inflammatory: acute appendicitis, diverticulitis, epiploic appendagitis, cholecystitis, pancreatitis, inflammatory bowel disease, hepatitis; Urinary: lithiasis, upper tract infection; Vascular: ovarian torsion, ovarian edema, pelvic congestion syndrome; Obstructive: bowel obstruction; Neoplastic.

ERE162

ED Breast Cases and Other Breast Emergencies

Education Exhibits
Location: ER Community, Learning Center

Certificate of Merit

Participants
Nasim R. Khadem MD (Presenter): Nothing to Disclose
Sravanthi Reddy MD : Nothing to Disclose
Sandy Chia-En Lee MD : Nothing to Disclose
Linda Hovanessian-Larsen MD : Nothing to Disclose
Daphne Kim Walker MD : Nothing to Disclose

TEACHING POINTS

1) Review the presentation, pathophysiology, imaging, and management of emergency breast cases and common breast pathology seen in the ED.
2) Understand the limitations of breast imaging in the acute setting, and know when to refer to a specialty breast center for further management.

TABLE OF CONTENTS/OUTLINE

1. Intro A. Breast development/anatomy B. Disease processes of the breast commonly present in the ED, and it is essential that the radiologist understand the imaging and management of the most common entities. An understanding of any limitations in the acute setting is especially important, as is knowing when referral to a specialty breast center is necessary. II. ED/emergency breast cases: will include discussion on pathophysiology/imaging of each case below, with particular focus on treatment and management. Will also include select case examples from our institution. A. Inflammatory/infectious: Mondor's disease, granulomatous mastitis, purpural/peri-purpural mastitis B. Blunt/penetrating trauma: contusions/hematomas, seatbelt injuries, stab wounds C. Implant complications: rupture, infection D. Post-procedural complications: pseudoaneuerysm following stereotactic biopsy E. Mimics: granulomatous mastitis as mimicker of cancer, gynecomastia (secondary to drugs,
Evaluating a Mouthful of Panorex Pathology and Associated Hardware

Education Exhibits
Location: ER Community, Learning Center

Participants
Evon Ross Finkelstein MD (Presenter): Nothing to Disclose
Jeffrey A. Chuy BA, MD: Nothing to Disclose
Ryan Melissa Finkelstein BS: Nothing to Disclose
Nicole Eve Finkelstein MMedSc, MS: Nothing to Disclose
Kim M. Caban MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1) To review anatomy and pathophysiology of the teeth. 2) To present cases with classic imaging findings for various pathologic processes on panorex. 3) To discuss the use and imaging appearance of current hardware within the mouth.

TABLE OF CONTENTS/OUTLINE
1) Teeth and panorex anatomy. 2) Clinical presentation of odontogenic disease. 3) Pathologic findings commonly encountered on panorex imaging. 4) Tooth trauma and associated hardware 5) Appearance of current dental restorations and orthodontic appliances 6) Panorex pitfalls 7) Summary

Explosive Blast Injuries: A Review of Radiologic Findings

Education Exhibits
Location: ER Community, Learning Center

Participants
John Franklin Brunner MD (Presenter): Nothing to Disclose
Ajay K. Singh MD: Nothing to Disclose
Tatiana C. Rocha MD: Nothing to Disclose
Joaquim Michael Havens MD: Nothing to Disclose
Aaron D. Sodickson MD, PhD: Research Grant, Siemens AG
Sravanthi Reddy MD: Nothing to Disclose
Robert Brunner BA: Nothing to Disclose

TEACHING POINTS
- Explosive blast injuries in the USA most commonly result from industrial accidents and rarely terrorist bombings
- Four common patterns of blast injury are traditionally described: primary, secondary, tertiary and quaternary, each with specific associated radiographic findings (Table 1)
- Radiologists should be familiar with all types of blast injury to ensure appropriate imaging strategies, accurate diagnosis, and rapid recognition of an explosive blast event
- Radiologist recognition of the hallmark findings of intentional terrorist bombings may result in improved clinical response and forensic investigation by legal authorities

TABLE OF CONTENTS/OUTLINE
I. Introduction II. Blast Injury Types (Table 1) a. Primary: Blast wave related barotrauma i. Mechanism ii. Injuries (Figure 1) b. Secondary: Blast related shrapnel injury i. Mechanism ii. Injuries (Figure 2 and 3) c. Tertiary: Blast wind displacement i. Mechanism ii. Injuries d. Quaternary: All other injuries i. Mechanism ii. Injuries III. Strategies for Imaging Blast injuries (Figure 5)

Fixin' the Retroperitoneum—Trauma at Retroperitoneal Fixation Points

Education Exhibits
Location: ER Community, Learning Center

Participants
Jason F. Broomhall MD (Presenter): Nothing to Disclose
Matthew Smetts MD: Nothing to Disclose
Kyuran Ann Choe MD: Nothing to Disclose
Susan Elizabeth Braley MD: Nothing to Disclose

TEACHING POINTS
- To review the retroperitoneal structures with attention to points of fixation.
- To discuss retroperitoneal trauma in relation to shear injury and points of fixation, including within the genitourinary tract, gastrointestinal tract, musculoskeletal system, and vasculature. The physics of shear stress will also be discussed.
- To illustrate imaging findings of retroperitoneal shear trauma.

TABLE OF CONTENTS/OUTLINE
- Review of the relevant retroperitoneal structures/anatomy and points of fixation that can lead to shear injury.
- Discussion of the physics of shear injury and mechanisms in which retroperitoneal structures are involved.
- Imaging manifestations of retroperitoneal shear injury.
Imaging Techniques in the Acute Assessment of Suspected Penetrating Diaphragmatic Injury: A Pictorial Review

Participants
Anushka Patchava MBCHIR, BSc (Presenter): Nothing to Disclose
Amanda Isaac MBChB, FRCA: Nothing to Disclose
Mohammad Daneshi MBBS: Nothing to Disclose
Duncan Bew: Nothing to Disclose
Lisa Marie Meacock MBBS: Nothing to Disclose

TEACHING POINTS
* The diagnosis of diaphragmatic injuries following penetrating thoraco-abdominal trauma can be challenging. * Direct computed tomography (CT) signs of injury are infrequent and in small defects CT imaging may be non-diagnostic. * Highlight diaphragmatic anatomy and areas susceptible to penetrating trauma. * Illustrate and review the direct and non-direct signs of diaphragmatic injury, using cases of surgically confirmed diaphragmatic injury. * Discuss how vectors of force and imaging clues facilitate a diagnosis of diaphragmatic injury. * Consider the role of adjuncts in CT imaging, for example the use of intra-pleural contrast.

TABLE OF CONTENTS/OUTLINE
* Background/Context: Diaphragmatic anatomy and susceptibility to trauma. * Patient group: Cases of surgically confirmed diaphragmatic injury from our level one trauma centre registry. * Purpose: Pictorial review of the direct and indirect radiological signs of diaphragmatic injury. * Discussion: Factors that help in the recognition of diaphragmatic injuries including vectors of force, trajectory mapping, common associated injuries and adjuncts to CT imaging. * Summarise: A checklist which highlights the common review areas to consider when assessing for diaphragmatic injuries.

Self-harm-Related Foreign Bodies in Adults: Diagnosis and Management in the Emergency Department

Participants
John Franklin Brunner MD (Presenter): Nothing to Disclose
Marie F Russell: Nothing to Disclose
Lee Alan Myers MD: Nothing to Disclose
Keith David Herr MD: Nothing to Disclose
Orest Bohdan Boyko MD, PhD: Nothing to Disclose
Sravanthi Reddy MD: Nothing to Disclose
Paul Michael Jaffray MD: Nothing to Disclose

TEACHING POINTS
• Self-harm-associated foreign bodies result in significant morbidity and mortality, resulting in 1500-1600 deaths per year in the USA • Amongst adults, the problem disproportionately affects individuals suffering from psychiatric conditions (85%), many of whom undergo repeat exposure to ionizing radiation in the form of CT and radiographs • Ingestion of foreign bodies is the most frequent manifestation of this behavior • Though the vast majority of ingested foreign bodies pass with only conservative management, 10-20% of patients require surgery or endoscopy for retrieval • Though less frequent, self-harm-related penetrating trauma results in higher morbidity and mortality.

TABLE OF CONTENTS/OUTLINE
I. Introduction II. Self-Harm Behavior a. Per Os (Ingested foreign bodies) i. Common entities ii. Complications (Figure 1-2) b. Per Rectum i. Common entities ii. Complications (Figure 3) c. Per Urethra (Figure 4) i. Common entities ii. Complications d. Per Vagina (Figure 5) i. Common entities ii. Complications e. Self-inflicted penetrating trauma i. Common entities (e.g. stabbing, GSW, other) (Figure 5) II. Complications III. Review of management strategies

Skin and Subcutaneous Emergencies: Multimodality Imaging with Ultrasound, CT, and Dual Energy CT

Participants
Hansol Kim MD: Nothing to Disclose
Sachin Shyamsunder Saboo FRCA, MD (Presenter): Nothing to Disclose
Naman Sanjiv Desai MD: Nothing to Disclose
Aaron D. Sodickson MD, PhD: Research Grant, Siemens AG

TEACHING POINTS
Awareness of characteristic Ultrasound and CT findings of various skin and subcutaneous emergencies is important for timely diagnosis and management.

TABLE OF CONTENTS/OUTLINE
1. Characteristic imaging findings and management of emergent skin and subcutaneous diseases: a. Inflammatory and...

3. Role of Dual Energy CT in skin and subcutaneous diseases in the emergency room 4. Conclusion

**ERE170**

*When Leaving Your Seat Can Ruin A Call Shift: Indications, Technique Considerations, and Common Imaging Findings For ED Fluoroscopic Exams*

**Education Exhibits**

**Location:** ER Community, Learning Center

**Participants**

- Peter M. Ghobrial MD (Presenter): Nothing to Disclose
- Sandeep Prakash Deshmukh MD: Nothing to Disclose

**TEACHING POINTS**

1. Review general considerations for radiation dose limitation during fluoroscopic examinations
2. Discuss appropriate clinical indications for use of fluoroscopy in patients presenting from the emergency department; some entities for which evaluation with fluoroscopy is no longer primarily indicated will also be described
3. Pertinent history supporting suspected diagnoses will be highlighted
4. Key aspects of successful exam technique will be reviewed
5. Expected exam findings will be demonstrated for each entity

**TABLE OF CONTENTS/OUTLINE**

- Introduction
- Objectives
- Strategies for Maximal Limitation of Fluoroscopic Radiation Dose
- Indications For Use of Fluoroscopy in ED Patient Evaluation (including: clinical presentation, expected effective radiation dose, imaging technique, and key findings--with imaging examples)
- Suspected Lower Urinary Tract Trauma: Male Urethra and Urinary Bladder Injury
- Esophageal Perforation
- Midgut Malrotation
- Reduction of Pediatric Intussusception
- Evaluation of ED Patients For Which Fluoroscopy Once Was, But Is No Longer Indicated (including: clinical presentation, expected effective radiation dose, imaging technique, and key findings--with imaging examples)
- Hypertrophic Pyloric Stenosis
- Small Bowel Obstruction

**ERE171**

*Imaging of Ovarian Torsion: Spectrum of Findings and Multimodality Case Review*

**Education Exhibits**

**Location:** ER Community, Learning Center

- **Selected for RadioGraphics**

**Participants**

- Shannon M. Navarro MPH, MD (Presenter): Nothing to Disclose
- Ashley Elizabeth Prosper MD: Nothing to Disclose
- Sravanthi Reddy MD: Nothing to Disclose
- Daphne Kim Walker MD: Nothing to Disclose

**TEACHING POINTS**

- Review pelvic anatomy and pathophysiology
- Clinical case presentation
- Diagnostic imaging
- Surgically proven cases with multimodality review
- Approach to imaging and pearls
- Future directions: contrast enhanced ultrasound

**TABLE OF CONTENTS/OUTLINE**

1. Pathophysiology
   a. Pelvic anatomy/pathology
   b. Clinical presentation
   c. Risk factors
2. Spectrum of ultrasound findings
   a. Grey scale
   b. Color Doppler
3. Diagnosis of ovarian torsion on CT and MRI
4. Surgically proven cases: a. Spectrum of ovarian and vascular findings b. Intraovarian and extraovarian masses as lead points c. Mimics
5. Approach to imaging and pearls
6. Contrast enhanced ultrasound

**ERE172**

*Role of Ultrasound in Imaging of the Breast: Experience in An Inner City Emergency Room*

**Education Exhibits**

**Location:** ER Community, Learning Center

**Participants**

- Mark Guelfguat DO (Presenter): Nothing to Disclose
- Arifa Faiz MBBS, MD: Nothing to Disclose
- Joshua D. Gross MD: Nothing to Disclose
- Shalom S. Buchbinder MD: Nothing to Disclose
- Ralph Wm. Liebling MD: Nothing to Disclose

**TEACHING POINTS**

- Breast diseases can progress rapidly; therefore appropriate imaging should be performed expeditiously
- Ultrasound (US) is an effective breast imaging modality when utilized in the Emergency Room (ER) for preliminary diagnosis, especially in the evenings or weekends
- More advanced imaging modalities may follow the initial US exam to supplement the knowledge of the extent of the disease
The purpose of this exhibit is to: 1. Review sonographic manifestations of breast diseases encountered in a setting on an inner city ER. 2. Discuss the diagnostic and prognostic role of US in evaluation of breast related diseases in an emergent setting. 3. Provide pictorial illustrations of differential diagnoses based on clinical presentations. Common and uncommon indications for ER breast US: -inflammation and mimickers: abscesses (typical and atypical pathogens; self-treated, medically treated and recurrent; adult and pediatric), inflammatory carcinoma, inflamed cyst, superficial thrombophlebitis -implant surgery complication (rupture, infection) -neoplasms (neglected and newly discovered, primary and secondary, benign and malignant, postoperative tumor recurrence) -gynecomastia (adult and pediatric)

**ERE174**

**The Ring of Fire: A New Approach to Excluding Ectopic Pregnancy for Junior Residents Taking Call in the Emergency Department**

**Education Exhibits**

**Location:** ER Community, Learning Center

**Participants**

Moreko Altoine Griggs MD (Presenter): Nothing to Disclose
Verghese George MBBS: Nothing to Disclose

**TEACHING POINTS**

The Ring of Fire algorithm is a visual and interactive mnemonic designed mainly for junior residents who take call in the emergency department. It provides a simple, innovative, and organized approach to the radiologic management of emergencies during early pregnancy. Emphasis is placed on how to exclude the diagnosis of ectopic pregnancy. As a play on words of the commonly described sonographic sign, the Ring of Fire algorithm is a set of six, sequential questions displayed along a ring that the user must address in order to exclude an ectopic pregnancy. The idea is to "escape" the Ring of Fire with answers that direct one away from the center of the ring where the diagnosis of ectopic pregnancy is located. However, if the answers continue to direct one along the ring of clinical and radiologic questions, concern for ectopic pregnancy should increase as the user progresses further. Links to clinical pearls are included at their respective points along the ring in order to build on this foundation.

**TABLE OF CONTENTS/OUTLINE**

- Ring of Fire Algorithm
- The Importance of Excluding Ectopic in Early Pregnancy Emergencies
- True Gestational Sac vs. Pseudosac
- Adnexal Ring of Fire
- Quantitative B-hCG and the Importance of Doubling Time
- Ectopic Pregnancy
- Non-ectopic early pregnancy emergencies
- Conclusion

**ERE175**

**Cardiopulmonary MDCT: Pearls and Pitfalls in Extracoronary Cardiac, Aortic and Pulmonary Artery Imaging**

**Education Exhibits**

**Location:** ER Community, Learning Center

**Participants**

Davood Joseph Abdollahian MD: Nothing to Disclose
Linda Chi Hang Chu MD: Nothing to Disclose
Stefan L. Zimmerman MD: Nothing to Disclose
Elizabeth Kristine Weihe MD: Author, Amirsys, Inc
Pamela Tecce Johnson MD (Presenter): Research funded, Becton, Dickinson and Company

**TEACHING POINTS**

CT has become the imaging modality for emergency imaging of the heart, aorta and pulmonary arteries. The purpose of this exhibit is to: Discuss technical pitfalls that result in pseudopathology Demonstrate intrepretative pearls that aid in making challenging diagnoses Illustrate post-operative findings that can be mistaken for pathology Review unusual pathology that may be encountered

**TABLE OF CONTENTS/OUTLINE**

- Cardiac: LA appendage thrombus vs pseuodthrombus RA thrombus vs crista semilunaris RA thrombus from RCC (keep on scanning!) Pacemaker lead through the wall of the RV Unusual pathology (subtle metastatic disease to the heart, ventricular wall calcification) Thoracic aorta Pseudodissection due to cardiac pulsation artifact Post operative material mimicking pseudoaneurysm or leak after aortic root repair Elephant trunk prosthesis (don't mistake for dissection!) Pulmonary artery: Bolus tracking timing pearls and pitfalls Pseudothrombus due to mixing, motion artifact and saline flush Parenchymal infarct: range of CT appearances Incidental and subsegmental PE and the clinical conundrum they create Tumor thrombus Pulmonary embolism on non-contrast CT

**ERE176**

**Intimal Problems: A Pictorial Review of Non-Traumatic Aortic Disease**

**Education Exhibits**

**Location:** ER Community, Learning Center

Cum Laude
Participants
Abigail Victoria Berniker MD (Presenter): Nothing to Disclose
Oleg Teytelboym MD: Nothing to Disclose
Justin Edward Mackey MD: Nothing to Disclose

TEACHING POINTS
Non-traumatic aortic diseases include a spectrum of conditions, many of which are associated with high morbidity and mortality. Radiologists should feel confident distinguishing non-traumatic aortic conditions and providing prompt and accurate interpretations to expedite appropriate patient management.

TABLE OF CONTENTS/OUTLINE
Goals - Review the spectrum of aortic disease encountered at imaging through a concise yet comprehensive case-based pictorial approach featuring common and uncommon entities - Help radiologists feel more confident characterizing non-traumatic aortic conditions and providing accurate interpretations to expedite timely treatment Background/Epidemiology Anatomy overview: Schematics alongside imaging Case-Based Pictorial Review: Aortic aneurysm • Aortic pseudoaneurysm • Intramural hematoma • Penetrating ulcer • Aortic dissection • Acute aortic thrombus • Aortic occlusion • Aortitis • Mimics/pitfalls Mini Quiz: Test your knowledge with interactive cases Summary Non-traumatic aortic conditions are serious and often go unrecognized until imaging studies are performed. Radiologists should be familiar with these entities and be able to provide accurate diagnoses to expedite patient care and prevent devastating, even fatal outcomes.

ERE177
Show Me the Way to the Bleeder! A Pelvic Vascular Road Map to Help the On-Call Interventional Radiologist

Education Exhibits
Location: ER Community, Learning Center

Participants
Aitor Lasarte Izcue MD (Presenter): Nothing to Disclose
Inaki Prieto: Nothing to Disclose
Francisco Loyola Echaniz: Nothing to Disclose
Virginia Gomez: Nothing to Disclose
Gorka Arenaza Choperena: Nothing to Disclose

TEACHING POINTS
- To show the potential of the computed tomography angiography (CTA) post-processing tools to achieve useful vascular reconstructions in the setting of acute pelvic bleeding. - To review pelvic vascular anatomy and draw a practical vascular road map to help the on-call interventional radiologist. - Use case examples to illustrate the correlation between CTA reconstructions and DSA (Digital Subtraction Angiography) and its therapeutic utility.

TABLE OF CONTENTS/OUTLINE
CT Angiography (CTA) in the acute pelvic bleeding CTA Protocol and post-processing tools Pelvic vascular anatomy: the road map for the interventional radiologist Show me the bleeder: Sample cases Summary

ERE178
Venous Injuries to the Thoracic Great Vessels

Education Exhibits
Location: ER Community, Learning Center

Selected for RadioGraphics

Participants
Carlos S. Restrepo MD: Nothing to Disclose
Daniel Lamus MD (Presenter): Nothing to Disclose
Aftab Haq MD: Nothing to Disclose
Daniel Vargas MD: Nothing to Disclose
Rajeev Suri MD: Nothing to Disclose
Andres Garza: Nothing to Disclose
Ghazwan M. Faozi Kroma MD: Nothing to Disclose

TEACHING POINTS
Review the direct and indirect imaging findings of traumatic injuries to the central veins Illustrate with cases the imaging features utilizing MDCT and DSA images of patients at our institution with the corresponding clinical and imaging followup. Emphasize the value of a multiphase scanning protocol to facilitate the early detection of these lethal injuries.

TABLE OF CONTENTS/OUTLINE
The clinical presentation of the injuries to the central venous system may be indistinguishable from injury to the arterial great vessels and most often are the result of either trauma or iatrogenic causes. MDCT with multiphase protocol MDCT, has increased the detection rate for these lesions in patients that survive the initial injury and give valuable information about injuries to adjacent structures. The indirect imaging findings of venous injury can be equivocal (perivascular hematoma, fat stranding, and vessel wall irregularity) but may prompt an early repair of these highly lethal injuries. Injuries to the SVC and innominate veins carry a high mortality. Traumatic injuries to the intrathoracic portion of the IVC are always fatal and rarely imaged. The unusual injuries to the azygos venous system manifest with morbidity and mortality that is similar to that of other great vessel injuries.

ERE179
A Stab in the Dark: Tips and Tricks for Interpreting Acute CT in Penetrating Stabbing Injuries to the Torso

Education Exhibits
Education Exhibits
Location: ER Community, Learning Center

Participants
Joel Dunn FRCR, MBBS (Presenter): Nothing to Disclose
Yaron J. Berkowitz MBChir, MRCS: Nothing to Disclose
Derfel Ap Dafydd MRCP, FRCR: Nothing to Disclose
Anoma Lalani Carlton Jones MBBS, FRCR: Nothing to Disclose
Raghavendra Kamanahalli MD, FRCR: Nothing to Disclose
Elka Kashef FRCR: Consultant, W. L. Gore & Associates, Inc
Elizabeth Ann Dick MD, FRCR: Nothing to Disclose

TEACHING POINTS
Using case based examples, with surgical correlation where possible, we aim to shed light on the imaging pathway and interpretation in patients with traumatic penetrating stab injuries. Our aim is to clarify the following:

- When to scan/when not to scan
- What orifice should contrast be given and how many phases
- How to interpret CT findings
- Discuss review areas where findings are often overlooked, i.e. bowel and diaphragm
- Tips and tricks from our experience at our institution.

TABLE OF CONTENTS/OUTLINE

- Introduction
- Peritoneal anatomy
- Imaging protocols and pathways at our institution
- Case based examples with surgical correlation
- Tips and tricks from our experience
- Summary

ERE180
CT of the Acute Female Pelvis

Education Exhibits
Location: ER Community, Learning Center

Participants
Douglas S. Katz MD (Presenter): Nothing to Disclose
Esther Evette Coronel MD: Nothing to Disclose
Joseph Patrick Mazzie DO: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose
Mariam Moshiri MD: Consultant, Reed Elsevier Author, Reed Elsevier
Savvas Nicolaou MD: Nothing to Disclose
Kristen Fruauff MD: Nothing to Disclose
Corinne C. Liu MD: Nothing to Disclose

TEACHING POINTS
Sonography is the primary imaging modality for the evaluation of pelvic pain in female patients, especially if gynecologic pathology is suspected, and MRI is being increasingly used for problem solving and followup. However, in the emergency setting CT is frequently used in patients presenting with non-specific abdominal and pelvic pain, and CT may be the first imaging examination to demonstrate gynecologic abnormalities. The purpose of this exhibit is therefore to discuss and illustrate the spectrum of gynecologic findings of the acute female pelvis which may be identified on CT by the emergency and general radiologist, with a brief review of the imaging and clinical features of each diagnosis. Radiologists need to be familiar with all of these gynecologic disorders on CT.

TABLE OF CONTENTS/OUTLINE

The following topics will be covered, with brief reviews of the literature and CT case demonstrations, with selective ultrasound correlations: CT technique; ovarian torsion (with or without underlying cyst/mass); ovarian cysts (simple and hemorrhagic, with and without peritoneal fluid/hemorrhage); endometriosis; unanticipated intra-uterine and ectopic pregnancy; ovarian hyperstimulation; pelvic inflammatory disease; endometritis; ovarian vein thrombosis; uterine rupture; gynecologic neoplasms with acute presentations; and complicated uterine leiomyomas.

ERE181
Iatrogenic Complications Affecting the Abdominal Wall

Education Exhibits
Location: ER Community, Learning Center

Participants
Gabriela Gayer MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. Review the pathophysiology of iatrogenic injuries affecting the abdominal wall. 2. Discuss the CT findings of a wide range of iatrogenic complications affecting the abdominal wall. 3. Emphasize the importance of integrating clinical data into the study’s interpretation process in this setting.

TABLE OF CONTENTS/OUTLINE
1. Pathogenesis of iatrogenic injuries affecting the abdominal wall. 2. Clinical presentation 3. Imaging findings - CT technique; ovarian torsion (with or without underlying cyst/mass); ovarian cysts (simple and hemorrhagic, with and without peritoneal fluid/hemorrhage); endometriosis; unanticipated intra-uterine and ectopic pregnancy; ovarian hyperstimulation; pelvic inflammatory disease; endometritis; ovarian vein thrombosis; uterine rupture; gynecologic neoplasms with acute presentations; and complicated uterine leiomyomas.
Incisional hernia - Heterotopic ossification in scar - Endometrioma

Summary

1. Familiarity and awareness of the broad spectrum of iatrogenic injuries is crucial.
2. Certain iatrogenic complications require prompt intervention.
3. Tailoring of CT study is important to confirm diagnosis.

Multidetector Computed Tomography (MDCT) Imaging Grading and Pitfalls of Hepatic Injuries in Patients with Abdominal Blunt Trauma

Education Exhibits
Location: ER Community, Learning Center

Participants
Guillermo P. Sangster MD (Presenter): Nothing to Disclose
Maureen Gail Heldmann MD : Nothing to Disclose
Carolina Navarro MD : Nothing to Disclose
Maren Donato MD : Nothing to Disclose
Ana Andrade, MD : Nothing to Disclose
Alejandro A Tempra : Nothing to Disclose

TEACHING POINTS

1. Apply the American Association for the Surgery of Trauma-Organ Injury Scale (AAST) to grade hepatic injuries utilizing MDCT
2. Discuss the role of MDCT in the detection of hepatic injury and active bleeding
3. Distinguish false (+) MDCT findings from true hepatic injuries to avoid misdiagnosis

TABLE OF CONTENTS/OUTLINE

MDCT is the imaging modality of choice for evaluation of hemodynamically stable patients with abdominal blunt trauma. The liver is the second most common injured abdominal solid organ, and the most frequent abdominal injury resulting in death. A retrospective collection of patients with blunt abdominal trauma from our level I trauma center are included in this pictorial essay. Hepatic lesions are described and classified following the American Association for the Surgery of Trauma-Organ Injury Scale (AAST). The following MDCT imaging finding are presented and discussed: a. Hematoma (subcapsular or intraparenchymal) b. Laceration c. Shattered liver d. Hilar vascular injury. e. The delayed hepatic rupture process is reviewed. This exhibit reinforces the comprehensive value of MDCT in the diagnosis and grading of blunt hepatic trauma, and the impact of imaging on patient management. Mimics should be recognized to avoid unnecessary invasive procedures.

Severe Abdominal Trauma: Spectrum of Findings in Patients Who Undergo Diagnostic CT After Life-saving Laparotomy

Education Exhibits
Location: ER Community, Learning Center

Select for RadioGraphics

Participants
Armonde Baghdanian MD (Presenter): Nothing to Disclose
Brian Michael Currie BS : Nothing to Disclose
Arthur Baghdanian MD : Nothing to Disclose
Christina Alexandra Lebedis MD : Nothing to Disclose
Stephan W. Anderson MD : Nothing to Disclose
Jorge A. Soto MD : Nothing to Disclose
Anthony Samuel Armetta MD : Nothing to Disclose

TEACHING POINTS

1. Review the most common indications for emergent exploratory laparotomy without pre-operative diagnostic CT, following blunt abdominal trauma.
2. Discuss the optimal trauma CT protocols in the setting of an open abdomen after trauma.
3. Illustrate the most significant injuries that are not detected or treated during an exploratory laparotomy performed without prior CT imaging.
4. Learn characteristic post-operative findings on CT performed after laparotomy for emergency hemostasis.
5. Describe findings of the open surgical abdomen.
6. Discuss the clinical implications of making the correct diagnoses.

TABLE OF CONTENTS/OUTLINE

2. When to obtain an immediate post operative CT scan.
3. Typical findings of an open surgical abdomen on CT after emergent laparotomy.
4. Differentiating between expected post-operative findings and true injuries from initial trauma.
5. Potential dangerous pitfalls on post-operative emergent CT.
6. Sample case presentations.

Traumatic Bladder Rupture: Utility of CT Cystogram and Clinical Implications

Education Exhibits
Location: ER Community, Learning Center

Certificate of Merit

Participants
Arthur Baghdanian MD (Presenter): Nothing to Disclose
Christina Alexandra Lebedis MD : Nothing to Disclose
Armonde Baghdanian MD : Nothing to Disclose
Anthony Samuel Armetta MD : Nothing to Disclose
Stephan W. Anderson MD : Nothing to Disclose
Jorge A. Soto MD : Nothing to Disclose
1. To review the imaging presentations and classification of bladder rupture in the trauma setting.
2. To explain the utility of CT Cystography to appropriately diagnose bladder trauma.
3. To discuss the clinical implications of making the correct diagnosis.

TABLE OF CONTENTS/OUTLINE

- When to obtain a CT Cystogram.
- Classification of bladder rupture based on Sandler et al. classification in Radiology 1986 (type 1-type 5).
- Association of pelvic fractures and bladder rupture.
- Sample cases with common imaging presentations that highlight the importance of CT Cystography for diagnosing bladder rupture.
- Clinical management implications of bladder rupture in extra vs intraperitoneal bladder rupture.

ERE186

Traumatic Injuries to the Pancreas: The Key Role of Imaging

Education Exhibits
Location: ER Community, Learning Center

Certificate of Merit

Participants
Jun Wang BSc (Presenter): Nothing to Disclose
HeeJun Kang : Nothing to Disclose
Patrick McLaughlin FFR(RCSI) : Nothing to Disclose
Savvas Nicolaou MD : Nothing to Disclose

TEACHING POINTS

1. To review the epidemiology, pathophysiology and classification of traumatic injuries to the pancreas.
2. To review key radiological findings in traumatic injuries of the pancreas including findings on MDCT and MRCP.
3. To discuss the management of traumatic pancreas injuries, including algorithms based on imaging findings.

TABLE OF CONTENTS/OUTLINE

- Discuss the epidemiology and pathophysiology of traumatic pancreas injuries.
- Review the imaging modalities available for imaging abdominal trauma, with emphasis on MDCT as the initial modality of choice.
- Explain the AAST grading scheme of pancreatic injuries using MDCT.
- Illustrate key findings of pancreatic trauma seen on MDCT and MRCP.
- Discuss an imaging based algorithm for the management of traumatic injuries to the pancreas including the role of curved planar minimal intensity reconstructions as well as secretin and Eovist enhanced cholangiopancreatography.

ERE187

Costal Cartilage Injuries in Acute Trauma—An Overlooked Injury

Education Exhibits
Location: ER Community, Learning Center

Participants
Matthew Brennan OBrien MD (Presenter): Nothing to Disclose
Daniel Thomas Myers MD : Nothing to Disclose
David L. Spizarny MD : Nothing to Disclose

TEACHING POINTS

1. Costal cartilage injuries are uncommon injuries and may easily be overlooked.
2. Costal trauma commonly occurs in three locations: costal cartilage attachment to the ossified rib end, costosternal/costomanubrial attachment and in the midportion of the cartilage.
3. Greater awareness of spectrum of injuries and their appearances will lead to greater recognition of this uncommon traumatic injury.

TABLE OF CONTENTS/OUTLINE

- Diagramatic anatomy of the costal cartilages
- Normal senescent change
- Classification scheme of injury
- Sites of injury (costal cartilage attachment, costosternal attachment, central cartilaginous injury)
- Types of injury (separation at cartilaginous attachment, complete fracture)
- Review of spectrum of costal cartilage injuries with emphasis on pictorial examples seen on CT for Trauma
- Relationship to American Association of Surgery for Trauma Chest Wall Trauma Score
- Complications including flail chest and lung herniation
- Mimics of injury / Pitfalls
- Summary

ERE188

Temporal Bone Trauma: Maneuvering through the Maze!

Education Exhibits
Location: ER Community, Learning Center

Participants
TEACHING POINTS

- Temporal bone flaunts a complex anatomy with multiple osseous components. It houses various important neural and vascular structures along with the auditory apparatus. Trauma to the temporal bone poses a risk to all these structures.
- Temporal bone fractures may present with hearing loss, balance dysfunction, CSF leaks, nerve palsies, life threatening vascular injuries etc.
- Evolution of Multi-detector CT has revamped the imaging of temporal bone with fast imaging speed, better resolution, multi-planar reformations and hence improved detection ability. Thus, it has now become mandatory for a radiologist to be well acquainted with the anatomy and imaging of temporal bone.

TABLE OF CONTENTS/OUTLINE

- Anatomy of the temporal bone would be discussed in detail.
- Imaging protocol with the normal CT anatomy would be illustrated with relevant images.
- Various classification systems of the temporal bone fractures would be discussed with their clinical relevance.
- The types of fractures that would be discussed - o Longitudinal, transverse and mixed type of fractures o Fractures violating or sparing the otic capsule o Petrous or non-petrous fractures
- Fracture mimics in temporal bone would be illustrated, to acquaint the radiologists with the possible false positives; like the intrinsic fissures, extrinsic fissures and the intrinsic channels.

ERE189
Avoiding Fracture Overcalls: Tips for On-Call Residents

Education Exhibits
Location: ER Community, Learning Center

Participants
- George Athanasatos MD (Presenter): Nothing to Disclose
- Yousef Yasin MD: Nothing to Disclose
- Bahram Kiani MD: Nothing to Disclose
- Scott David Wurzter MD, MS: Nothing to Disclose
- Leon Lenchik MD: Nothing to Disclose

TEACHING POINTS

1. The goal of every on-call resident is to avoid missing fractures, but the importance of avoiding fracture overcalls should be equally emphasized.
2. Increased awareness of the types of overcalls and their common locations will help reduce their number.
3. Avoiding fracture overcalls may help reduce unnecessary cross-sectional imaging, relieve patient anxiety, and decrease unwarranted treatment.

TABLE OF CONTENTS/OUTLINE


ERE190
Imaging of Traumatic Peripheral Nerve Injuries

Education Exhibits
Location: ER Community, Learning Center

Magna Cum Laude

Participants
- Yoshimi Endo MD (Presenter): Nothing to Disclose

TEACHING POINTS

1. To review the normal appearance of peripheral nerves on MRI and ultrasound.
2. To describe the imaging features of traumatically injured nerves on MRI and ultrasound.
3. To understand the strengths and limitations of each modality for evaluating peripheral nerves.

TABLE OF CONTENTS/OUTLINE

1. Normal appearance of peripheral nerves on MRI and ultrasound.
2. Introduction to major categories of nerve injuries: Neurapraxia, axonotmesis, neurotmesis
3. Imaging features of traumatically injured nerves, including appearance on dynamic ultrasound: - Nerve transections - End-bulb/stump neuromas - Post-traumatic neuritis
4. Nerve injuries in sports and non-penetrating trauma.
5. Predicting which nerve injury may benefit from surgical intervention and the need for clinical correlation.

ERE192
MDCT of Blunt Mandibular Trauma

Education Exhibits
Location: ER Community, Learning Center
Participants

David Dreizin MD (Presenter): Nothing to Disclose
Krystal Archer-Arroyo MD: Nothing to Disclose
Nikki Tirada MD: Nothing to Disclose
Thorsten Roger Fleiter MD: Nothing to Disclose
Felipe Munera MD: Nothing to Disclose
Deborah Stein MD, PhD: Nothing to Disclose
Stuart E. Mirvis MD: Nothing to Disclose

TEACHING POINTS

After completing this exhibit, viewers will be able to... List the most common patterns of bilateral mandibular fractures in blunt trauma. Explain the importance of basal triangles and alveolar fracture components in determining appropriate management. Describe findings that warrant tooth extraction in dentolaveolar trauma.

TABLE OF CONTENTS/OUTLINE

1. Anatomy and biomechanics
   - Mechanisms of injury
   - Goals of treatment: occlusional and osseous reduction
   - Different surgical approaches for different segment fractures
   - Biomechanics: lines of tension and compression
2. Common fracture patterns
   - Single fractures
   - Multiple unilateral fractures
   - Multiple bilateral fractures
   - Basal triangles
   - Alveolar fracture segments
   - Comminuted fractures
3. Teeth in the line of fracture
   - Closed vs open/contaminated
   - Open/contaminated: Antibiotics vs extraction
4. Indications/contraindications for extraction
5. Atypical/uncommon fracture patterns
   - Isolated coronoid fractures
   - Special considerations in edentulous atrophic fractures
6. Complications
   - Nerve injuries
   - Aspirated teeth
   - Risk factors for osteomyelitis
   - Risk factors for malunion/non-union
   - TMJ Ankylosis

ERE193

Radiographic Assessment of Osseous Fixation Pathways in Pelvic and Acetabular Fractures

Education Exhibits
Location: ER Community, Learning Center

Participants

Nicholas Marc Beckmann MD (Presenter): Nothing to Disclose
Susanna Claire Spence MD: Nothing to Disclose
Manickam Kumaravel MD, FRCR: Nothing to Disclose

TEACHING POINTS

1) Describe the osseous fixation pathways (OFPs) used for percutaneous fixation of pelvic and acetabular fractures
2) Demonstrate the optimal radiographic views for assessing hardware placement in each OFP
3) Discuss general clinical indications for use of each OFP

TABLE OF CONTENTS/OUTLINE

Discussion of evolution of percutaneous pelvic fixation and osseous fixation pathways (OFPs)
Discussion of osseous anatomy of the pelvis using 3D volume rendered and virtual radiograph CT images
Discussion of indications for percutaneous pelvic fixation instead of traditional open fixation
Discussion of intra-operative fluoroscopic assessment of pelvic stability and percutenous screw placement for the major pelvic OFPs:
   - Anterior column
   - Inferior pubic ramus AIIS to posterior ilium
   - Gluteus medius pillar
   - Iliac crest
   - Posterior acetabular column
   - Sacroiliac Sacral
   - Discussion of radiograph and CT assessment of percutaneous pelvic fixation and examples of appropriately and malpositioned hardware in pelvic OFPs

ERE194

Radiographic Spectrum of Lisfranc Injuries of the Foot

Education Exhibits
Location: ER Community, Learning Center

Participants

Suresh Cheekatla MBBS (Presenter): Nothing to Disclose
Nagaramesh Chinapuvvula MBBS: Nothing to Disclose

TEACHING POINTS

1. Anatomy of the lisfranc joint.
3. What to look for on radiographs?

TABLE OF CONTENTS/OUTLINE

1. Anatomy of the lisfranc joint.
3. Clinical signs of lisfranc injury.
4. What are the radiographic views?
5. What to look for on radiographs?
6. What is the role of CT and MRI?
   a) Total Incongruity- Type A.
   b) Partial Incongruity- Type B1, Type B2.
   c) Divergent- Type C1, Type C2.
8. Treatment and postoperative appearance.

ERE195

Traumatic Finger Injuries: What the Orthopedic Surgeon Wants to Know

Education Exhibits
Location: ER Community, Learning Center

Magna Cum Laude
Participants
Ged G. Wieschhoff MD: Nothing to Disclose
Scott Sheehan MD: Nothing to Disclose
Jeremy Robert Wortman MD (Presenter): Nothing to Disclose
George Dyer: Nothing to Disclose
Aaron D. Sodickson MD, PhD: Research Grant, Siemens AG
Ketankumar L. Patel MBBS: Nothing to Disclose
Bharti Khurana MD: Nothing to Disclose

TEACHING POINTS
1) Knowledge of the biomechanics of the most common traumatic finger injuries. 2) Understanding of the classification and grading systems used by orthopedic surgeons for traumatic finger injuries. 3) What the orthopedic surgeons need in imaging interpretation to guide effective management.

TABLE OF CONTENTS/OUTLINE
1) Review the relevant anatomy of the fingers using multiple imaging modalities including radiographs, CT, MRI, and 3D modeling. 2) Illustrate the common mechanisms of traumatic finger injury, utilizing 3D modeling and animation. 3) Review the most commonly encountered osseous and soft tissue injury patterns seen in traumatic finger injuries. 4) Describe the classification systems of finger injuries most commonly used by orthopedic surgeons. 5) Case based review of common traumatic injuries in multiple imaging modalities.

ERE196
"A Stab in the Dark"—Review of Multidetector CT Imaging Findings in Penetrating Diaphragmatic Injury and Correlation with Clinical Outcome: A Level 1 Trauma Centre Perspective

Education Exhibits
Location: ER Community, Learning Center

Participants
Sadaf Javed MBBS (Presenter): Nothing to Disclose
Mohammed Rashid Akhtar MBBS, BSc: Nothing to Disclose
Susan Cross MBChB, FRCP: Nothing to Disclose

TEACHING POINTS
1) To illustrate the importance of multidetector CT in delineation of diaphragmatic rupture in Penetrating Trauma
2) The CT signs in penetrating diaphragmatic injury can be subtle. We will demonstrate key findings along with potential pitfalls.

TABLE OF CONTENTS/OUTLINE
1) PATHOPHYSIOLOGY OF INJURY 2) CLINICAL SIGNS AND SYMPTOMS IN DIAPHRAGMATIC INJURY 3) RADIOLOGICAL FINDINGS INDICATIVE OF INJURY TO DIAPHRAGM - CXR - US - CT 4) ACCURACY OF INDIVIDUAL CT SIGNS ACCORDING TO THE LITERATURE 5) OUR EXPERIENCE 6) METHODS - RETROSPECTIVE STUDY LOOKING AT SURGICALLY CONFIRMED CASES OF DIAPHRAGMATIC INJURY - WAS DIAPHRAGMATIC INJURY PICKED UP ON CT (REPORTED INDEPENDENTLY BY 2 RADIOLOGISTS) - WHICH SIGNS WERE MOST USEFUL 7) RESULTS 8) CONCLUSIONS INCLUDING SENSITIVITY AND SPECIFICITY

ERE197
Multisystemic Imaging Findings Associated with Near-fatal Drowning

Education Exhibits
Location: ER Community, Learning Center

Participants
Daniel Ocazionez MD (Presenter): Nothing to Disclose
Carlos S. Restrepo MD: Nothing to Disclose
Achint K. Singh MD: Nothing to Disclose
Carolina Ortiz-Lopez MD: Nothing to Disclose
Gregory Kicska MD, PhD: Nothing to Disclose
J. David Godwin MD: Shareholder, Cardiac Insight

TEACHING POINTS
1. Lower cervical spine injuries (involving C4 through C7) are particularly prevalent in near-fatal drowning victims when the predominant mechanism of injury was diving. 2. The most common pulmonary CT findings in near-fatal drowning consist of diffuse, hazy groundglass and alveolar opacities throughout the bilateral lungs, with sparing of the most lateral, apical and basilar regions, coalescing in the perihilar and medial lung zones. 3. The most common abdominal CT finding in near-fatal drowning is a distended stomach, with increased amount of gastric fluid which can have increased attenuation reflecting aspirated sand or sediment.

TABLE OF CONTENTS/OUTLINE

ERE198
Spectrum of Findings of Hypovolemic Shock Complex in Severe Blunt Trauma seen on Whole-Body MDCT

Education Exhibits
Participants

Cathy Zhang (Presenter): Nothing to Disclose
David Tso MD: Nothing to Disclose
Patrick McLaughlin FFR(RCSI): Nothing to Disclose
Silvia D. Chang MD: Nothing to Disclose
Savvas Nicolaou MD: Nothing to Disclose

TEACHING POINTS

1. Recognize MDCT signs of hypovolemic shock complex in the setting of blunt trauma. 2. Highlight the importance of early detection and significance of the findings in the management of patients that present to the emergency department. 3. Review of the literature of prevalence of radiological findings in shock.

TABLE OF CONTENTS/OUTLINE

1. Review the pathophysiology of hypovolemic shock and its main etiology in trauma 2. Discuss the findings on MDCT imaging:
   • Bowel wall thickening and enhancement (i.e. shock bowel)  
   • Presence of intraperitoneal or retroperitoneal free fluid  
   • Abnormal enhancement of solid organs including pancreas, spleen, liver, kidneys, and adrenal glands  
   • Edema surrounding the peri-hepatic IVC (i.e. halo sign)  
   • Flattening of IVC and aorta  
   • Acute contrast extravasation 3. Highlight the management of patient who present to the emergency department with positive findings to suggest hypovolemic shock.

ERE199
Out of Radiologist’s Sight: Sacral Fractures and Lumbosacral Dissociation

Education Exhibits

Location: ER Community, Learning Center

Participants

Yan Epelboym MD, MPH (Presenter): Nothing to Disclose
Scott Sheehan MD: Nothing to Disclose
Michael Weaver MD: Nothing to Disclose
Aaron D. Sodickson MD, PhD: Research Grant, Siemens AG
Bharti Khurana MD: Nothing to Disclose

TEACHING POINTS

1. Understanding of the pathophysiology of sacral fractures 2. Understanding of the spectrum of sacral fractures and lumbosacral dissociation 3. Relevant imaging findings for the orthopedic surgeon to guide effective treatment.

TABLE OF CONTENTS/OUTLINE

1. Review the relevant anatomy of the sacrum in multiple imaging modalities 2. Illustrate the common mechanism of sacral injury utilizing 3D modeling and animation 3. Illustrate the most commonly encountered sacral fractures 4. Describe the classification systems of lumbosacral junction injuries and sacral fractures 5. Case based review of sacral fractures and lumbosacral junction injuries.

ERE202

Updated and Novel Imaging of Blunt Vascular Neck Injuries (BVNI)

Education Exhibits

Location: ER Community, Learning Center

Participants

Teresa I-Han Liang MD (Presenter): Nothing to Disclose
Shamir Rai BSC: Nothing to Disclose
William Chun Ki Lau MD: Nothing to Disclose
Savvas Nicolaou MD: Nothing to Disclose

TEACHING POINTS

1. Discuss scope, clinical presentation and rationale for screening of Blunt vascular neck injuries (BVNI) 2. Discuss the imaging modalities and spectrum of imaging findings used for diagnosis of BVNI 3. Review novel imaging techniques which have been introduced for dose reduction imaging of BVNI.

TABLE OF CONTENTS/OUTLINE

- Review the pathophysiology, epidemiology, anatomy, and clinical presentation of BVNI  
- Review the utility and limitations of imaging modalities used for assessment of BVNI such as ultrasound, angiography, MRI and MR angiography, with emphasis on MDCT as the main imaging modality  
- Demonstrate the spectrum of imaging examples of BVNI including minimal intimal injury, raised intimal flap, pseudoaneurysm, occlusion and transection with contrast extravasation  
- Review the imaging classification system of BVNI with imaging examples  
- Discuss an imaging-based management algorithm for evaluation, management and follow-up of BVNI  
- Review imaging examples of pitfalls and mimics associated with BVNI such as streak artifacts and fibromuscular dysplasia  
- Discuss new imaging techniques applicable for imaging of BVNI including use of new dose reduction techniques such as iterative reconstruction and dual-energy CT.

GIE001-b
Contrast Enhanced Ultrasound of the Spleen. How to do it. What to Expect of It

Education Exhibits

Location: GI Community, Learning Center

Participants
TEACHING POINTS

Basic steps for performing a Contrast Enhanced Ultrasound (CEUS) examination of the spleen. Explanation of normal haemodynamic behaviour post injection of the contrast agent. Description of underlying pathophysiology of the commonest pathologic entities of the spleen, with imaging examples on CEUS, compared to B-mode and Colour Doppler US, as well as CT or MR when available.

TABLE OF CONTENTS/OUTLINE

Different chapters of the presentation include review of splenic anatomy, contrast agents physics and description of technical parameters in order to perform a successful CEUS examination, as well as analysis of contrast circulation through the spleen. The commonest pathologic conditions of the spleen are reviewed with imaging examples on B mode, Colour Doppler and CEUS, correlated with CT or MR when these were performed. CEUS indications, contraindications, limitations and pitfalls are also mentioned.

GIE002-b
Sonography of the Gastrointestinal Tract Abnormalities

Education Exhibits
Location: GI Community, Learning Center

Participants
Dal Mo Yang : Nothing to Disclose
Hyun Cheol Kim : Nothing to Disclose
Sang Won Kim MD (Presenter): Nothing to Disclose
Woo Jin Yang : Nothing to Disclose
Kyung Jin Lee MD : Nothing to Disclose

TEACHING POINTS
1. An awareness of the sonographic appearance of diseases of the intestine is essential to achieve the proper diagnosis. 2. Familiarity with the sonographic appearances of diseases that affect the intestine may allow specific diagnosis based on the degree and distribution of bowel wall thickening and associated changes of perienteric tissues.

TABLE OF CONTENTS/OUTLINE
Normal anatomy of bowel wall Sonographic techniques Review of imaging findings Sample cases -infectious and inflammatory diseases (appendicitis, crohn’s disease, ulcerative colitis, tuberculosis enterocolitis, diverticulitis, terminal ileitis, typhilitis, epiploic appendagitis, pseudomembranous colitis and syphilis) -ischemic disease, intussusception, -benign tumors -malignant tumors (malignant GIST, lymphoma, carcinoma, neuroendocrine tumors and metastases) -intramural hematoma.

GIE003-b
The Technology for Colon Distention in CT Colonography—Insufflation Method to Obtain Constantly a Good Distention of Colon

Education Exhibits
Location: GI Community, Learning Center

Participants
Masahiro Suzuki (Presenter): Nothing to Disclose
Takashi Sakamoto MD : Nothing to Disclose
Jun Torii RT : Nothing to Disclose
Michihiko Yamasaki : Nothing to Disclose
Yushi Hirano : Nothing to Disclose
Tomohiko Aso RT : Nothing to Disclose
Noriyuki Moriyama MD, PhD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1:To review the colon distention technology of CT Colonography (CTC). 2:To discuss the relationship between the conventional insufflation and the new “two steps insufflation”. 3:To explain the insufflation method of colon distention in order to achieve a high quality CT Colonography.

TABLE OF CONTENTS/OUTLINE
1:Relationship between the colon distention and the insufflation. 2:Anatomy of colon needed to distend the colon. 3:Steps necessary for re-positioning along the shape of the colon. 4:Visual assessment of the distention degree by means of a three-dimensional image. a:Conventional insufflation. b:2 steps insufflation. 5:Benefits of the colon distention utilizing the new insufflation method.

GIE004-b
An MRCP-guided Trip through Pancreatobiliary Normal Anatomy and Anatomical Variants

Education Exhibits
Location: GI Community, Learning Center

Participants
TEACHING POINTS
To describe the MRCP (magnetic resonance cholangiopancreatography) technique used in our department To review and illustrate the MR features of normal biliary and pancreatic ductal anatomy and the possible anatomical variants that may occur.

TABLE OF CONTENTS/OUTLINE
There are several anatomical variants of the biliary and pancreatic ducts. Though these are not usually relevant or pathological per se, they can be of ultimate importance hepatobiliary or gallbladder interventional procedures. MRCP, a non-invasive, and ionizing radiation-free technique, has replaced ERCP as the modality of choice to diagnose pancreatobiliary tract conditions as it allows ductal anatomy recognition as well as potential anomalies of the adjacent structures, without possible ERCP complications like pancreatitis, hemorrhage, bowel perforation or infection. In this paper, we provide a review of MRCP’s role on the identification of normal anatomy and anatomical variants of the biliary and pancreatic ducts.

GIE005-b
Iatrogenic Bile Duct Injuries: Diagnosis and Management

Education Exhibits
Location: GI Community, Learning Center

Participants
Dae Jung Kim MD (Presenter): Nothing to Disclose

TEACHING POINTS
(1) To review bile duct injury after surgery (2) To review bile duct injury after transarterial chemoembolization (3) To review management of bile duct injuries

TABLE OF CONTENTS/OUTLINE
1. Biliary injuries, related to the biliary tract surgery (a) Classification system for bile duct injuries Bismuth-Corlette classification, Strasberg classification, Stewart-Way classification (b) Diagnostic techniques (c) Complication of bile leakage - biliary fistula, biloma, bile ascites, bile peritonitis (d) Complication of bile stricture (e) Management 2. Biliary injuries, related to the biliary tract surgery (a) Mechanism and Patterns of bile duct injuries (b) Diagnostic techniques (c) Complication of bile leakage - biliary fistula, biloma, bile ascites, bile peritonitis (d) Complication of bile stricture (e) Management

GIE006-b
There’s More than Stones. An Ultrasound Pictorial Review of Gallbladder and Bile Ducts Normal Variants and Pathology

Education Exhibits
Location: GI Community, Learning Center

Participants
Demosthenes D. Cokkinos MD (Presenter): Nothing to Disclose
Eleni Antypa : Nothing to Disclose
Konstantinos Iosifidis MD : Nothing to Disclose
Fani Dimitroyli MD : Nothing to Disclose
Aikaterini Pavlopoulou : Nothing to Disclose
Ploutarhos A Piveropoulos MD, PhD : Nothing to Disclose

TEACHING POINTS
To present an atlas of the diverse normal variants and abnormal findings related to the gallbladder and bile ducts imaged with ultrasound (US).

TABLE OF CONTENTS/OUTLINE
Different normal variants of the gallbladder and bile ducts on sonography: Heister spiral valves, septate gallbladder, Phrygian cap, duplication, gallbladder diverticulum etc. Common and uncommon pathological conditions, including gallstones, biliary sludge, heaptisation, haemobilia, acute, chronic and emphysematous cholecystitis, wall rupture, adenomyomatosis, wall oedema, polyps, mural tumours, porcelain gallbladder, cholangiocarcinoma, bile duct dilatation due to various reasons etc. Brief review of pathophysiology and sonographic appearance of all entities. Images on B-mode and Colour Doppler US, as well as Contrast Enhanced US and CT when available.

GIE007-b
Focused US of Gallblader: Technique, Differential Points and Pitfalls

Education Exhibits
Location: GI Community, Learning Center

Participants
Song-Ee Baek MD (Presenter): Nothing to Disclose
Yong Eun Chung MD, PhD : Nothing to Disclose
Jae Young Lee MD : Nothing to Disclose
Hye-Jeong Lee MD : Nothing to Disclose
Myeong-Jin Kim MD, PhD : Nothing to Disclose

TEACHING POINTS
1. To review techniques of focused US of gallblader (GB)
2. To explain differential US findings of GB wall thickening among adenomyomatosis, cholecystitis and cancer
3. To discuss differential points of benign and neoplastic GB polyp

TABLE OF CONTENTS/OUTLINE
Outline 1. Techniques of focused GB US: selecting probes and optimizing parameters 2. Differential US findings of GB wall thickening: Rokitansky-aschoff sinus (RAS), cholesterol crystal, comet tail artifact, twinkling artifact, preservation of GB wall layer 3. How can we diagnose neoplastic polyp: size, multiplicity, echogenicity, shape, growth rate 4. Strong point and weakness of trans-abdominal GB US, compared to endoscopic US 5. Typical cases and mimickers The major teaching points of this exhibit are: 1. US is a still powerful tool for diagnosis of GB disease 2. GB wall thickening with RAS, cholesterol crystal and preservation of GB wall layer suggest adenomyomatosis rather than GB cancer 3. A single polyp with hypechogenicity, larger than 1cm and sessile shape may have higher chance to be confirmed as neoplastic polyp.

GIE008-b
What Radiologists Should Know about Colorectal Cancer Operation: High Tie versus Low Tie of the Inferior Mesenteric Artery and Inferior Mesenteric Vein

Education Exhibits
Location: GI Community, Learning Center

Participants
Seong Eun Ko (Presenter): Nothing to Disclose
Suk Keu Yeom MD : Nothing to Disclose
In Young Choi : Nothing to Disclose
Sang Hoon Cha MD : Nothing to Disclose
Seung Wha Lee : Nothing to Disclose
Hwan Hoon Chung : Nothing to Disclose
Ki Yeol Lee MD, PhD : Nothing to Disclose

TEACHING POINTS
1. To review the surgical options in colorectal cancer; High tie versus low tie vascular ligation of the inferior mesenteric artery and inferior mesenteric vein 2. To review the clinical importance of the anatomy variance of inferior mesenteric artery and inferior mesenteric vein in relation to the surgical options.

TABLE OF CONTENTS/OUTLINE
1. Normal anatomy and its variant of inferior mesenteric artery and inferior mesenteric vein on 3D reconstructed CT scan 2. High tie versus low tie ligation of inferior mesenteric artery and inferior mesenteric vein in colorectal cancer surgery (1) According to vascular anatomy (2) Tumor location (3) Lymph node dissection level (4) Associated complication 3. What surgeons need to know before the colorectal cancer operation?

GIE009-b
Jejunal Crohn’s Disease at CT and MR Enterography: Appearance, Implications and Differential Diagnosis

Education Exhibits
Location: GI Community, Learning Center

Participants
Gregory J. Hanson (Presenter): Nothing to Disclose
John M. Barlow MD : Nothing to Disclose
Amy B. Kolbe MD : Nothing to Disclose
Jeff L. Fidler MD : Nothing to Disclose
David Bruning MD : Research Grant, Given Imaging Ltd Consultant, Bracco Group
Stephanie Hansel MD : Research support, Given Imaging Ltd Research support, Salix Pharmaceuticals, Inc
Mahmoud Mouhamad Al-Hawary MD : Nothing to Disclose
Mark E. Baker MD : Research Consultant, Bracco Group Researcher, Salix Pharmaceuticals, Inc
Joel Garland Fletcher MD : Grant, Siemens AG

TEACHING POINTS
1. Jejunal Crohn’s disease is frequently missed by radiologists, but is associated with worse outcomes (strictureplasties, surgeries). 2. Jejunal Crohn’s disease is characterized by asymmetric mural hyperenhancement, and wall and fold thickening. 3. Other small bowel pathologies often cause segmental hyperenhancement or wall thickening, including neutropenic and infectious enteritis, ulcerative jejunitis in celiac disease, ACE-related visceral angioedema, vasculitis, and systemic diseases such as mastocytosis. Examples of these entities will be shown with emphasis on unique diagnostic findings. 4. Correlation with serum markers, capsule and enteric and endoscopic findings often assist in the determining the cause of jejunal inflammation.

TABLE OF CONTENTS/OUTLINE
1. Review CT/MR appearance normal jejunum in different phases of enhancement. 2. Display numerous examples showing spectrum jejunal Crohn’s disease, emphasizing key imaging findings, and complementarity with optical imaging methods (e.g., capsule). 3. Review treatment options for and implications of jejural Crohn’s disease. 3. Display other pathologies causing jejunal hyperenhancement or mural thickening, with brief description and illustration of unique imaging features, as well as typical clinical history, and serologic and endoscopic findings.

GIE011-b
Gastrointestinal Stromal Tumor (GIST) with a Thousand Faces: Uncommon Manifestations and Causes of Misdiagnosis on CT

Education Exhibits
Location: GI Community, Learning Center
GIE012-b
Multimodal Imaging Findings of Small-bowel Disorders

Education Exhibits
Location: GI Community, Learning Center

Participants
Javier Vallejos MD, MBA (Presenter): Nothing to Disclose
Claudia Analia Alvarez MD: Nothing to Disclose
Carlos Capunay MD: Nothing to Disclose
Patricia M. Carrascosa MD: Research Consultant, General Electric Company

TEACHING POINTS
1. To determine the role of imaging modalities in evaluation of small bowel diseases. 2. To discuss various considerations in achieving small bowel distention and other technical issues. 3. To describe and illustrate imaging findings in the most common diseases, including Crohn disease, ulcerative colitis, celiac disease, small bowel tumors, and incidental findings.

TABLE OF CONTENTS/OUTLINE
Imaging modalities: Small-bowel barium CT enterography MR enterography Technical considerations: With or without enteroclysis Achieving small bowel distention With or without intravenous contrast material Imaging findings: Crohn disease Ulcerative colitis Celiac disease Small bowel tumors Incidental findings Additional considerations: Pitfalls Potential clinical impact Future directions

GIE013-b
“Appendicitis! Are You Really Alone?”: A Case-based Review of Imaging Findings of Tumors Presenting as Acute or Chronic Appendicitis

Education Exhibits
Location: GI Community, Learning Center

Participants
Yedaun Lee MD (Presenter): Nothing to Disclose
Hye Jin Baek: Nothing to Disclose
Kwanghi Lee: Nothing to Disclose
Seon-Jeong Kim MD: Nothing to Disclose
Jeong Hee Yoon MD: Nothing to Disclose

TEACHING POINTS
1. A variety of different tumors may present as appendicitis or periappendiceal abscess. 2. Recognition of imaging findings of tumorous appendicitis would help to avoid unnecessary emergent appendectomy and provide appropriate treatment.

TABLE OF CONTENTS/OUTLINE
1. Tumors presenting as acute appendicitis. 1) Acute appendicitis mimicking cancer 2) Tumors presenting as acute appendicitis - Infected mucinous neoplasm of appendix, Neuroendocrine tumor, Non-mucinous appendiceal cancer 2. Tumors masquerading as periappendiceal abscess 1) Chronic inflammatory condition mimicking cancer. - Periappendiceal abscess mimicking cancer, Chronic xanthogranulomatous appendicitis, Endometriosis, Actinomycosis 2) Tumors masquerading as periappendiceal abscess - Colon cancer (cecum, appendix), Ovarian cancer, Gastrointestinal stromal tumors, Lymphoma 3. Differential diagnosis between non-tumorous and tumorous appendicitis

GIE014-b
Acute Right Lower Quadrant Pain: Differential Diagnoses on Ultrasonography

Education Exhibits
Location: GI Community, Learning Center

Participants
Min-Jeong Kim (Presenter): Nothing to Disclose
TEACHING POINTS

1. To discuss the various US techniques in the evaluation of patients with acute right lower quadrant pain.
2. To identify key sonographic findings of normal appendix and acute appendicitis.
3. To list the other causes of right lower quadrant pain beyond appendicitis and describe their US findings.

TABLE OF CONTENTS/OUTLINE

1. US Techniques
   2. Normal appendix and Acute appendicitis
      1) US anatomy of appendix
      2) Appendicitis or Not: Key US findings
      3) Pitfalls of acute appendicitis: appendiceal diverticulitis, early appendicitis, distal appendicitis, retrocecal appendicitis, perforated appendicitis, spontaneously resolving appendicitis
   3. Other causes of RLQ pain
      1) Right colonic diverticulitis
      2) Ileal diverticulitis
      3) Infectious enterocolitis
      4) Inflammatory bowel disease
      5) Primary epiploic appendagitis
      6) Ommental infarction
      7) Mesenteric lymphadenitis
      8) Malignancy
      9) Miscellaneous: Urologic and gynecologic disease

GIE016-b

Preoperative High Resolution MRI Evaluation of Perianal Fistulas: Making the Difficult Easy by Combining Different Sequences and Image Processing

Education Exhibits

Location: GI Community, Learning Center

Participants

Miguel Eduardo Nazar MD (Presenter): Nothing to Disclose
Santiago Andres MD: Nothing to Disclose
Maria Florencia Grana MD: Nothing to Disclose
Ariel Oscar Vazquez MD: Nothing to Disclose
Lorena Alarcon MD: Nothing to Disclose
Eduardo Pablo Eyheremendy MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: To review anorrectal anatomy. To review the types of perianal fistulas and their complications. To describe high resolution MRI techniques for anorrectal evaluation using phased-array coil. To describe high resolution MRI findings of perianal fistulas and their complications. To show the usefulness of MRI to help surgical planning to minimize recurrence and detect clinically unapparent disease.

TABLE OF CONTENTS/OUTLINE

1. High resolution MRI protocol of anorrectal anatomy.
2. Anorrectal normal anatomy.
3. Pathological MRI findings of perianal fistulas and their complications.
4. New applications MRI techniques:
   1. Diffusion-weighted
   2. Fusion T2-w- DWI-w images
   3. Scan dynamics T1-w gradient echo with fat suppression with color map graph and time-intensity curves.

GIE017-b

Restaging of Rectal Carcinoma after Chemoradiation Therapy: High Resolution MRI with Pathologic Correlation after Total Mesorectal Excision

Education Exhibits

Location: GI Community, Learning Center

Participants

Santiago Andres MD (Presenter): Nothing to Disclose
Maria Florencia Grana MD: Nothing to Disclose
Miguel Eduardo Nazar MD: Nothing to Disclose
Giselle Romero Caimi MD: Nothing to Disclose
Nicolas Rotholz: Nothing to Disclose
Eduardo Pablo Eyheremendy MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: To review the normal rectal and mesorectal anatomy. To describe and compare the high-resolution MRI features of rectal carcinoma after chemoradiation treatment (CRT). To correlate MRI images with the histologic findings after total mesorectal excision (TME). To review TNM staging of rectal carcinoma. To review the high resolution MRI protocol for evaluation of rectal carcinoma using phased-array coil. To show the accuracy of MRI for assessment of rectal carcinoma staging after chemoradiation treatment.

TABLE OF CONTENTS/OUTLINE
High resolution MRI protocol Rectal and mesorectal normal anatomy Anatomical, morphological and signal intensity changes after chemoradiation therapy Pathological MRI findings with histopathological correlation Usefulness of MRI to help surgical planning to minimize recurrence and complications after surgery Importance of the correlation between MRI findings and pathological features to predict the clinical outcomes

**GIE018-b**

What Radiologists Need to Know and What Radiation Oncologists Want to Know about Anorectal Cancers: Critical Anatomic and Staging Distinctions that Affect the Use of Radiation Therapy for Anorectal Malignancies

*Education Exhibits*
*Location: GI Community, Learning Center*

**Participants**
- Shanna Matalon MD (Presenter): Nothing to Disclose
- Sreeharsha Tirumani MBBS, MD: Nothing to Disclose
- Harvey Mamon MD, PhD: Nothing to Disclose
- Nikhil H. Ramaiya MD: Nothing to Disclose
- Michael Hayden Rosenthal MD, PhD: Nothing to Disclose

**TEACHING POINTS**
1. Anatomic distinctions in the pelvis and perineum, such as the difference between mesorectal and internal iliac lymph nodes, can dramatically alter the staging and treatment of anorectal malignancies. 2. High rectal, low rectal, and anal cancers demonstrate different patterns of local, regional, and systemic dissemination. 3. Accurate reporting of the locations of suspicious lymph nodes is critical to the planning and delivery of radiation therapy.

**TABLE OF CONTENTS/OUTLINE**
- Anatomy of the anus, rectum, perineum, and pelvic nodal stations as seen on CT and MRI.
- Key anatomic landmarks from the anal margin to the rectosigmoid junction.
- Common histologic types of cancer that are found in each anatomic location with associated demographics and risk factors.
- TNM staging for anal and rectal cancers, with emphasis on the key distinctions between these two sites (e.g., differing definitions of regional lymph nodes, most notably the internal iliac and inguinal nodal stations).
- Roles of CT, MRI, and PET-CT in the initial staging of anorectal cancers and in radiation treatment planning.

**GIE019-b**

Abdominal and Pelvic Imaging of Complications to Systemic Cancer Therapy

*Education Exhibits*
*Location: GI Community, Learning Center*

**Participants**
- Rahul Anil Sheth MD (Presenter): Nothing to Disclose
- Debra Ann Gervais MD: Research Grant, Covidien AG

**TEACHING POINTS**
Imaging plays a pivotal role in the care of oncologic patients, not only for the monitoring of treatment response but also for the detection and management of treatment-related complications. Systemic chemotherapies result in a broad spectrum of complications, some of which are relatively unique to particular agents. In addition to assessing for treatment effects, radiologists should be attuned to these specific complication risks in cancer patients. In this exhibit, we will: 1. Review the common abdominal and pelvic imaging complications related to conventional systemic chemotherapy agents. 2. Highlight complications associated with newer molecularly targeted agents.

**TABLE OF CONTENTS/OUTLINE**
- Liver
  - Hepatic steatosis due to irinotecan
  - Hepatotoxicity due to oxaliplatin
  - "Pseudocirrhosis" due to treated hepatic breast cancer metastases
- Spleen
  - Splenic rupture due to granulocyte colony stimulating factor
- Pancreas
  - Pancreatitis due to L-asparaginase
  - Gastrointestinal tract
  - Collitis due to ipilimumab
  - Perforation due to bevacizumab
  - Enteritis due to 5-fluorouracil, capcitabine, and paclitaxel
- Benign pneumatosis
- Kidneys
  - Chronic renal failure/atrophy due to cisplatin and methotrexate
  - Bladder
    - Hemorrhagic cystitis due to cyclophosphamide
    - Neurogenic bladder due to vincristine

**GIE020-b**

Granulomatous Diseases in the Abdomen: A Pictorial Essay

*Education Exhibits*
*Location: GI Community, Learning Center*

**Participants**
- Gustavo Andres Maldonado Ramirez MD (Presenter): Nothing to Disclose
- Rocio Perez Johnston MD: Nothing to Disclose
- Luis Antonio Sosa MD: Nothing to Disclose
- Sergio A. Criares Vera MD: Nothing to Disclose
- Eric T. Kimura-Hayama MD: Nothing to Disclose

**TEACHING POINTS**
- A wide variety of granulomatous diseases can occur in the abdomen, involving multiple organs and systems. - Granulomatous diseases can be congenital, inflammatory and infectious. - This educational exhibit aims to highlight the different manifestations of granulomatous disease in the abdomen.

**TABLE OF CONTENTS/OUTLINE**
1. Review spectrum of pathology characteristics of granulomatous diseases. 2. Review different organs and systems affected by...
granulomatous diseases including gastrointestinal, hepatobiliary, urinary tract, mesentery and vascular. 3. Review pathology, clinical and imaging findings of chronic granulomatous disorders including: sarcoidosis, Crohn’s disease, xanthogranulomatous pyelonephritis and cholecystitis, actinomycosis and tuberculosis. 4. Understand the role of different imaging modalities and their impact on treatment decision and follow-up.

### GIE021-b

**Disease Spectrum of Abdominal Wall; Radiological Findings and Clinical Significance**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Seong Jin Park MD, PhD (Presenter): Nothing to Disclose
- Hyun Cheol Kim: Nothing to Disclose
- Sung Eun Ahn: Nothing to Disclose
- Sung Kyoung Moon: Nothing to Disclose
- Dong Ho Lee MD: Nothing to Disclose
- Joo Won Lim: Nothing to Disclose
- Han Na Lee MD: Nothing to Disclose

**TEACHING POINTS**

1. To review the pathophysiology of abdominal wall diseases causing various clinical presentations. 2. To describe the radiological findings of abdominal wall diseases, including ultrasonography, CT, MR, PET-CT. 3. To discuss the diagnostic tips of abdominal wall diseases during radiological trials.

**TABLE OF CONTENTS/OVERSEVIEW**

1. Anatomy of abdominal wall 2. Spectrum of abdominal wall diseases 1) Inflammation, including myositis, abscess, infected lymphangioma, 2) Abdominal wall hernia 3) Trauma, including hematoma, muscle tear 4) Vascular diseases 5) Tumors, including desmoid tumor, inflammatory myofibroblastic tumor, lymphoma, rhabdomyosarcoma, metastasis, and etc. 6) Miscellaneous 3. Radiological findings of abdominal wall diseases, including ultrasonography, CT, MR, PET-CT 4. Clinical significance 5. Discussion and summary

### GIE023-b

**Multimodality Imaging of Immunotherapy: What Every General Radiologist Should Know**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Angela Patricia Moreno MD (Presenter): Nothing to Disclose
- Jorge Andres Abreu MD: Nothing to Disclose
- Carolina Rumie Valois: Nothing to Disclose
- Andres Vasquez MD: Nothing to Disclose
- Julianna Ocampo MD: Nothing to Disclose
- Javier Andres Romero MD: Nothing to Disclose

**TEACHING POINTS**

1. Response Criteria in Solid Tumors or WHO criteria, designed to detect early effects of cytotoxic agents, may not provide a complete assessment of immunotherapeutic agents; 2. The appearance of measurable antitumor activity may take longer for immune therapies than for cytotoxic therapies; 3. Ipilimumab monotherapy has four distinct patterns of tumor response: a. shrinkage in baseline lesions, without new lesions; b. durable stable disease with no significant change in the size of the baseline lesions (in some patients followed by slow, steady decline in total tumor burden); c. Response after an increase in total tumor burden; and d. response in the presence of new lesions; 4. Ipilimumab produces a spectrum of immune-related adverse effects: enterocolitis, hypophysitis, hepatitis, dermatitis, myopathy, pancreatitis and nephritis; 6. Specific patterns of immune-related adverse events that are detectable radiologically should be recognized early and communicated to the clinician.

**TABLE OF CONTENTS/OVERSEVIEW**

Introduction Why not RECIST or WHO criteria? New criteria in the assessment of Immune related tumor response Types of response. Main differences with RECIST. Are they related with favorable survival? Adverse effects related with therapy. They can be recognized radiologically? Importance in the treatment surveillance. Conclusions.

### GIE024-b

**Assessment of Locoregional Cancer Therapy in the Liver—Complications and Pitfalls**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Dianna Yu Ning Yang DO (Presenter): Nothing to Disclose
- Noushin Vahdat MD: Nothing to Disclose
- Shetal N. Shah MD: Nothing to Disclose
- Namita Sharma Gandhi MD: Nothing to Disclose

**TEACHING POINTS**

1. Familiarize with available locoregional cancer therapy for primary and metastatic liver tumors. 2. Recognize the expected imaging findings and potential pitfalls after locoregional cancer therapy. 3. Recognize the common and the rare (but clinically significant) complications associated with locoregional therapy.

**TABLE OF CONTENTS/OVERSEVIEW**

1. Familiarize with available locoregional cancer therapy for primary and metastatic liver tumors. 2. Recognize the expected imaging findings and potential pitfalls after locoregional cancer therapy. 3. Recognize the common and the rare (but clinically significant) complications associated with locoregional therapy.
Introduction to locoregional therapy for primary and metastatic liver tumors: Radiation therapy Thermal Ablation Transcatheter Therapy Expected post treatment imaging findings Potential imaging pitfalls Post treatment complications

**GIE026-b**

**Correlation between Gadoxetic Acid Enhanced MR Imaging and Molecular/Genetic Background of Hepatocellular Carcinoma: Implication for Radiogenomics**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

Azusa Kitao (Presenter): Nothing to Disclose  
Osamu Matsui MD: Research Consultant, Kowa Company, Ltd Research Consultant, Otsuka Holdings Co, Ltd Research Consultant, Eisai Co, Ltd  
Toshiyuki Ogata: Nothing to Disclose  
Norio Hiyae: Nothing to Disclose  
Kazuto Koizumi: Nothing to Disclose  
Satoshi Kobayashi: Nothing to Disclose  
Dai Inoue: Nothing to Disclose  
Kotaro Yoshida: Nothing to Disclose  
Tetsuya Minami: Nothing to Disclose  
Wataru Koda: Nothing to Disclose

**TEACHING POINTS**

The purpose of this presentation is 1. To review that the hepatobiliary phase of gadoxetic acid enhanced MR imaging is a sensitive (indirect) molecular imaging reflecting expression of uptake transporter organic anion transporting polypeptide 1B3 (OATP1B3) in hepatocellular carcinoma (HCC). 2. To demonstrate that the signal intensity on hepatobiliary phase reflects biological and molecular/genetic characteristics of HCC. 3. To discuss the possibility of gadoxetic acid enhanced MR imaging for personalized medicine in HCC as an imaging biomarker from "radiogenomics" point of view.

**TABLE OF CONTENTS/OUTLINE**

1. Enhancement mechanism of gadoxetic acid enhanced MR imaging in HCC - Correlation between OATP1B3 expression and signal intensity - Changes in enhancement ratio and OATP1B3 expression in multistep hepatocarcinogenesis 2. Biological and molecular/genetic characteristics of hypointense (OATP1B3 under-expressed) HCC and hyperintense (OATP1B3 over-expressed) HCC - Clinical and pathological findings - Molecular and genetic analysis - Role of transcription factor hepatocyte nuclear factor (HNF) 4A in hepatocarcinogenesis 3. Usefulness of gadoxetic acid enhanced MR imaging for personalized medicine in HCC as an imaging biomarker expressing some specific molecular/genetic backgrounds (radiogenomics)

**GIE027-b**

**US-guided Percutaneous Radiofrequency Ablation of Liver Tumors; Comparison Among Various Imaging Modalities for the Evaluation of Technical Success**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

Sang Soo Shin MD (Presenter): Nothing to Disclose  
Jin Woong Kim MD: Nothing to Disclose  
Suk Hee Heo MD: Nothing to Disclose  
Hyo Soon Lim MD: Nothing to Disclose  
Yong-Yeon Jeong MD: Nothing to Disclose  
Heoung-Keun Kang MD: Nothing to Disclose

**TEACHING POINTS**

1. To overview the current status of imaging evaluation after US-guided radiofrequency ablation (RFA) of liver tumors. 2. To illustrate the role of CT, US, MR imaging in the assessment of results of RFA. 3. To suggest strengths and limitations of various imaging modalities in determining technical success of RFA.

**TABLE OF CONTENTS/OUTLINE**


**GIE028-b**

**WHO, EASL, RECIST 1.1 and mRECIST Criteria: A Case-based Pictorial Illustration on Key Differences in Radiologic Assessment of Response after Embolotherapy in Hepatocellular Carcinoma**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

Haq Wajid DO (Presenter): Nothing to Disclose  
Ram Kishore Reddy Gurajala MBBS, FRCR: Nothing to Disclose  
Dianna Yu Ning Yang DO: Nothing to Disclose  
Shetal N. Shah MD: Nothing to Disclose  
Amanjit Singh Gill MD: Nothing to Disclose
TEACHING POINTS
The goal is • To review multiple criteria that can be used to evaluate response to embolotherapy in hepatocellular carcinoma (HCC) • To highlight key differences between these criteria • To demonstrate varying impact these criteria can have

TABLE OF CONTENTS/OUTLINE
A. Background: An overview of tumor treatment response criteria by World Health Organization (WHO), the European Association for the Study of the Liver (EASL), and Response Evaluation Criteria in Solid Tumors - RECIST version 1.1 and modified RECIST (mRECIST) is presented. B. Highlight major differences: a. WHO and RECIST 1.0 and 1.1 are based on entire tumor size b. EASL and mRECIST are based only on viable residual tumor c. WHO and EASL are based on bi-dimensional measurements d. RECIST 1.1 and mRECIST are based on greatest uni-dimensional measurement C. Brief review on prognostic correlation between these criteria and HCC D. EASL and mRECIST a. Special significance in HCC b. Example cases: Like the one case shown in the images, based on the criteria used, residual tumor size and description of treatment response can vary. E. SUMMARY: With the prediction of viability depending on imaging, a consistent methodology adopted throughout the follow-up period will aid in better management of HCC.

GIE029-b
LI-RADS 2014 Technical Requirements for CT and MRI: A Primer for Radiologists

Education Exhibits
Location: GI Community, Learning Center

Participants
Avinash Ranez Kambadakone MD, FCR (Presenter): Nothing to Disclose
Dushyant V. Sahani MD : Research Grant, General Electric Company
An Tang MD : Speaker, Siemens AG Speaker, Boehringer Ingelheim GmbH
Amol Shah BS : Nothing to Disclose
Thomas Hope MD : Nothing to Disclose
Kathryn Jane Fowler MD : Research support, Bracco Group
Rajan T. Gupta MD : Consultant, Bayer AG Speakers Bureau, Bayer AG
Karthik Ganesan MBBS, MD : Nothing to Disclose
Hero Kamal Hussain MD : Consultant, Bayer AG
Claude B. Sirlin MD : Research Grant, General Electric Company Speakers Bureau, Bayer AG Consultant, Bayer AG

TEACHING POINTS
The purpose of this education exhibit on LI-RADS 2014 technical requirements for liver CT and MRI is: 1) to define and describe the recommended dynamic imaging phases, 2) to discuss the technical requirements and specifications for performance of CT/MRI of liver and review common technical challenges of optimal image acquisition, and 3) to compare and contrast the LI-RADS 2014 technical requirements with the recent OPTN imaging policy 3.6.4.4.

TABLE OF CONTENTS/OUTLINE

GIE030-b
Postoperative Anatomic and Pathologic Findings at Multi-detector CT Following Pancreaticoduodenectomy

Education Exhibits
Location: GI Community, Learning Center

Participants
Jin Woong Kim MD : Nothing to Disclose
Sang Soo Shin MD : Nothing to Disclose
Suk Hee Heo MD : Nothing to Disclose
Sung Mo Kim (Presenter): Nothing to Disclose
Hyo Soon Lim MD : Nothing to Disclose
Yong-Yeon Jeong MD : Nothing to Disclose
Heoung-Keun Kang MD : Nothing to Disclose

TEACHING POINTS
1. To understand postoperative anatomy after pancreaticoduodenectomy with multi-detector CT (MDCT) 2. To review and illustrate the spectrum of postoperative complications after pancreaticoduodenectomy 3. To correlate MDCT findings with surgical grading of pancreatic fistula

TABLE OF CONTENTS/OUTLINE

GIE031-b
Beyond the Whipple Resection: What the Radiologist Needs to Know about the Multimodality Imaging of Borderline Resectable, Locally Advanced, and Metastatic Pancreatic
Adenocarcinomas

Education Exhibits
Location: GI Community, Learning Center

Participants
John Webster Gilbert MD (Presenter): Nothing to Disclose
Atul Bhanudas Shinagare MD : Nothing to Disclose
Jyothi Priya Jagannathan MD : Nothing to Disclose
Brian M Wolpin MD : Nothing to Disclose
Nikhil H. Ramaiya MD : Nothing to Disclose
Michael Hayden Rosenthal MD, PhD : Nothing to Disclose

TEACHING POINTS
- About 70% of patients with pancreatic cancer present with locally advanced or metastatic disease, and another 5-10% have borderline resectable cancer. These three classes of pancreatic cancer undergo distinct treatments and demand different areas of vigilance on the part of the radiologist. - Neoadjuvant therapy for borderline resectable tumors is performed with goal of resection and potential cure; locally advanced and metastatic tumors are treated for local control and palliation.

TABLE OF CONTENTS/OUTLINE
- Review of normal anatomy of the pancreas and nearby structures relevant to staging with correlation on CT and MRI, including discussion of optimum imaging technique - Review of TNM staging system for pancreatic adenocarcinoma (AJCC 7th ed) - Overview of classes of non-resectable pancreatic cancer (borderline resectable, locally advanced, metastatic) and current staging methods - Illustration of common and uncommon pathways of tumor spread and sites of metastases with multimodality imaging - Discussion of treatment options defined by extent of disease, including roles of chemotherapy, molecular targeted therapy, and radiotherapy - Case-based review of side effects, complications, and treatment response.

GIE032-b
Postoperative CT Findings after Pancreatic Head Resection: Normal CT Anatomy and Complications

Education Exhibits
Location: GI Community, Learning Center
Cum Laude

Participants
Ji Won Seo MD (Presenter): Nothing to Disclose
Minwook Lee MD : Nothing to Disclose
Ki Whang Kim MD : Nothing to Disclose
Yong Eun Chung MD, PhD : Nothing to Disclose
Myeong-Jin Kim MD, PhD : Nothing to Disclose
Hye-Jeong Lee MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To review the surgical technique of pancreatic head resection To understand the postoperative CT anatomy according to surgical techniques To review CT findings of postoperative complication The major teaching points of this exhibit are: Understand the postoperative CT anatomy to various surgical techniques Linear fluid collection at the pancreaticojejunostomy site does not suggest pancreatic fistula or bile leak Fistula formation between pancreaticojejunostomy site and adjacent fluid collection may suggest bile leak

TABLE OF CONTENTS/OUTLINE
1. Illustration of surgical techniques of pancreatic head resection A. Type of pancreatic head resection - Whipple’s operation - Pylorus-preserving pancreaticojejunostomy B. Anastomosis methods of the remnant pancreas - Duct-to-mucosa pancreaticojejunostomy - End-to-side or end-to-end pancreaticojejunostomy - Pancreatocigastrostomy - Closing remnant pancreatic duct 2. Normal postoperative findings according to the surgical techniques 3. Imaging findings of post-operative complications - Pancreatic fistula, fluid collection, acute pancreatitis, hemorrhage, delayed gastric emptying, enteric fistula

GIE033-b
Complications of Peritoneal Dialysis in Patients with Chronic Kidney Disease: Imaging Features

Education Exhibits
Location: GI Community, Learning Center

Participants
Jong-Young Oh (Presenter): Nothing to Disclose
Kyung Jin Nam MD : Nothing to Disclose
Jaehyung Park : Nothing to Disclose
Hee-Jin Kwon MD : Nothing to Disclose
Jin Han Cho : Nothing to Disclose
Dong Won Kim : Nothing to Disclose
Dong Ho Ha MD, PhD : Nothing to Disclose

TEACHING POINTS
1. Learning what kinds of complications can occur in patients with peritoneal dialysis 2. Recognition of the characteristic imaging findings of peritoneal dialysis related complications 3. Understanding of the pathophysiology of peritoneal dialysis related complications

TABLE OF CONTENTS/OUTLINE
Classification of peritoneal dialysis related complications Pathophysiology and clinical features Review of multimodality imaging findings Sample cases and mimics Summary
**GIE034-b**

**Danger! Have You Missed a Desmoid Tumour? Pictorial Review of Cross-Sectional Imaging**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Amanda Cheng MBBS : Nothing to Disclose  
Sarah Eljamel MBChB (Presenter): Nothing to Disclose  
Stephen John Glancy MBChB : Nothing to Disclose  
Li Foong Wong BMedSc, MBBS : Nothing to Disclose  
Malcolm Dunlop MBChB : Nothing to Disclose

**TEACHING POINTS**

- Pathogenesis and clinical features of abdominal desmoid tumours.  
- Emphasis on MRI in diagnosis, assessment of complications and disease follow-up.  
- Subtle imaging features raising suspicion of a DT.  
- Spectrum of imaging appearances.

**TABLE OF CONTENTS/OUTLINE**

Background: Abdominal desmoid tumours (DTs) are rare, benign fibromatous neoplasms occurring sporadically or in relation to familial syndromes. Despite lacking malignant potential, DTs cause significant morbidity and mortality via local invasion and compressive effects upon adjacent organs. DTs are notoriously challenging to diagnose and manage. Role of MRI: Non-ionising cross-sectional imaging has a particular role in assessing young patients that require long-term follow-up. MRI signal characteristics can provide additional information over CT and suggest potential behavioural and cellular properties. MRI Imaging Features: DTs occur in variable locations with a wide range of appearances. We aim to demonstrate common and rare locations within the abdomen, specific signal characteristics and enhancement patterns to look out for. Conclusion: MRI is a useful modality in the diagnosis of DTs, frequently in a young population. We provide examples of commonly overlooked imaging appearances.

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**GIE035-b**

**MDCT Imaging of Post-Surgical Abdominal Bleeding (PSAB)**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Orlando Catalano MD : Nothing to Disclose  
Antonio Nunziata MD (Presenter): Nothing to Disclose  
G Carone MD : Nothing to Disclose  
Paolo Delrio MD : Nothing to Disclose  
Antonella Petrillo MD : Nothing to Disclose

**TEACHING POINTS**

PSAB is a relevant, potentially life-threatening occurrence. In the post-operative setting, haemorrhage may have a variety of clinical and imaging presentations. Rapid assessment and decision making is mandatory for proper patient management and avoidance of further complications. Knowledge of normal and near-normal findings after recent surgery is mandatory to achieve a prompt and effective diagnosis. Understanding the main features indicating abnormal, eventually ongoing bleeding, is particularly relevant. The purpose of this exhibit is 1) To discuss the topic of abdominal haemorrhage developing after surgery, from a clinical and MDCT imaging point of view 2) To summarize the clues to MDCT diagnosis and potential pitfalls. 3) To highlight the optimal diagnostic work-up in cases suspected for PSAB, with special reference to the role of MDCT in selecting the most appropriate patient treatment.

**TABLE OF CONTENTS/OUTLINE**

The clinical and surgical aspects are first discussed, with special reference to risk factors, and main presentation scenarios. Various cases of intra-organ, intraperitoneal, and retroperitoneal PSAB are then illustrated, as shown by MDCT angiography. A correlation with presurgical findings is given, as well as, that with post-treatment findings. Interpretative pitfalls, leading to false positive or false negative diagnoses are considered.

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**GIE036-b**

**Functioning or Non-functioning? Pancreatic Neuroendocrine Tumors Sometimes Reveal Their Functional Status on Imaging**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Colin J. McCarthy MD (Presenter): Nothing to Disclose  
Shaunagh McDermott FFR(RCSI) : Nothing to Disclose  
Patrick Joseph Burke MBCh : Nothing to Disclose  
Peter F. Hahn MD, PhD : Stockholder, Abbott Laboratories Stockholder, Covidien AG Stockholder, CVS Caremark Corporation Stockholder, Kimberly-Clark Corporation Stockholder, Landauer, Inc  
Joseph F. Simeone MD : Nothing to Disclose  
Michael Austin Blake MBCh : Editor with royalties, Springer Science+Business Media Deutschland GmbH

**TEACHING POINTS**

Pancreatic neuroendocrine tumors (PNETs) are increasingly being detected neoplasms with variable hormone production and secretion. They represent 10% of pancreatic neoplasms and can present with unusual symptoms due to secretion of hormones. Their presentations can be initially clinically challenging including such symptoms as paresthesia and confusion related to hypoglycemia from an insulinoma. We emphasize the imaging features that can be helpful to differentiate PNETs from...
adenocarcinoma and demonstrate the differences between functioning and non-functioning pancreatic neuroendocrine tumors. We also highlight cases in which the functional status of the tumor can be deduced from imaging alone such as gastrinoma producing imaging features of Zollinger Ellison syndrome, ACTH secreting PNET producing increase in adrenal size and serotonin secreting PNET inducing fibrosis and a pancreatic ductal stricture.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction - cellular origin, location of tumors, malignant potential. 2. Imaging features - differences between functioning and non-functioning PNETs and adenocarcinoma. 3. The use of US, CT, MRI and Molecular imaging. 4. PNETS and their imaging features - Insulinoma and gastrinoma, Somatostatinoma, VIPoma, glucagonoma, ACTH- and serotonin- producing tumors. 5. Syndromes associated with PNETs. 6. Summary.

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**GIE037-b**

**Customizing Dual Energy CT Post Processing to Your Abdominal Radiology Practice**

*Education Exhibits*

*Location: GI Community, Learning Center*

Certificate of Merit

**Participants**

- Sergio Klimkowski MD: Nothing to Disclose
- Jessica Garrette Zarrour MD: Nothing to Disclose
- Lincoln L. Berland MD: Consultant, Nuance Communications, Inc Stockholder, Nuance Communications, Inc
- Desiree E. Morgan MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

1. Review standard presentations of simulated monoenergetic and material density dual energy CT images 2. Understand choices for customizing and saving post processing steps to analyze specific abdominal conditions 3. Become familiar with incorporation of advanced dual energy post processing into daily clinical practice

**TABLE OF CONTENTS/OUTLINE**

Brief review of dual energy technology Basic types of images generated with dual energy image data Customizing dual energy post processing to address specific clinical abdominal imaging needs Virtual unenhanced image choices Adrenal adenoma Pancreatic lesions Liver nodules and steatosis Renal lesions and stones Research post processing examples Incorporation of dual energy images and post processing into clinical practice Summary

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**GIE038-b**

**Portal Complications after Liver Transplantation: When, What and How**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

- Jesus Alejandro Gabutti MD (Presenter): Nothing to Disclose
- Veronica Espinosa: Nothing to Disclose
- Griselda Teresa Romero Sanchez MD: Nothing to Disclose
- Ignacio Munoz-Lopez MD: Nothing to Disclose
- Enrique Miguel Cruz MD: Nothing to Disclose
- Jorge Vazquez-Lamadrid MD: Nothing to Disclose

**TEACHING POINTS**

1. To describe the portal anastomosis technique, and main risk factors for developing complications. 2. To classify the temporality of portal complication in relation with the moment of surgery, acute, subacute and late. 3. To describe the normal imaging findings of the post-transplant portal vein. 4. To describe and how the different imaging techniques must be use to screen, document and follow up (before and after treatment) a portal complication.

**TABLE OF CONTENTS/OUTLINE**


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**GIE039-b**

**Not What You Expected? Typical and Atypical Appearances of Focal Liver Lesions on Contrast Enhanced Ultrasound**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

- Demosthenes D. Cokkinos MD (Presenter): Nothing to Disclose
- Eleni Antypa: Nothing to Disclose
- Panagiotis Tserotas MD: Nothing to Disclose
- Polichronis Liotios: Nothing to Disclose
- Ekaterini Tavernarakis MD: Nothing to Disclose
- Ploutarhos A Piperopoulos MD, PhD: Nothing to Disclose

**TEACHING POINTS**
Presentation of typical enhancement patterns of various histologic types of focal liver lesions (FLLs) on Contrast Enhanced Ultrasound (CEUS). Explanation of their haemodynamic behaviour post contrast injection based on their histology and recognition of atypical patterns of contrast enhancement.

**TABLE OF CONTENTS/OUTLINE**

Review of the status of CEUS as the first imaging method to be performed when a FLL is found on baseline US. Description of various types of lesions and their different patterns of US contrast agents’ enhancement, depending on their blood flow from the hepatic artery and portal vein during the arterial, portal and late phase. Explanation of diagnosis based on these typical patterns and acknowledgement of enhancement in atypical ways. Presentation of cases of FLLs with typical and atypical behaviour on CEUS and explanation of the pathophysiological basis for these features based on their histology. Analysis of different behaviour of US, CT and MR contrast agents resulting in potential different behaviour of the same lesion in these modalities.

**GIE040-b**

**Abnormalities in Intrahepatic Periportal Space : Multimodality Imaging Findings**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Jong-Young Oh (Presenter): Nothing to Disclose
- Kyung Jin Nam MD : Nothing to Disclose
- Jin Hwa Lee MD : Nothing to Disclose
- Kyungjae Lim : Nothing to Disclose
- Hee-Jin Kwon MD : Nothing to Disclose
- Jin Han Cho : Nothing to Disclose
- Seong Kuk Yoon MD : Nothing to Disclose

**TEACHING POINTS**

The major teaching points of this exhibit are: 1. Learning what kinds of disease can involve the intrahepatic periportal space. 2. Recognition of the characteristic imaging findings associated with various kinds of periportal abnormalities. 3. Understanding of the pathophysiology of periportal abnormalities.

**TABLE OF CONTENTS/OUTLINE**

Anatomy of intrahepatic periportal space. Classification of intrahepatic periportal pathologies according to different periportal structures. Pathophysiology and clinical features. Review of multimodality imaging findings - Utility of each modality in the diagnosis. Sample cases and mimics. Summary.

**GIE041-b**

**Common and Uncommon Inflammatory Diseases of the Liver; Imaging Findings and Differential Diagnosis**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Young Hwan Lee MD (Presenter): Nothing to Disclose
- Han Ah Lee : Nothing to Disclose
- Dong-Ho Bang MD : Nothing to Disclose
- Youe Ree Kim MD : Nothing to Disclose
- Kwon-Ha Yoon MD, PhD : Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: 1. To understand the radiologic findings of infectious or non-infectious inflammatory processes in the liver according to various causes. 2. To know the imaging features in differential diagnosis of hepatic inflammatory diseases.

**TABLE OF CONTENTS/OUTLINE**

Pathogenic mechanism of hepatic infection. Comparison of imaging modalities. Imaging findings of hepatic inflammation according to various causes - Infectious diseases - Non-infectious diseases. Differential diagnosis of various hepatic inflammatory diseases.

**GIE042-b**

**Neuroendocrine Tumor (NET) of Abdominal Organs: The WHO Update on Classification and Radiological Review**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Certificate of Merit**

**Participants**

- Joonseok Hwang MD (Presenter): Nothing to Disclose
- Hae-Kyung Lee MD : Nothing to Disclose
- Boem Ha Yi MD, PhD : Nothing to Disclose
- Min Hee Lee MD : Nothing to Disclose
- Seo-Youn Choi MD : Nothing to Disclose

**TEACHING POINTS**

Teaching point 1. To review the pathologic assessment of NET according to new WHO classification and grading. 2. To illustrate the various imaging features of NET of abdominal organs and to present the differential point from mimics. 3. To review the contemporary treatment options.
TABLE OF CONTENTS/OUTLINE
Update WHO classification and grading of NET Pathologic findings according to NET Review of imaging findings Sample cases and mimics Contemporary treatment options

GIE043-b
CT Findings of Intestinal Malrotation

Education Exhibits
Location: GI Community, Learning Center

Participants
Laura Marcela Ospina MD (Presenter): Nothing to Disclose
Carlos Alejandro Garcia MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is:
1. To review the embryology and classification of malrotation
2. To define the CT signs of intestinal malrotation
3. To show fluoroscopic findings of Intestinal malrotation on CT
4. To describe the CT findings that are related to intestinal malrotation and propose a new one

TABLE OF CONTENTS/OUTLINE

Summary

GIE101
Bowel Obstruction through the Ages: A Tour

Education Exhibits
Location: GI Community, Learning Center

Participants
Michelle Diane Sakala MD (Presenter): Nothing to Disclose
Michael Oliphant MD : Nothing to Disclose
Evelyn Young Anthony MD : Nothing to Disclose

TEACHING POINTS
Review the common causes of bowel obstruction in the upper gastrointestinal tract, small bowel, and large bowel. Illustrate how obstruction at differing levels can appear similar across age groups when the etiologies are, in fact, different. Create a deliberate differential diagnosis based on patient age from neonate to older adult.

TABLE OF CONTENTS/OUTLINE

GIE102
CSF Shunt Complications; What the Abdominal Imager Needs to Know

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
Eric Rinker MD (Presenter): Nothing to Disclose
Daniel Thomas Myers MD : Nothing to Disclose
Todd Williams MD : Nothing to Disclose

TEACHING POINTS
1. Review the spectrum of abdominal complications of Ventriculoperitoneal (VP) and Lumboperitoneal (LP) shunts with emphasis on CT imaging and multimodality correlation including Nuclear Medicine and myelography.
2. Explore the different imaging options available in evaluation of CSF shunts.

TABLE OF CONTENTS/OUTLINE
1. Review imaging options for abdominal complications of CSF shunts (CT scan, Nuclear Medicine shunt studies, radiographs, CT myelography).
2. Background literature review of shunt complications.
3. Display examples of abdominal complications of CSF shunts at our institution, including: loculated CSF collections (subcutaneous, peritoneal, intramuscular), shunt infection including abscess, regional hematoma, mechanical failures (valve disconnect, tube shear, shunt retraction) and complications of abandoned shunt tubing (bowel perforation).

GIE103
CT Review of Internal Hernias

Education Exhibits
Location: GI Community, Learning Center

Participants
Shiv Bir Bhanu MD : Nothing to Disclose
Lawrence C. Chow MD (Presenter): Nothing to Disclose

TEACHING POINTS
To learn pertinent anatomy as it relates to internal hernias. To learn imaging appearance and locations of more common internal hernias. To appreciate that internal hernias are diagnostically challenging given complex array of findings on sequential CT images. There is need for an electronic based resource for review of characteristic internal hernia CT findings.

TABLE OF CONTENTS/OUTLINE
Purpose: Internal hernias continue to account for an increasing number of intestinal obstruction cases. Given the potential severity of internal hernias it is paramount that radiologists familiarize themselves with the assortment of internal hernias and their CT features. This suggestion, while easily offered is challenging as internal hernias are inherently complex in their imaging characteristics and do not lend themselves to diagnosis based on a single CT image as is often illustrated in the written literature. We present a series of fully scrollable internal hernia cases demonstrating classic signs best appreciated as a whole on multiple images. Content: Participants will become familiar with pertinent anatomy and characteristic CT findings of more common internal hernias. The importance of real-time scrolling ability for image interpretation is emphasized. Section headings will be Case # 1-13, discussion, IH vs simple SBO: hints for differentiation, summary.

GIE104
Difficult Diagnosis—A Pictorial Review of the CT Appearances of Uncommon Internal Hernias and Correlation with Surgical Findings

Education Exhibits
Location: GI Community, Learning Center

Participants
Anu Obaro MBBS (Presenter): Nothing to Disclose
Suzanne Ryan MD : Nothing to Disclose

TEACHING POINTS
To demonstrate the subtle signs sometimes overlooked in the acute and non-acute abdomen that can lead to missed diagnosis and litigation. To recognise the CT appearances of common and unusual internal hernias. To demonstrate correlation between CT appearances and surgical findings.

TABLE OF CONTENTS/OUTLINE
Internal hernias are associated with high mortality and are a common missed diagnosis in patients who present with abdominal pain. The purpose of this presentation is to demonstrate predominantly unusual hernia appearances on CT, with surgical correlation. Types of internal hernia and epidemiology Anatomy of internal hernias High risk patients - particularly those with gastric bypass. Role of CT CT findings in both common and rare internal hernias - red flag signs that should not be missed, including mesenteric oedema, lymph node enlargement and free fluid. Case studies Static images and video examples of common and uncommon internal hernias including Petersen’s, transmesenteric, retroperitoneal and broad ligament hernias. Surgical correlation and management.

GIE105
Internal and Abdominal Wall Hernias: Findings on CT, Frequency and Potential Complications

Education Exhibits
Location: GI Community, Learning Center

Participants
Temel Tirkes MD (Presenter): Nothing to Disclose
Chandana G. Lall MD : Nothing to Disclose
Fatih Akisik MD : Nothing to Disclose

TEACHING POINTS
1. Understand the anatomy of the peritoneal cavity and location.
2. Frequency and complication of each internal and abdominal wall hernias.
3. Demonstration by multi-planar CT images and illustrations.

TABLE OF CONTENTS/OUTLINE
Multi-detector row CT with multi-planar reformations provides exquisite anatomic detail of the peritoneal cavity thereby allowing accurate identification of hernias and their contents, differentiation of hernias from other abdominal masses (tumors, hematomas, abscesses) and detection of pre- or postoperative complications. Knowledge of abdominal hernias and their complications is essential for making the correct diagnosis and may help guide clinical management. Internal Hernias Foramen of Winslow Paraduodenal Transmesenteric Transomental Pericecal Intersigmoid Supravesical and pelvic Abdominal Wall Hernias
GIE106

Internal Hernias in the Era of MDCT: MDCT-surgical Findings Correlation

Education Exhibits
Location: GI Community, Learning Center

Selected for RadioGraphics

Participants
Satoshi Doishita (Presenter): Nothing to Disclose
Tohru Takeshita : Nothing to Disclose
Taro Tsukamoto : Nothing to Disclose
Hiroyuki Tatekawa MD : Nothing to Disclose
Asari Sai : Nothing to Disclose
Taro Shimono MD : Nothing to Disclose
Yukio Miki MD, PhD : Nothing to Disclose

TEACHING POINTS
Internal hernias are challenging disorder for clinicians because of non-specific clinical signs and symptoms. Currently, multi-detector computed tomography (MDCT) is the first-line imaging technique for diagnosing various types of internal hernias. Supplementation of thin-slice axial CT with high-quality multiplanar reformation in the coronal and sagittal planes allows improved visualization of normal anatomical structures and pathological conditions and greater diagnostic accuracy in the diagnosis of internal hernias. Furthermore, the additional information provided by three-dimensional (3D) images allows a better understanding of pathological conditions of internal hernias and improves the ability to evaluate severity of a disease, thereby helping to optimize surgical planning. Radiologists should familiarize themselves with diagnostic MDCT findings of various types of internal hernias.

TABLE OF CONTENTS/OUTLINE
1. Definition, clinical issues and types of internal hernias
2. Features of CT images with pearls of interpretation
3. Reviewing the various types of internal hernias
   a. CT images
   b. Intraoperative pictures
   c. Related anatomy with emphasis on vessels

GIE107

Intestinal Anisakiasis: Could the Radiologist Give the First Clue?

Education Exhibits
Location: GI Community, Learning Center

Participants
GERARDO AYALA (Presenter): Nothing to Disclose
Elena Martinez Chamorro : Nothing to Disclose
Esteban Peghini MD : Nothing to Disclose
Virginia Navarro Cutillas : Nothing to Disclose
Alicia Merina MD : Nothing to Disclose
Susana Borruel MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To illustrate CT findings of intestinal anisakiasis in patients attended in the emergency setting. 2. To emphasize those CT findings which allow the radiologist to suggest the diagnosis of intestinal anisakiasis, despite an alternative clinical suspicion.

TABLE OF CONTENTS/OUTLINE
Retrospective review of the emergency department clinical records of a tertiary hospital, finding 21 patients diagnosed with intestinal anisakiasis, who underwent CT examination, from January 2011 to December 2013. Diagnosis was made in patients with prior raw fish ingestion, based on positive results for Prick-test, total IgE and Anisakis-specific IgE levels and the presence of intestinal lesions on CT. CONTENTS: Patient demographic information and time of onset of symptoms Clinical presentation and initial diagnosis before CT examination: table 1 CT findings in intestinal anisakiasis: table 2 and figures 1-3 -Ascites, small bowel wall thickening, submucosal edema and luminal narrowing, proximal small bowel dilatation (14 patients [66,7 %] ) and occasional dilatation of distal bowel with fluid content, affected bowel segment length greater than 10 cm (14 patients [66,7 %]) and mesenteric fat infiltration. 4. CONCLUSION: Radiologist could suggest intestinal anisakiasis based on MDCT findings.

GIE108

Luminal GI Injury: A Spectrum of Etiologies and Appearances

Education Exhibits
Location: GI Community, Learning Center

Participants
Lauren Moomjian MD (Presenter): Nothing to Disclose
Laura R. Carucci MD : Nothing to Disclose

TEACHING POINTS
1. It is important to be aware of exam techniques and subtle findings with bowel injury to make an accurate and timely diagnosis, as missed bowel injuries can be life threatening. 2. Radiologists must also recognize complications of bowel injury to facilitate timely treatment. Purpose: 1. To review etiologies of bowel injury including self-induced, iatrogenic, blunt or penetrating trauma 2. To describe the imaging evaluation of suspected injury to the luminal GI tract. 3. To discuss expected imaging findings of bowel injury and complications of injury and missed injury.

TABLE OF CONTENTS/OUTLINE
• Etiologies and Sites of Bowel injury
• Techniques and Modalities for imaging suspected GI tract trauma
• Self-induced:
• Etiologies and Sites of Bowel injury
• Techniques and Modalities for imaging suspected GI tract trauma
• Self-induced: Boerhaave’s, impaction, foreign body ingestion or insertion, (esophageal, rectal, small and large bowel)
• Iatrogenic- surgical or endoscopic injury, migrated medical device (i.e. biliary stent causing SBO), malpositioned devices, medication-induced injury
• Blunt- perforation, duodenal injury, diffuse small bowel hyperenhancement from reperfusion injury, mesenteric injury with bowel devascularization
• Penetrating- focal wall thickening, discontinuity or hematoma secondary to gunshot or stab wound, colorectal injury associated with pelvic fracture
• Complications of injury and missed injury - stricture, abscess, infarction

GIE109
Mesenteric Ischemic Disease: Improving Early Detection Using Dual Energy Imaging

Education Exhibits
Location: GI Community, Learning Center

Participants
Patrik Rogalla MD (Presenter): Nothing to Disclose
Christin Farrell: Employee, Toshiba Corporation
Bernice E. Hoppel PhD: Employee, Toshiba Corporation
Sonja Kandel MD : Nothing to Disclose

TEACHING POINTS
To understand the principles, algorithms and different imaging techniques of Dual-energy CT. To learn how to apply Dual-Energy CT in patients with suspected mesenteric ischaemia to improve differentiation between healthy and diseased intestine.

TABLE OF CONTENTS/OUTLINE
To review 3 principles and algorithms of DE-CT 7 ways to obtain iodine maps in CT Myths versus reality in DE data acquisition Clinical cases

GIE110
Misleading Cases and Pitfalls in the Diagnosis of Small Bowel Obstruction on Plain Film with CT Correlation

Education Exhibits
Location: GI Community, Learning Center

Participants
Zina Joan Ricci MD : Nothing to Disclose
Fernanda Samara Mazzaroli MD (Presenter): Nothing to Disclose
Sarah Kyung Oh MD : Nothing to Disclose
Marjorie Werner Stein MD : Nothing to Disclose
Susan Judith Frank MD : Nothing to Disclose
Ellen Leslie Wolf MD : Nothing to Disclose
Shari Friedman MD : Nothing to Disclose
Alla M. Rozenblit MD : Nothing to Disclose

TEACHING POINTS
1. A normal plain film does not always exclude SBO. 2. Plain films can be insensitive in the detection of SBO when the obstruction is in the proximal small bowel or the small bowel is fluid filled. If clinical suspicion exists, CT will be diagnostic. 3. Plain film is insensitive for the detection of strangulated obstruction and closed loop obstruction, both requiring CT for diagnosis. 4. The cause of SBO is generally not identified on plain film but easily determined on CT. 5. SBO may be erroneously diagnosed on plain film and CT can exclude obstruction and provide the correct diagnosis.

TABLE OF CONTENTS/OUTLINE

GIE111
Multimodality Evaluation of Large Bowel Obstruction: A Pictorial Review

Education Exhibits
Location: GI Community, Learning Center

Participants
Adam Noah Rucker MD (Presenter): Nothing to Disclose
Patrick Kobis DO : Nothing to Disclose
John J. Hines MD : Nothing to Disclose
Barak Friedman MD : Nothing to Disclose

TEACHING POINTS
Large bowel obstruction is a potentially deadly disease requiring prompt diagnosis and rapid intervention. Patients presenting with large bowel obstruction can present with non-specific clinical symptoms making radiologic diagnosis a crucial component in patient care. The etiology of large bowel obstruction includes both neoplastic and non-neoplastic causes as well as entities which may mimic LBO. The purpose of this exhibit is to: 1. Review the spectrum of diseases which may cause LBO utilizing a variety of modalities. 2. Identify imaging patterns that will lead to rapid diagnosis of large bowel obstruction. 3. Discuss specific radiologic signs for each disease process to help in providing a succinct differential for referring clinicians.
TABLE OF CONTENTS/OUTLINE

Introduction Neoplastic Causes Non-neoplastic Causes Mimics of large bowel obstruction Management and consultative recommendations Summary

GIE112

Not all Right Flank Pain Is Appendicitis

Education Exhibits
Location: GI Community, Learning Center

Participants
Marcela De la Hoz Polo MD (Presenter): Nothing to Disclose
Oscar Pozuelo Segura : Nothing to Disclose
Cristina Delgado MD : Nothing to Disclose
Stefano Pasetto MD : Nothing to Disclose
Albert Anguera : Nothing to Disclose

TEACHING POINTS
1. To review the anatomy of the right iliac fossa
2. To review the pathological conditions, surgical and nonsurgical, that cause right flank pain
3. To discuss the uses of CT scan in the diagnosis of abdominal pain. A series of challenging cases would be used to improve accuracy on the radiographic diagnostic of these pathologies.

GIE113

Rapid Acquisition Axial and Coronal T2 HASTE MR Imaging in Diagnosis of Post-operative Collections

Education Exhibits
Location: GI Community, Learning Center

Participants
Sam Byott MBChB (Presenter): Nothing to Disclose
Ian Harris MBCh, FRCR : Nothing to Disclose

TEACHING POINTS
To understand the key features and imaging characteristics of various important post-operative findings on T2 HASTE MR abdominal imaging. To understand that rapid acquisition axial and coronal T2 HASTE MR imaging is a practical and effective tool to assess for post operative collections.

GIE114

Restricting Appetites: Common and Unusual Post-operative Complications for Gastric Bands

Education Exhibits
Location: GI Community, Learning Center

Participants
Sophia Tincey MBBS (Presenter): Nothing to Disclose
Anastasia Hadjivassiliou MBBS : Nothing to Disclose
Aniket N. Tavare MA, MBBCh : Nothing to Disclose
Michael John Steward MBChB, MRCP : Nothing to Disclose

TEACHING POINTS
Understand the clinical indications for laparoscopic gastric banding Description of surgical techniques currently used Discussion of imaging techniques used for band evaluation and normal post-procedural anatomy Illustrated examples of common and unusual complications with clinico-radiological correlation

TABLE OF CONTENTS/OUTLINE

A. Imaging in the post-operative patient
B. Advantages/Disadvantages of MRI in this context
C. Rapid acquisition axial and coronal T2 HASTE MR abdomen
D. Concise review of single centre experience over 4 years and 147 cases
E. Case examples demonstrating important features on T2 HASTE MR
F. Discussion and future prospects

TABLE OF CONTENTS/OUTLINE

Obesity is a growing global problem and a huge economic burden for healthcare providers. More frequently, laparoscopic gastric banding is being offered as a treatment and is one of the less invasive surgical options. It is important for radiologists to recognize normal post-operative anatomy which we will outline with imaging correlation. Illustrated multi-modality examples of potential post-operative complications including band slippage, band erosion with subsequent strictures, and infection will be reviewed. Additionally, more unusual complications including tube kinks and tubing erosion will be also discussed. Cases have
been collected from a large regional centre for bariatrics where surgery is carried out for both the local population and referrals from other urban centres.

GIE115

Spleenic Infarct: Pictorial Review

Education Exhibits

Location: GI Community, Learning Center

Participants

Moncef Allegue MD (Presenter): Nothing to Disclose
Riadh Atallah MD: Nothing to Disclose
Faten Bouzaine MD: Nothing to Disclose
Omar Essid MD: Nothing to Disclose
Radhouane ElAbed MD: Nothing to Disclose
Letaief Jemni MD: Nothing to Disclose

TEACHING POINTS

1. To review the imaging findings of acute and chronic splenic infarcts
2. To explain the utility of MDCT to identify a potential cause of splenic infarcts

TABLE OF CONTENTS/OUTLINE

Anatomy and congenital anomalies of the spleen
Different appearances of acute and chronic splenic infarcts (SI)
MDCT features of SI / causes:
- Thrombo-embolic origin
- Hematologic disorders
- Collagen vascular disease
- Miscellaneous disorders

Teaching points
Summary

GIE116

The Utility of MDCT on the Diagnosis of Acute Abdomen

Education Exhibits

Location: GI Community, Learning Center

Participants

Luz Elena Guerrero MD (Presenter): Nothing to Disclose
Patricia Herrera Quilez MEd: Nothing to Disclose
Lina K. Rojas MD: Nothing to Disclose
Ivan Carrion MD: Nothing to Disclose
Sandra Milena Cordoba Rovira MD: Nothing to Disclose
Tomas Sempere: Nothing to Disclose

TEACHING POINTS

1. Academic review of the different conditions that clinically are presented as acute abdomen, including postoperative complications.
2. Exposure of different clinical-radiological cases, diagnosed in our hospital during the last year and correlating them with surgical findings.
3. Recognize MDCT imaging appearance of various acute abdominal disease processes that are encountered in the emergency department.
4. To learn the usefulness of 2D MPR reconstructions and 3D volume rendering in the differential diagnosis of acute abdomen.

TABLE OF CONTENTS/OUTLINE

Reviewed retrospectively 80 cases of patients with acute abdomen, including those that come spontaneously to the emergency room, and patients admitted to our hospital for other reasons, during the last year. All of them required urgent surgical intervention with a prior execution of an abdominal MDCT. It was correlated the radiological findings with the surgical findings. Revising the clinical and radiological signs characteristics of each pathology: Mechanical bowel obstruction (intascreration, volvulus, intussusception, mesenteric vascular occlusion, adhesions, stenosis, bezoar, adhesive band), bowel perforation, postoperative common complications, acute cholecystitis, acute appendicitis, aortic aneurysm rupture and others. Summary and conclusions.

GIE117

Ticked Off: Complications of Colonic Diverticular Disease

Education Exhibits

Location: GI Community, Learning Center

Participants

Alexander Gavlin MD: Nothing to Disclose
Mike Spektor MD: Nothing to Disclose
Meir Hillel Scheinfeld MD, PhD: Nothing to Disclose
Dameon R. Duncan MD, MBA: Nothing to Disclose
Thomas McCann MD: Nothing to Disclose
Robert Joshua Dym MD (Presenter): Nothing to Disclose
TEACHING POINTS

Colonic diverticular disease is a very common condition which can lead to serious complications. The most frequent complications of colonic diverticulosis are gastrointestinal bleeding and diverticulitis. Acute diverticulitis varies in severity, with either localized effects or distant spread of infection. Long term sequelae of diverticulosis include fistulae and strictures, which may lead to bowel obstruction. Due to the high prevalence of diverticulosis, complications of diverticular disease and other serious conditions can often be confused.

TABLE OF CONTENTS/OUTLINE

- Introduction
- Epidemiology
- Anatomy
- Etiology/pathophysiology
- Diverticular bleeding
- Acute diverticulitis - uncomplicated
- Local complications of diverticulitis
- Intramural abscess
- Pericolic phlegmon
- Pericolic abscess
- Diverticulitis involving other structures
- Free perforation and peritonitis
- Thrombophlebitis
- Liver abscess
- Fistulae to adjacent organs - urinary bladder - small bowel or colon - uterus - vagina - adnexa - abdominal wall
- Other post-diverticulitis morphologic changes
- Giant diverticulum
- Muscular hypertrophy
- Stricture, leading to obstruction
- Confusion with other conditions
- Colon cancer
- Appendicitis
- PID/TOA
- Conclusion

GIE118

X Marks the Spot: Use of Multi Detector CT Angiography in the Localization of Active Gastrointestinal Hemorrhage

Education Exhibits
Location: GI Community, Learning Center

Participants

Lee Lian Chew MBBS (Presenter): Nothing to Disclose

TEACHING POINTS

The aim of this educational exhibit is: 1. Discuss common causes of acute gastrointestinal (GI) hemorrhage 2. Review the current use of multi detector CT angiography in the investigation of patients with GI hemorrhage, illustrated with images from our Institution. 3. Describe the protocol for multi detector CT angiography in patients with acute gastrointestinal hemorrhage.

TABLE OF CONTENTS/OUTLINE

1. Introduction
2. Causes of acute gastrointestinal hemorrhage - upper tract - lower tract
3. Limits of Endoscopy
4. Use of multidetector CT angiography in localization of source of gastrointestinal hemorrhage
5. Imaging technique
6. Findings of acute gastrointestinal hemorrhage - active bleed (blush) - recent bleed (clots)
7. Sample cases with angiographic correlation
8. Pitfalls
9. Conclusion

GIE119


Education Exhibits
Location: GI Community, Learning Center

Participants

Praveen Peddu MBBS, FRCR (Presenter): Nothing to Disclose
Rajeev Jain MBBS, MD: Nothing to Disclose
Ruchi Sharma: Nothing to Disclose
John Barr Karani MBBS, FRCR: Nothing to Disclose
Pauline Anne Kane MBBS, FRCR: Nothing to Disclose
Nigel Heaton: Nothing to Disclose

TEACHING POINTS

1. Abernethy malformations are extremely rare. Two major types are described. 2. Our experience of four patients - 3 with hepatocellular carcinoma and 1 with a large focal nodular hyperplasia (which regressed spontaneously after shunt occlusion) - Clinical presentation, Imaging studies and Interventional Radiological / Surgical Management. 3. The embryology, pathophysiology, imaging findings (CT, MR and Angiography) and Interventional Radiological / Surgical management. 4. Recognition of the Abernethy malformation and complications on Imaging studies, Management options and algorithms.

TABLE OF CONTENTS/OUTLINE

- Embryology of the Abernethy Malformation
- Types of Porto-Systemic Shunts
- Imaging Diagnosis - CT, MRI and Angiography
- Oncological Complications
- Description of four patients with primary liver tumors - Imaging Diagnosis, Interventional Radiological / Surgical Management Discussion

GIE121

Evaluation of the Deep Inferior Epigastric Artery Perforator (DIEP) for Flap Repair after Mastectomy

Education Exhibits
Location: GI Community, Learning Center

Participants

Steven Lee MD (Presenter): Nothing to Disclose
John Ross McGrath MD: Nothing to Disclose
Ravinder Sidhu MD: Nothing to Disclose

TEACHING POINTS

1. DIEP flaps are widely used for breast reconstruction. The deep inferior epigastric system is a consistent system of perforators from the inferior epigastric artery that can provide a reliable vascular supply for reconstruction.

TABLE OF CONTENTS/OUTLINE

- Evaluation of the DIEP flap
- Anatomy
- Vascular supply
- Surgical technique
- Results and complications
- Conclusion
TEACHING POINTS

2. Identification of the different portions of the DIEA (i.e. intramuscular, subfascial, superficial).
3. Correctly describe the position of perforating branches with respect to the umbilicus.
4. Be familiar with entities that may jeopardize flap repair or render flap repair difficult.
5. Be familiar with complications after flap repair.

TABLE OF CONTENTS/OUTLINE

1. Correct categorization of the branching pattern of DIEA.
2. Identification of the different portions of the DIEA.
3. Correctly describe the position of perforating branches with respect to the umbilicus.
4. Be familiar with entities that may jeopardize flap repair or render flap repair difficult.
5. Be familiar with complications after flap repair.

GIE122

Hepatobiliary and Pancreatic Vascular Anatomy in the Era of Dual Energy CT (DECT)

Education Exhibits

Location: GI Community, Learning Center

Participants

Gaiane M. Rauch MD, PhD (Presenter): Nothing to Disclose
Priya Ranjit Bhosale MD: Nothing to Disclose
Eric P. Tamm MD: Nothing to Disclose
Catherine Ellen Devine MD: Nothing to Disclose
Brinda Rao MD: Nothing to Disclose
Janio Szklaruk MD, PhD: Nothing to Disclose

TEACHING POINTS

1. DECT improves vascular imaging in the abdomen by increasing contrast between vessels and background at low monochromatic energy images and on iodine material density images when compared to conventional CT imaging.
2. Knowledge of the common and variant vascular anatomy of the pancreas and liver are essential for the correct interpretation of DECT images, especially for surgical planning.
3. DECT may facilitate visualization of smaller vessels and therefore improve detection of second order vessels which may improve surgical planning.
4. DECT may facilitate visualization of vascular variants. Better visualization of such variants may improve surgical planning.

TABLE OF CONTENTS/OUTLINE

1. Brief review of dual energy CT, with description of specific postprocessing techniques to visualize and evaluate hepatobiliary and pancreatic vascular anatomy.
2. To review the common and uncommon vascular anatomical variants in the liver and pancreas, including arterial, portal venous and systemic venous anatomy, using multiphasic DECT images.
3. To compare various monochromatic energy images (keV) and with iodine-water images.
4. To show improved detection of second order vascular supply on DECT.
5. To discuss the benefits and pitfalls of the various energies and material specific images in the interpretation of vascular anatomy of the hepatobiliary organs.

GIE123

Spectrum of Visceral Artery Pseudoaneurysms due to Various Etiologies Diagnosed on MDCT Abdominal Angiography

Education Exhibits

Location: GI Community, Learning Center

Participants

Jigar Vasantlal Zota MBBS: Nothing to Disclose
Samirjot Singh Ghuman MBBS, MD (Presenter): Nothing to Disclose
Tarvinder Bir Singh Buxi MD: Nothing to Disclose
Kishen Singh Rawat MBBS, MD: Nothing to Disclose
Anurag Yadav MBBS: Nothing to Disclose

TEACHING POINTS

• Visceral artery pseudoaneurysms(VAPA) are a frequent cause of sudden onset intra-abdominal hemorrhage.
• A spectrum of various etiologies like iatrogenic, pancreatitis, trauma, tumors, vasculitis etc. can lead to VAPAs.
• MDCT Angiography is the modality of choice for the diagnosis of affected artery, assessing underlying etiology and planning further intervention.
• Varying etiologies can often lead to varying imaging parameters in VAPAs.

TABLE OF CONTENTS/OUTLINE

Firstly, we briefly discuss the epidemiology of visceral artery pseudoaneurysms(VAPA). Then, we discuss MDCT abdominal angiography protocol and imaging reconstruction manipulations. Further, a case based review of VAPA secondary to various etiologies are discussed, including LGA PA secondary to pancreatitis RHA PA at the margin of a hepatic abscess Splenic artery PA due to large pancreatic mass Post Whipples surgery GDA stump blow-out PA Post laparoscopic cholecystectomy cystic artery blow-out PA RHA PA secondary to acute cholecystitis Renal artery PA post PCNL Middle colic artery PA post pancreatitis Renal artery PA due to angiomyolipoma Post trauma RHA PA Post trauma splenic stump blow out PA RHA PA due to hepatoblastoma Ruptured GDA PA post pancreatitis We close with few take home messages.

GIE125

Biliary Pathology: A Pictorial Review
GIE126

Chronic Cholecystitis, "The Silent Time Bomb": US, CT and MR Imaging Findings of Associated Neoplastic and Non Neoplastic Complications

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
Matias Gustavo Vargas Araya MD (Presenter): Nothing to Disclose
Eugenio Zalaquett MD : Nothing to Disclose
Christine O. Menias MD : Nothing to Disclose
Maria Jose Baladron MD : Nothing to Disclose
Alvaro Huete Garin MD : Nothing to Disclose
Ignacio Beddings MD : Nothing to Disclose
Pablo Bachler MD : Nothing to Disclose
Sanjeev Bhalla MD : Nothing to Disclose

TEACHING POINTS
1. To understand the pathophysiology of chronic cholecystitis.
2. To review the imaging findings of non-complicated cholelithiasis
3. To classify the different delayed complications of chronic cholecystitis: Inflammatory - Fistula - Neoplastic
4. To illustrate the spectrum of US, CT and MR imaging findings of the complications of longstanding gallstone disease.

TABLE OF CONTENTS/OUTLINE
1. Demographics and clinical presentations.  
2. Pathophysiology of chronic cholecystitis.  
3. US, CT and MR imaging findings of non-complicated chronic cholecystitis.  
5. Conclusion
extra-wall spread is essential to ascertain the appropriate therapeutic strategies for gallbladder cancer. In addition, it is essential to evaluate gallbladder wall invasion with a combination of various modalities, including transabdominal US, EUS, CT, and MRI and to ascertain the role of each modality in ensuring accurate diagnosis.

GIE129
Gallbladder Disease: Multi-modality Imaging and Radiologic–pathologic Correlation

Education Exhibits
Location: GI Community, Learning Center

Participants
Hanan Sherif MD (Presenter): Nothing to Disclose
Amal Airashid MBBS: Nothing to Disclose
Tahir Imaddudeen MBBS: Nothing to Disclose
Issam Albozom MD: Nothing to Disclose
Ahmed-Emad Mahfouz MD: Nothing to Disclose

TEACHING POINTS
- The spectrum of gallbladder disease includes cholecystitis (acute, chronic, calcular, noncalcular, gangrenous, and xanthogranulomatous), cholesterosis, adenomyomatosis, adenoma, neuroendocrine tumor, ganglioneuromatosis in multiple endocrine neoplasia MEN IIB, and carcinoma. The educational exhibit provides a full radiologic-pathologic correlation of these disease entities. Multi-modality imaging of the gall bladder includes ultrasonography, color Doppler, CT, MRI, HIDA scintigraphy, and PET/CT. The relative merits of each modality in a particular disease entity are illustrated. Examples are HIDA scintigraphy in acute cholecystitis, MRI in noncalcular cholecystitis, and Color Doppler and MRI in differentiating adherent sludge from gallbladder carcinoma.

TABLE OF CONTENTS/OUTLINE
- The educational exhibit covers (in the Quiz format) the radiological features of a wide spectrum of gallbladder disease with full radiologic-pathologic correlation in all cases including: Cholecystitis: acute, chronic, calcular, noncalcular, gangrenous, and xanthogranulomatous. Cholesterosis Adenomyomatosis Gallbladder adenoma Neuroendocrine tumor Ganglioneuromatosis of the gall bladder in multiple endocrine neoplasia MEN IIB. Gallbladder carcinoma.

GIE130
Imaging Cholangiocarcinoma: All Equal, Some Different?

Education Exhibits
Location: GI Community, Learning Center

Participants
Luisa Costa Andrade (Presenter): Nothing to Disclose
Daniel Andrade MD: Nothing to Disclose
Luis Curvo-Semedo MD, PhD: Nothing to Disclose
Filipe Caseiro-Alves: Nothing to Disclose

TEACHING POINTS
- To review the histological classification of cholangiocarcinomas (CCK) focusing on the less typical forms of presentation and acknowledging their biologic behaviour. - To describe the CT and MR findings of the less common histological sub-types of cholangiocarcinoma. - To determine the usefulness of MR in the differential diagnosis and patient management.

TABLE OF CONTENTS/OUTLINE
- Cholangiocarcinoma is an adenocarcinoma that originates in the bile duct epithelium. Depending on the anatomical location they are divided in intra-hepatic, also called cholangiocellular carcinoma and extra-hepatic, the latter further sub-divided into peripheral or hilar (Klatskin tumor) taking into account the implications for patient management. According to their morphological features they are also classified as mass-forming, periductal infiltrative and intra-ductal. Despite a straightforward definition the histological classification is more complex since cases of mixed HCC-CCK tumors and intra-ductal papillary mucinous biliary neoplasms (IPMBN) are being increasingly recognized in the literature. The purpose of this pictorial essay is to illustrate and describe the imaging features of the less well known forms of CCK addressing their biological behavior, mechanisms of spread, prognosis and major clues to the differential diagnosis.

GIE131
Imaging Diagnosis of Gallbladder

Education Exhibits
Location: GI Community, Learning Center

Participants
Satoshi Goshima MD, PhD (Presenter): Nothing to Disclose
Yoshifumi Noda MD: Nothing to Disclose
Hiroshi Kondo MD: Nothing to Disclose
Yukichi Tanahashi MD: Nothing to Disclose
Masayuki Kanematsu MD: Nothing to Disclose

TEACHING POINTS
- Understanding and recognizing various benign polypoid lesions of gallbladder mimicking gallbladder cancer is crucial for appropriate treatment and management. The assessment of mucosal and/or serosal surface irregularity is useful for the diagnosis of invasion depth of gallbladder cancer.

TABLE OF CONTENTS/OUTLINE
- Review imaging findings of benign polypoid lesions of gallbladder, including cholesterol polyp, inflammatory polyp, gallbladder adenoma, adenomyomatosis of gallbladder, and xanthogranulomatous cholecystitis emphasis on differentiating gallbladder
cancer. Discussion of associated deformity of gallbladder wall for the evaluation of gallbladder cancer invasion depth. Discussion of diagnostic problems and clinical implications.

GIE132

Imaging Spectrum of Biliary Tree Pathology: Not a Single Branch

Education Exhibits
Location: GI Community, Learning Center

Participants
Tanzilah Afzal Barrow MBCh : Nothing to Disclose
Ayesha Nasrullah MBBS (Presenter): Nothing to Disclose
Victoria Barnes : Nothing to Disclose
Rafik Filobbos : Nothing to Disclose
Velauthan Rudralingam MBBCh : Nothing to Disclose

TEACHING POINTS

1. Demonstrate the wide range of common and uncommon pathological abnormalities involving the biliary tree. 2. Illustrate how careful interpretation of the cross-sectional imaging findings together with clinical history can establish the correct diagnosis promptly and initiate treatment which may be potentially life saving. 3. Highlight interpretational pitfalls.

TABLE OF CONTENTS/OUTLINE

1. Etiology of common & common biliary tree pathology. 2. Review main learning points for the general radiologist. Case examples to include; • Congenital (Biliary atresia, Caroli’s disease, choledochal cyst) • Choledochalcholithiasis (calculi, Mirizzi’s syndrome- type 1/2) • Inflammatory (IgG4 related systemic disease, PSC) • Infectious (cholangitis, AIDS cholangiopathy, Oriental cholangiohepatitis, biliary parasites) • Neoplasia (cholangiocarcinoma, biliary cystadenoma, ampullary tumour) • Miscellaneous (haemobilia secondary to pseudoaneurysm, bile duct necrosis) SUMMARY • A sound knowledge of the spectrum of biliary tree pathology together with the clinical context is key in identifying the likely underlying condition. • Radiologists need to be aware of the spectrum of CT and MR appearances of bile duct disease & its possible causes in order to facilitate prompt appropriate management.

GIE133

Laparoscopic Cholecystectomy, a Low Risk Surgery? An Overview of Iatrogenic Bile Duct Injuries

Education Exhibits
Location: GI Community, Learning Center

Participants
Daniela Canaviri MD (Presenter): Nothing to Disclose
Fritz Hofmann MD : Nothing to Disclose
Oskar Giovanni Lopez Espinoza MD : Nothing to Disclose
Alejandro Gabutti : Nothing to Disclose
Montserrat Santoscoy MD : Nothing to Disclose

TEACHING POINTS

To show radiologic features of iatrogenic bile duct injuries To demonstrate imaging findings of iatrogenic bile duct injuries To review the underlying mechanism of different kinds of bile duct injuries. To check risk factors To know anatomic variations that can become a problem during surgery To discuss differentiation of iatrogenic bile duct injuries from other causes of bile duct lesions.

TABLE OF CONTENTS/OUTLINE

Epidemiology of bile duct injuries. Underlying mechanism of different kinds of bile duct injuries Risk factors. Anatomic variations Appearance of bile duct injuries • Fluoroscopy • CT • MRI Differentiation of iatrogenic bile duct injuries from other causes of bile duct lesions.

GIE134

Many Faces of Cholangiocarcinoma

Education Exhibits
Location: GI Community, Learning Center

Selected for RadioGraphics

Participants
Andrew Minsoo Shon MD (Presenter): Nothing to Disclose
Jonathan H. Yu DO : Nothing to Disclose
Senta Maria Berggroun MD : Nothing to Disclose
Grace Guzman : Nothing to Disclose
Winnie Anne Mar MD : Nothing to Disclose

TEACHING POINTS

1. To provide a comprehensive overview of the imaging features of intrahepatic and extrahepatic cholangiocarcinoma. 2. To review mimics of cholangiocarcinoma and potential pitfalls.

TABLE OF CONTENTS/OUTLINE

Migration of Pancreaticojejunostomy Silastic Stents into the Bile Ducts after Pancreatoduodenectomy

**Education Exhibits**

Location: GI Community, Learning Center

**Certificate of Merit**

**Participants**

- So Hyun Park MD (Presenter): Nothing to Disclose
- Jin Hee Kim MD: Nothing to Disclose
- Seung Soo Lee MD: Nothing to Disclose
- Jae Ho Byun MD: Nothing to Disclose
- Hyo Young Kim MD: Nothing to Disclose
- Moon-Gyu Lee MD: Nothing to Disclose

**TEACHING POINTS**

1. To present various complications associated with migrated silastic stents from pancreaticojejunostomy into the bile ducts after pancreatoduodenectomy
2. To discuss pitfalls in CT and MR imaging interpretations in patients with migrated silastic stents in the bile ducts
3. To emphasize the importance of making an effort to find silastic stents which can be easily overlooked on imaging examinations in patients who underwent pancreatoduodenectomy

**TABLE OF CONTENTS/OVERSEVIEW**

1. Demonstration of silastic stents on imaging examinations
2. Stent migration-associated complications (1) Bile duct stricture (2) Cholangitis (3) Abscess formation (4) Stent serving as a nidus for stone formation (5) Stent fracture
3. Long-term follow-up of the migrated stents at imaging studies
4. Pitfalls in CT and MR imaging interpretations in patients with migrated stents
5. Misinterpretation of stent-related complications: how and why?
6. Importance of precontrast CT scan

**Summary:** Migrated pancreaticojejunostomy silastic stents can cause a variety of biliary complications which may be confused with other conditions, in particular, malignancies. Therefore, it would be important that radiologists be aware of these stent-related biliary complications to eliminate misdiagnosis and consequently to minimize unnecessary costly examinations or surgeries.

Minimum Intensity Projection Imaging of the Biliary Tree: An Under-utilized Technique for Demonstrating Anatomy and Pathology

**Education Exhibits**

Location: GI Community, Learning Center

**Participants**

- Jabi E. Shriki MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

This exhibit has the following educational goals: 1. To demonstrate the basics of minimum intensity (MinIP) reformatting of imaging studies, including CT and MRI. 2. To review normal and variant anatomy of the biliary tree, and depict anatomic patterns using MinIP images. 3. To utilize MinIP images to show the range of pathology that may be seen in the biliary system. 4. To correlate MinIP images of the biliary tree with conventional imaging studies, including MRCP and ERCP.

**TABLE OF CONTENTS/OVERSEVIEW**

The basic techniques of MinIP will be reviewed. The methods of reformatting volumes into MinIP images will be demonstrated. Normal and variant anatomy of the biliary tree will be discussed, with patterns of anatomy demonstrated using MinIP images. The spectrum of biliary pathology will be reviewed with depiction of disease states on MinIP images of studies, including CT and MRI. Correlation will be made with conventional imaging techniques, including MRCP and ERCP.

Illustrative cases will be shown in order to demonstrate how MinIP images of the biliary tree can help guide patient care.

MRI of Biliary Emergencies: Beyond Stones—Cases for Aces!

**Education Exhibits**

Location: GI Community, Learning Center

**Participants**

- Chandana G. Lall MD (Presenter): Nothing to Disclose
- Sadhna Verma MD: Nothing to Disclose
- Priya Ranjit Bhosale MD: Nothing to Disclose
- Roozbeh Houshyar MD: Nothing to Disclose
- Madhavi Patnana MD: Nothing to Disclose
- Ramit Lamba MD: Nothing to Disclose
- Martin Roberto Goyenechea MD: Nothing to Disclose
- Andrew J. Del Gaizo MD: Nothing to Disclose

**TEACHING POINTS**

1. Review current role of magnetic resonance imaging in evaluation of acute biliary processes
2. Illustrate the MRI features of unusual biliary processes and acute complications of chronic processes presenting to the Emergency Department
3. Discuss
details of each disease entity presented and differential diagnosis

TABLE OF CONTENTS/OUTLINE

Educational Goals/Teaching Points
1. Overview of unusual acute biliary disorders in the ED in QUIZ format
2. MR imaging of acute biliary processes and acute complications of chronic biliary processes
3. Role of MRI in management and disposition of ED patients and inpatients
4. Limitations and challenges of MRI
Conclusion
After reviewing this exhibit, the radiologist will have a better understanding of MRI features of some unusual acute biliary disorders and the acute complications of chronic biliary disorders.

GIE138

MRI of Common and Uncommon Pathologies Involving the Periportal Space

Education Exhibits
Location: GI Community, Learning Center

Participants
Christine Uang-Chin Lee, MD, PhD (Presenter): Nothing to Disclose
James F. Glockner, MD, PhD: Nothing to Disclose

TEACHING POINTS
1. Review the anatomy and contents of the periportal space
2. Recognize the MRI features of common and uncommon pathologies involving the periportal space

TABLE OF CONTENTS/OUTLINE
I. Review the anatomy of the periportal space
II. Describe the range of common and uncommon pathologies involving the periportal space
III. Illustrate MRI features of periportal pathologies and provide teaching comments

GIE139

MRI of Gallbladder Disease: The Spectrum from Acute to Chronic and Benign to Malignant Conditions, including Postcholecystectomy Complications

Education Exhibits
Location: GI Community, Learning Center

Participants
Matthew C. McDermott, MD (Presenter): Nothing to Disclose
Courtney Ann Coursey Moreno, MD: Nothing to Disclose
Juan Camilo Camacho: Nothing to Disclose
Kelly Lynn Cox, DO: Nothing to Disclose
Pardeep Kumar Mittal, MD: Nothing to Disclose

TEACHING POINTS
1. MRI provides superior soft tissue contrast facilitating accurate diagnosis of a multitude of gallbladder diseases including acute and chronic non-neoplastic diseases, and benign and malignant neoplasms
2. Indications for MRI of the gallbladder, general MRI protocol and special considerations (hepatobiliary agents)
3. Review postcholecystectomy complications

TABLE OF CONTENTS/OUTLINE
A. Indications for gallbladder MRI, general MRI protocol and special considerations
B. Gallbladder anatomy
C. Non-neoplastic acute and chronic diseases
   - Acute and chronic cholecystitis, including typical and variant/complicated forms
   - Cholelithiasis and Mirizzi syndrome
   - Gallstone ileus
   - Adenomyomatosis and cholesterolosis
   - Iatrogenic gallbladder and bile duct injury
D. Benign and malignant neoplasms
   - Gallbladder polyps
   - Gallbladder adenocarcinoma
   - Involvement by cholangiocarcinoma and hepatic malignancies
   - Distant metastases to gallbladder
E. Summary: Due to its unique combination of excellent soft tissue contrast, multiplanar capabilities and lack of ionizing radiation, MRI plays an important role in the initial evaluation and follow-up of many gallbladder diseases. Optional use of a contrast agent with hepatobiliary excretion aids in evaluation of gallbladder and bile duct injuries.

GIE140

Non-lithiasic Gallbladder Diseases: Differential Diagnosis and Imaging Interpretation—What Should You Know?

Education Exhibits
Location: GI Community, Learning Center

Participants
Juan C. Spina, MD (Presenter): Nothing to Disclose
Ramiro Orta, MD: Nothing to Disclose
Jesica Lorena Savluk, MD: Nothing to Disclose
### GIE141

**Role of Hepatobiliary Contrast Agents in MRI Evaluation of Challenging Cases, including Bile Duct Injuries**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Neil Shah MD (Presenter): Nothing to Disclose
- Juan Camilo Camacho: Nothing to Disclose
- Courtney Ann Coursey Moreno MD: Nothing to Disclose
- Pardeep Kumar Mittal MD: Nothing to Disclose

**Teaching Points**

1. To explain the difference between extracellular and hepatobiliary contrast
2. To demonstrate the role of different contrast agents in imaging bile duct injuries pre and post operatively
3. To provide examples of challenging cases, including hepatocellular carcinoma, focal nodular hyperplasia, adenoma, and hemangioma

**Table of Contents/Outline**

Hepatobiliary contrast agents are one of several types of contrast agents available for hepatic MRI. They can be used to detect and characterize focal lesions (especially challenging cases), evaluate diffuse hepatocellular disease, and evaluate biliary tree anatomy and function. Contrast Agents Mechanism of Action ---extracellular ---hepatobiliary Role of Different Contrast Agents in Bile Duct Injuries MRI with Hepatobiliary Contrast: Bile Duct Injuries ---bile duct leak ---stricture ---occlusion --- transaction ---bilia MRI with Hepatobiliary Contrast: Other Challenging Cases ---hepatocellular carcinoma ---focal nodular hyperplasia ---adenoma ---hemangioma Summary: Hepatobiliary contrast agents play a key role in accurately recognizing and classifying bile duct injuries. Additionally, hepatobiliary contrast assists in evaluating challenging hepatic MRI cases.

### GIE143

**The Radiologist's Role in Biliary Duct Injury: Pre-Operative and Post-Operative Imaging and Assessment**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Jay A. Karajigkar MD (Presenter): Nothing to Disclose
- Barak Friedman MD: Nothing to Disclose
- John J. Hines MD: Nothing to Disclose

**Teaching Points**

1. To learn the common etiologies of biliary tract injuries. 2. To describe our institutional protocol for the evaluation of biliary tract injury, including the utility of different imaging modalities (CT, MR, nuclear medicine). 3. To recognize the common imaging findings of bile duct injury in the pre-operative setting. 4. To recognize and describe the post-operative biliary tract complications(biliary leak, obstruction, stricture).

**Table of Contents/Outline**

- Background and etiology of biliary injury. - Types of biliary injury (Strasberg classification). - Imaging workup of biliary tract injury (MRCP, CT, hepatobiliary scintigraphy). - Description of salient pre-operative imaging findings when evaluating biliary tract injury (site of injury, length of involvement, presence of other biliary tract anomalies). - Description of imaging findings of post-operative biliary complications with cases (biliary leak, obstruction, stricture). - Summary and conclusions.

### GIE145

**3T MRI in Perianal Fistulas: Road Mapping the Tracks**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Kanchan Gupta MD (Presenter): Nothing to Disclose
- Rahul Bhusan Gujralthi MD: Nothing to Disclose
- Tanvi S. Jakhi MBBS: Nothing to Disclose
- Vivhek Pai: Nothing to Disclose
- Isha Prakash Kotecha MBBS: Nothing to Disclose
- Bhujang Upendra Pai: Nothing to Disclose
TEACHING POINTS
1. To study perianal anatomy on 3T MRI
2. To outline MR classification of perianal fistulas
3. To illustrate spectrum of findings of perianal fistulas on 3T MRI

TABLE OF CONTENTS/OUTLINE
Detailed assessment of perianal fistulae, their anatomical extent and associated complications play a crucial role in preoperative surgical planning and favourable outcome. Multiplanar imaging and excellent soft tissue resolution on 3T enables accurate delineation of primary and secondary tracks and associated complications. Retrospective review of 63 cases of perianal fistulas scanned between January 2010 to January 2014 on 3T MRI revealed a spectrum of findings. The findings encountered and illustrated in our exhibit include intersphincteric, transsphincteric, extrasphincteric extent; secondary tracts in various planes; perianal abscesses; suprarectal extent, in isolation and/or variable combinations. Purpose of our exhibit is to understand the anatomy of perianal region and varied appearance of perianal fistulas, enabling radiologists to road map these primary and secondary tracks helping in favorable surgical outcome.

GIE146
A Review on the Role of Dynamic Rectal Examination (Defecography) to Assess the Abnormalities of Defecation Mechanics

Education Exhibits
Location: GI Community, Learning Center

Participants
Ahmad Yasin Ibrahim Taha MD, MBBS (Presenter): Nothing to Disclose
Ahmed Monier Sherif MBCh, FRCR : Nothing to Disclose
Ala Alsherbini MD : Nothing to Disclose
Amal Airashid MBBS : Nothing to Disclose
Shaimaa Abdelhassib Fadi MD : Nothing to Disclose
Adham Darweesh : Nothing to Disclose
Mostafa All MBBCh, MD : Nothing to Disclose

TEACHING POINTS
1-To emphasize the diagnostic importance of defecography and to list the most encountered evacuatory disorders of the rectum and anal canal in our department.
2-To demonstrate the steps and the needed preparations for defecography procedure.
3-To explore the diagnostic yield and interpret the images findings.

TABLE OF CONTENTS/OUTLINE

GIE148
Beyond TME—Determining Surgical Planes for Locally Advanced Rectal Cancer Using MRI

Education Exhibits
Location: GI Community, Learning Center

Magna Cum Laude

Participants
Venus Hedayati MRCP, FRCR (Presenter): Nothing to Disclose
Svetlana Balyasnikova : Nothing to Disclose
Paris Tekkis : Nothing to Disclose
Gina Brown MD, MBBS : Nothing to Disclose

TEACHING POINTS
With the advent of extra-levator abdomino-perineal resections (ELAPE) and exenterative surgery there has been a paradigm shift in the management of locally advanced rectal cancer. The development and use of these surgical procedures has significantly increased accessibility to curative surgery, previously not performed on the basis of mesorectal margin involvement. The radiologist is fundamental in determining appropriate radiological suitability for these procedures and in assessing the surgical planes required and likely to achieve curative (R0) resections. The key imaging factors in locally advanced rectal cancer with the use and importance of a descriptive compartmental anatomical classification system for determining sites of local spread will be discussed. The indispensable understanding of surgical planes in concluding potential surgical options will be drawn upon.

This exhibit will highlight recent advances in radiological-surgical assessment and focus on the surgical options beyond standard Total Mesorectal Excision (TME).

TABLE OF CONTENTS/OUTLINE
-Background -Summary of the current surgical options of TME and beyond -Case examples from our institution using a compartmental-based pattern of reporting to ensure the radiologist can appropriately define the required surgical planes.

GIE150
MRI Defecography. Anatomical and Functional Cine-based Evaluation of the Pelvic Floor Dysfunction: When Everything Is Falling Down

Education Exhibits
Location: GI Community, Learning Center
Participants

Julieta Viridiana Galicia MD (Presenter): Nothing to Disclose
Fabian Andres Cabrera-Florez MD: Nothing to Disclose
Rocio Perez Johnston MD: Nothing to Disclose
Jaime A. Saavedra-Abril MD: Nothing to Disclose
Carmen Rocio Ramirez Carmona MD: Nothing to Disclose
Santiago Saavedra MD: Nothing to Disclose
Cesar Nicolas Cristancho Rojas MD: Nothing to Disclose
Eric T. Kimura-Hayama MD: Nothing to Disclose

TEACHING POINTS

1. The pelvic floor is a complex anatomical-functional system, which provides pelvic support, maintains continence, and coordinates relaxation during urination and defecation. 2. Pelvic floor dysfunction (PFD) involves a heterogeneous group of disorders affecting up to 50% of middle-aged and older patients, primarily women. 3. The knowledge of anatomy and physiology of the pelvic floor allows the classification of the female pelvis in 3 functional compartments: Anterior, middle and posterior. 4. Fluoroscopic studies have been used for the past 20 years for the diagnosis of pelvic floor dysfunction. However, MR defecography provides accurate real time (cine-based) images to survey the entire pelvis and to evaluate its dynamics. This method is useful in patients with moderate to severe symptoms to localize and classify pelvic floor dysfunction for surgical planning.

TABLE OF CONTENTS/OUTLINE

1. Historical review. 2. MR and radiologic anatomy of the pelvic floor. 3. MR defecography protocol and interpretation with traditional (fluoroscopic) correlation based. 4. Pictorial review (static and cine images) of pelvic floor disorders. 5. Advantages or MR compared to other techniques.

GIE151

MRI Evaluation of Perianal Fistula: What the Radiologist Should Know

Education Exhibits
Location: GI Community, Learning Center

Participants

Omar Addou MD, MSc (Presenter): Nothing to Disclose
Badreeddine Alami MD: Nothing to Disclose
Youssef Alaoui Lamrani MD: Nothing to Disclose
Meryem Boubbou: Nothing to Disclose
Mustapha Maarouf: Nothing to Disclose
Siham Tizniti: Nothing to Disclose
Imane Kamaoui MD, PhD: Nothing to Disclose

TEACHING POINTS

• To illustrate the relevant pelvic normal anatomy and examples of various anoperineal fistula types. • To provide an overview of pelvic MRI for the evaluation of perianal fistulas and demonstrate MRI imaging features of those fistula types.

TABLE OF CONTENTS/OUTLINE

In this exhibit we * Demonstrate the imaging findings of anoperineal fistula types * Learn how to diagnose and classify all perianal fistulas, with the aim to have a successful treatment without recurrences. Examples to include the following: - Simple primary and direct fistula (10 cases) - Complex fistulas including horseshoe type (15 cases) - Postoperative anal fistula (5 cases) - Perianal abscess (8 cases) - Recurrent fistulas (3 cases)

GIE152

MRI findings of Rectal Submucosal Lesions: Beyond the Optical Colonoscopy

Education Exhibits
Location: GI Community, Learning Center

Participants

Ana Alvarez Vazquez (Presenter): Nothing to Disclose
Chawar Hayoun: Nothing to Disclose
Luis Herranz Hidalgo: Nothing to Disclose
Raquel Cano Alonso: Nothing to Disclose
Ana Fernandez Alfonso: Nothing to Disclose
Vicente Martinez de Vega: Nothing to Disclose

TEACHING POINTS

1. Lesions of intramural or extramural origin may give rise to a submucosal abnormality at colorectal evaluation. 2. MRI is the best diagnostic technique for the characterization of rectal submucosal lesions because it allows to arrive a reasonable differential diagnosis and to assess the degree of rectal wall involvement and the impairment of adjacent organs.

TABLE OF CONTENTS/OUTLINE

- High-Resolution MRI - Anatomic landmarks - Histological-radiological correlation - Gastrointestinal lesions - Pelvic pathology - Sample cases

GIE153

MRI in Rectal Cancer: A 2014 Up-to-Date with Pathologic Correlation

Education Exhibits
Location: GI Community, Learning Center

Participants
TEACHING POINTS

The aim of the exhibit is to: • Illustrate the anatomical information provided by rectal magnetic resonance imaging (MRI). • Discuss the protocols and the technical requirements. • Understand the MRI findings used to stage rectal cancer based on the TNM classification and other relevant prognostic factors, before and after neoadjuvant radiochemotherapy (RCT), with pathologic correlation. • Acknowledge and illustrate the importance of MRI for surgical planning. • Discuss the current role of diffusion weighted imaging (DWI) in the restaging after neoadjuvant RCT. • Summarize essential findings that should be searched for and included in the radiologist report.

TABLE OF CONTENTS/OUTLINE

• Introduction Up-to-date on the current state-of-the-art treatment options. Discussion of the pivotal role of rectal MRI in the individualization of treatment by providing an accurate stratification of risk. • Normal anatomy and MRI technique/protocol Role of DWI and volumetry after RCT is discussed. • Illustration of the relevant imaging findings based on the TNM classification and other important prognostic factors with pathologic correlation. • Discussion of the items that should be included in a structured report, with review of the literature. • Conclusion.

GIE154

Natural History of Colorectal Cancer: How CT Colonography Can Help to Predict Which Lesions Grow Slowly or Rapidly

Education Exhibits
Location: GI Community, Learning Center
Certificate of Merit

TEACHING POINTS

1. To show the sequential morphological changes of various colorectal neoplastic lesions, based on the imaging findings obtained from follow-up surveillance CT colonography, conventional abdominal CT, barium enema and colonoscopy.
2. To familiarize the audience with the developmental process and characteristics of the lesions showing progressive behavior.
3. To understand key imaging findings of the lesions which should be detected effectively to reduce mortality.

TABLE OF CONTENTS/OUTLINE

1. Review of the developmental process (natural history) of colorectal neoplastic lesions. 2. Introduction of typical shapes and characteristics of clinically indolent lesions and progressive life-threatening lesions. 3. Case series using 2D- and 3D- images in a quiz case-study format, including adenoma, serrated adenoma, adenocarcinoma with or without submucosal invasion and advanced adenocarcinoma. 4. Answer for all questions.

GIE155

Peri-anal Crohn's Disease: Spectrum of Imaging Findings

Education Exhibits
Location: GI Community, Learning Center
Certificate of Merit

TEACHING POINTS

The purpose of this exhibit is to: 1. Review the pathophysiology and manifestations of perianal Crohn's disease. 2. Review the role of imaging in perianal Crohn's, particularly of MRI for its ability to depict relationship of perianal fistulae to the anal sphincter complex, and to demonstrate entire extent of disease, including occult collections. 3. Describe the importance of multidisciplinary management in perianal Crohn's disease, and the role of the radiologist. 4. Show multiple imaging examples of perianal Crohn's disease, including imaging before and after various medical and surgical interventions.

TABLE OF CONTENTS/OUTLINE

Epidemiology of Perianal Crohn's Disease Pathophysiology of Perianal Crohn's Disease Role of Imaging in Perianal Crohn's Disease - with emphasis on MRI Multidisciplinary Care in Perianal Crohn's Disease Case examples - range of manifestations - appearance of medical and surgical interventions
Perianal Fistulas—MRI Evaluation

Education Exhibits
Location: GI Community, Learning Center

Participants

Ines Santiago Martins MD (Presenter): Nothing to Disclose
Hugo Pisco Pacheco MD: Nothing to Disclose
Madalena Pimenta MD: Nothing to Disclose

TEACHING POINTS

In this educational exhibit we propose to review:
- The anatomy of the perianal region
- The MRI technique in the evaluation of perianal fistulas
- The St James' University Hospital classification of the various fistula types

TABLE OF CONTENTS/OUTLINE

- Anatomy of the perianal region
- The St James' University Hospital classification of fistulas
- The MRI technique in the evaluation of perianal fistulas
- Review of imaging findings on MRI
  o Classification of the fistula types (intersphincteric, transsphincteric, supralevator and translevator, submucosal fistulas and sinus tracts)
  o Identification of secondary tracts
  o Identification of abscesses
  o Relationships to pelvic structures
- Summary

Primer of Reading Defecography for Residents

Education Exhibits
Location: GI Community, Learning Center

Participants

Tina Islam MD (Presenter): Nothing to Disclose
Anuradha Samir Shenoy-Bhangle MD: Nothing to Disclose
Joseph F. Simeone MD: Nothing to Disclose
Michael J. Shortsleeve MD: Nothing to Disclose
Mukesh Gobind Harisinghani MD: Nothing to Disclose

TEACHING POINTS

1. The reader will learn a systematic approach to interpreting defecography
2. The reader will understand normal and abnormal findings in defecography

TABLE OF CONTENTS/OUTLINE

1. Overview of a structured approach to interpreting defecography with illustrative normal and abnormal clinical cases
2. A structured dictation template is provided on how to report findings

Pseudomyxoma Peritonei (PMP): Imaging Findings before and after the Combined Therapy Using Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy

Education Exhibits
Location: GI Community, Learning Center

Participants

Tsuyoshi Tajima MD, PhD (Presenter): Nothing to Disclose
Ryuji Uehara MD: Nothing to Disclose
Hiroaki Wakiyama: Nothing to Disclose
Hideaki Yano: Nothing to Disclose

TEACHING POINTS

The purpose of this study is:
1. To understand the concepts of PMP
2. To recognize the up-to-date surgical procedures and postoperative complications of PMP
3. To review the common and uncommon imaging findings of PMP

TABLE OF CONTENTS/OUTLINE

1. PMP concepts
2. PMP treatment in our institute
3. Up-to-date PMP treatment
4. Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy
5. Primary and disseminated PMP: common and uncommon imaging findings
6. Differential diagnosis
7. Various imaging findings of post-operative complications

Radiation Dose and Image Quality for Low Dose Fecal-tagging CT Colonography: A Comparison of Electronic Cleansing between Single-energy and Dual-energy CTC

Education Exhibits
Location: GI Community, Learning Center
Participants

Wenli Cai PhD (Presenter): Nothing to Disclose  
Da Zhang PhD: Nothing to Disclose  
Bob Liu PhD: Nothing to Disclose  
Michael Ethan Zalis MD: Co-founder, QPID Health Inc Chief Medical Officer, QPID Health Inc Stockholder, QPID Health Inc

TEACHING POINTS

The teaching points of this exhibits are:
1. Dual-energy CT colonography (DE-CTC) has different profiles of radiation dose compared to conventional single-energy CT colonography (SE-CTC).
2. Dual-energy electronic cleansing (DE-EC) improves the quality of electronic cleansing and the diagnostic performance in fecal-tagging DE-CTC images compared to SE-CTC.
3. DE-EC may achieve better EC performance compared to conventional single-energy EC with less radiation dose.
4. Low-dose DE-CTC assisted by DE-EC has the potential to become the next-generation colorectal screening modality.

TABLE OF CONTENTS/OUTLINE

The exhibit will be outlined as below: 1. Experiments of radiation dose: demonstrate the measurements of radiation dose in the colon scanned by DE-CTC and SE-CTC imaging protocols at the same scanner-reported doses. 2. Review of the DE-EC technique for low-dose DE-CTC, including reduction of image noise, material decomposition model, and virtual colon tagging. 3. Experiments of DE-EC: demonstrate the improvement of EC quality in the reduction of artifacts and pitfalls by using DE-EC vs. single-energy EC. 4. Discussion of the effectiveness and limitations of DE-EC techniques in visualization of low-dose DE-CTC images. 5. Future work and summary of DE-EC in low-dose DE-CTC images.

GIE160

Rectal Cancer MRI: How DWI Can Help Diagnosis in Local Recurrences

Education Exhibits
Location: GI Community, Learning Center

Participants

Maria Isabel Puig-Povendano (Presenter): Nothing to Disclose  
Eva Maria Merino Serra MD: Nothing to Disclose  
David Martinez De La Haza MD: Nothing to Disclose  
Ana Sanchez Marquez MD: Nothing to Disclose  
Eduardo Andia Navarro MD: Nothing to Disclose  
Domenico Fraccalvieri: Nothing to Disclose

TEACHING POINTS

In spite of improvement in surgical techniques local rectal cancer recurrences are not rare. Usually the rectal cancer follow up is done with CT but, if suspicion of pelvic tumoral relapse exists and CT findings remain equivocal, patients can be tributaries of PET-CT. With this technique false positives (inflammatory diseases, previous surgery or radiotherapy, complications like fistulas or haematomas) and false negatives (necrotic or mucinous lesions or recent chemotherapy) can appear. MRI conventional images alone have high accuracy in detecting recurrences. DWI is able to help especially when they are small, anastomotic or multiples and improves confidence in rule out recurrence. Relapsing tumors restrict diffusion in b 1000 and are hypointenses in ADC maps, these features allow differential diagnosis with fibrotic or inflammatory changes. False positive are possible in mucinous tumor relapses. Surgical contraindications: proximal sacral invasion (above S2-S3), sciatic notch extension, involvement of nervous roots (S1, S2) or vascular encasement can be evaluated with conventional sequences.

TABLE OF CONTENTS/OUTLINE

1. MRI rectal recurrence findings. 2. DWI in detection and differential diagnosis of recurrences. Correlation with equivocal lesions at PET-CT. 3. MRI planning surgery. Surgical contraindications.

GIE161

Rectal Cancer: How Local Staging with MR Imaging Influences Clinical Management

Education Exhibits
Location: GI Community, Learning Center

Participants

Supreeta Arya MD (Presenter): Nothing to Disclose  
Deepak Das MBBS: Nothing to Disclose  
Amar Ramesh Udare MBBS: Nothing to Disclose  
avanish saklani: Nothing to Disclose  
Kumaresan Sandrasegaran MD: Nothing to Disclose

TEACHING POINTS

To discuss the issues of clinical importance in the local staging of rectal cancers.
2. To discuss the optimal MRI technique for local staging as per ESGAR 2012 consensus meeting for MRI in clinical management of rectal cancers.
3. To bring awareness of how MR imaging findings assist in planning optimal therapy.

TABLE OF CONTENTS/OUTLINE

1. Radiological anatomy of the rectum. 2. Brief outline of the major phase III trials in nonmetastatic rectal cancer that have influenced current evidence based optimal therapy. 3. Issues of importance in the local staging of rectal cancer. 4. Highlights of ESGAR 2012 consensus meeting for MRI in clinical management of rectal cancers that will include optimal MRI technique. 5. Pictorial essay of various stages of rectal cancer with impact of various imaging findings on the therapy plan; how
imaging assists surgical and radiation therapy planning

6. Checklist for synoptic reporting

**GIE162**

Rectal, Peri-rectal and Perineal Diseases- a Multi-modality Pictorial Review with Histological, Endoscopic and Operative Correlation

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Maureen Gail Heldmann MD (Presenter): Nothing to Disclose  
Phillip Cole MD: Nothing to Disclose  
Arielle Dubose MD: Nothing to Disclose  
Jaiyeola Q. Thomas-Ogunniyi MD: Nothing to Disclose  
Guillermo P. Sangster MD: Nothing to Disclose  
Sana Naeem MD: Nothing to Disclose

**TEACHING POINTS**

Review the anatomy of the supra levator and infra levator spaces of the pelvis and perineum Illustrate a variety of neoplastic, infectious, inflammatory, traumatic and congenital disease states affecting the rectum, anus, surrounding soft tissues and perineum Depict correlative imaging, endoscopic and histological findings in rectal and peri-rectal pathology Provide an overview of key findings that influence therapy selection and operative approaches to rectal, anal and perineal therapies

**TABLE OF CONTENTS/OUTLINE**

A gamut of pathology affects the rectum, anus and perineum, and multiple imaging modalities offer information complimentary to the physical examination for optimal assessment and treatment planning. In an area easy to overlook on routine imaging, we offer correlative imaging, endoscopic, pathologic and operative review of a range of rectal, peri-rectal and perineal disease processes organized by the following topics: Neoplasm- benign and malignant Infectious and non-infectious inflammatory Traumatic Congenital/developmental Vascular Key surgical concepts are discussed, including radiological information required by the colorectal surgeon and current operative approaches to these anatomic spaces to assist the practicing radiologist in comprehensive reporting.

**GIE163**

The Post-Operative Colon: Imaging and Complications

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Jay A. Karajgikar MD (Presenter): Nothing to Disclose  
Barak Friedman MD: Nothing to Disclose  
John J. Hines MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is to: 1. To understand and recognize the post-operative imaging appearance (CT and fluoroscopy) of commonly performed colon resections, with detailed emphasis on the Hartmann’s Pouch, Ileoanal J-Pouch, and Lower Anterior Resection. 2. To understand and recognize the post-operative complications associated with the above mentioned procedures. 3. To learn the indications and contraindications for the Hartmann’s Pouch, Ileoanal J-Pouch, and Lower Anterior Resection.

**TABLE OF CONTENTS/OUTLINE**

Background on colon resection (Indications, common terminology) Ileoanal J-Pouch: - Indications, contraindications, surgical technique. - Normal post-operative anatomy. Hartmann’s Pouch: - Indications, contraindications, surgical technique. - Normal post-operative anatomy. Low Anterior Resection: - Indications, contraindications, surgical technique. - Normal post-operative anatomy. Complications, with examples from the above procedures (i.e. anastomotic leak and abscess, fistula, pouchitis, bowel obstruction, anastomotic stricture) Summary and Conclusions

**GIE164**

Tumor and Tumor-like Lesions of the Rectum: Uncommon Imaging Findings and Rare Pathological Entities

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Luis Curvo-Semedo MD, PhD (Presenter): Nothing to Disclose  
Daniel Andrade MD: Nothing to Disclose  
Jorge Brito MD: Nothing to Disclose  
Filipe Caseiro-Alves: Nothing to Disclose

**TEACHING POINTS**

The main purposes of this work are:  
- To recognize uncommon imaging findings of tumor and tumor-like conditions of the rectum as seen on cross-sectional imaging studies, with emphasis on MRI (including DWI). These include both primary staging and restaging examinations.  
- To review the clinical and imaging features of some rare neoplasms and neoplasm-like lesions occurring in the rectum.

**TABLE OF CONTENTS/OUTLINE**
**GIE165**

**Unusual Masses of the Rectal, Perirectal and Presacral Regions**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Andreu F. Costa MD, MSc (Presenter): Nothing to Disclose

Seng Thipphavong MD: Nothing to Disclose

**TEACHING POINTS**

A variety of interesting and unusual masses may arise in the rectal, perirectal and presacral regions. The precise location of the mass and its imaging manifestations can often yield a limited differential diagnosis. MRI is superior in delineating the origin and local extent of masses in this region of the pelvis.

**TABLE OF CONTENTS/OUTLINE**

- Learning Objectives
- Disclaimer
- Rectal and perirectal masses: Interesting manifestations of adenocarcinoma: intussusception; mucinous adenocarcinoma Rectal GIST Rectal carcinoid Perirectal sarcomas Perirectal abscess
- Presacral masses: Nerve sheath tumor Presacral extra-medullary hematopoiesis Extra-adrenal myelolipoma
- Summary
- References
- Contact Information

**GIE166**

**Virtual Monochromatic CT Colonography: What Is It and How To Use It**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**


Janne Johannes Nappi PhD: Royalties, Hologic, Inc Royalties, MEDIAN Technologies

Radin Adi Nasirudin DIPLENG: Nothing to Disclose

Peter B. Noel PhD: Nothing to Disclose

Simone Mazzetti: Nothing to Disclose

Daniele Regge MD: Nothing to Disclose

Rie Tachibana: Nothing to Disclose

**TEACHING POINTS**

To learn about the benefits and pitfalls of virtual monochromatic spectral imaging in the interpretation of dual-energy CT colonography (CTC) examinations, in particular, ultra-low-dose CTC examinations.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction and background: Describe the role of virtual monochromatic imaging in dual-energy CTC. 2. Principles of monochromatic CT imaging: Review the principles of how virtual monochromatic images are generated from dual-energy CTC acquisitions using image-domain or projection-domain methods. 3. Image quality improvement in virtual monochromatic images: Provide an overview of the effect of virtual monochromatic imaging on image quality, including beam-hardening artifact reduction and noise reduction, in comparison with single-energy CTC imaging. 4. Computer-assisted virtual monochromatic CTC: Describe the principles and benefits of computer-assisted CTC techniques based on virtual monochromatic imaging, in particular, virtual bowel cleansing and computer-aided detection. 5. Interpretation of virtual monochromatic CTC: Provide an overview of the CTC reading based on virtual monochromatic images. 6. Conclusions: Virtual monochromatic spectral imaging has the potential to improve image quality in low-dose CTC and to improve readers' diagnostic performance.

**GIE167**

**Abdominal Wall Hernias: A Pictorial Review**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Peter Lee MD (Presenter): Nothing to Disclose

Gregory Michael Grimaldi MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: 1. To review the various types of abdominal wall hernias with a focus on anatomy. 2. To discuss characteristic imaging findings of abdominal wall hernias. 3. To understand clinical implications and complications of abdominal wall hernias.

**TABLE OF CONTENTS/OUTLINE**

- Description of abdominal wall hernia types: Inguinal Ventral Lumbar Femoral Port site Richter's Littre's Amyand's For each type of abdominal wall hernia, we will discuss: Anatomic considerations Imaging findings Presentation Clinical Implications
Abdominal Wall Hernias: Classic and Unusual

Education Exhibits
Location: GI Community, Learning Center

Participants
Arash Bedayat MD (Presenter): Nothing to Disclose
Hemang Kotecha DO : Nothing to Disclose
Matthew Lukas Holmes MD : Nothing to Disclose
Byron Y. Chen MD : Nothing to Disclose
Hao Steven Lo MD : Nothing to Disclose
Adib Raphael Karam MD : Nothing to Disclose

TEACHING POINTS
Review the radiologic anatomy and imaging findings of abdominal wall hernias. Discuss the etiologies, imaging pitfalls, and complications.

TABLE OF CONTENTS/OUTLINE
With the improved spatial resolution of current multidetector computed tomography (MDCT) and availability of multiplanar reformatted (MPR) images, abdominal wall hernias are displayed with precise anatomical detail allowing accurate description. The surgically relevant radiologic anatomy, etiologies, pitfalls, and complications of a wide range of both primary and incisional abdominal wall hernias will be discussed in this presentation.

GIE170
Calcifications in Abdominal Radiography: A Pictorial Review

Education Exhibits
Location: GI Community, Learning Center

Participants
Alvaro Paniagua MD (Presenter): Nothing to Disclose
Sara Moron Hodge MD, PhD : Nothing to Disclose
Susana Hernandez Muniz MD : Nothing to Disclose
Mercedes Ibanez Moya : Nothing to Disclose
Jose Carmelo Alibaiso Merino MD : Nothing to Disclose

TEACHING POINTS
Understand how abdominal calcifications are originated and describe different causes that lead to detectable calcifications on plain abdominal radiographs. To establish a differential diagnosis based on location, characteristics and clinical features. To learn which calcifications have clinical significance and when additional imaging exploration may be required.

TABLE OF CONTENTS/OUTLINE
Calcifications are a common incidental finding in abdominal plain film and sometimes the clue to achieve a diagnosis. The quality of our report increases if we are able to determine its etiology and possible clinical significance. Clinical and imaging keys for differential diagnosis: shape, morphology, density and location in quadrants will be revised. The relation between stone composition and radiographic appearance will be explained and displayed for biliary and urinary stones. Examples of common causes and some unpredictable ones will be shown with CT correlation. Cases when further additional imaging needs to be obtained will be reviewed.

GIE171
Don’t Get Thrown for a Loop (US)!: Imaging Findings, Atypical Presentations, Complications of Abdominal Systemic Lupus Erythematosus (SLE)

Education Exhibits
Location: GI Community, Learning Center
Certificate of Merit

Participants
Gayatri Joshi MD : Nothing to Disclose
Christine O. Menias MD (Presenter): Nothing to Disclose
Amy Kiyo Hara MD : Nothing to Disclose
Kumaresan Sandrasegaran MD : Nothing to Disclose
Mariam Moshiri MD : Consultant, Reed Elsevier Author, Reed Elsevier
Douglas S. Katz MD : Nothing to Disclose
Akram Mohamed Shaaban MB,BS : Contributor, Amirsys, Inc

TEACHING POINTS
Review classic SLE clinical presentations and abdominopelvic imaging Describe atypical abdominopelvic SLE imaging findings Improve diagnosis of SLE complications that can be diagnosed at imaging

TABLE OF CONTENTS/OUTLINE
Discuss pathophysiology of SLE abdominopelvic SLE Describe etiology and illustrate abdominal SLE findings including: bowel wall thickening, hepatitis, nephritis, pancreatitis, intramural hemorrhage, and vasculitis. Illustrate complications of abdominal SLE including: mesenteric ischemia, visceral infarction, venous thrombosis, hematomas, and perforation. Discuss management options of abdominal SLE SLE is an autoimmune disorder that induces a necrotizing vasculitis affecting the musculoskeletal system, GI and GU tract, and skin Inflammation of small blood vessels of the gut produces a variety of complications including intestinal ischemia, hemorrhage ulceration, infarction, and perforation. Genitourinary involvement of SLE includes
hydronephrosis, nephritis, renal infarcts, and renal vein thrombosis. These imaging findings can often be mistakenly attributed to other etiologies. The purpose of this exhibit is to illustrate the key imaging features of GI and GU manifestations of SLE, with an emphasis on CT. In addition, this exhibit will explain the implications of these various imaging findings on patient management.

GIE174

Imaging of Umbilicus in Adults

Education Exhibits

Location: GI Community, Learning Center

Participants

Jun Isogai MD (Presenter): Nothing to Disclose
Jun Kaneko : Nothing to Disclose
Mikio Tezuka : Nothing to Disclose
Yoshiaki Katada MD : Nothing to Disclose

TEACHING POINTS

To demonstrate normal variants and mimics of periumbilical structures To illustrate a wide variety of umbilical disorders

TABLE OF CONTENTS/OUTLINE

A. Review of embryologic and anatomical features of the umbilicus B. CT findings of normal variants of the periumbilicus. 1) Ligamentum teres, paraumbilical veins and hepatic falciform arteries in the falciform ligament, 2) Urachal remnants and obliterated umbilical arteries in the preperitoneal space. C. CT or MRI findings of a wide spectrum of umbilical diseases. 1) Urachal congenital anomalies 2) Infected urachal remnants 3) Omphalomesenteric duct anomalies attached to the umbilicus 4) Recanalized paraumbilical vein in Cruveilhier-Baumgarten syndrome 5) Portosystemic collateral veins related with embryologic vitellointestinal vessels connecting the ileal branch to the umbilicus 6) Traumatic injury of the hepatic falciform artery 7) Malignant umbilical tumors

GIE175

Laparoscopic Adjustable Gastric Banding: What the Radiologist Needs to Know

Education Exhibits

Location: GI Community, Learning Center

Participants

David Borukhov MD (Presenter): Nothing to Disclose
Mustafa Al Roubaie MD : Nothing to Disclose
John J. Hines MD : Nothing to Disclose

TEACHING POINTS

1) Review the history, indications and weight loss outcomes of laparoscopic gastric banding. 2) Learn how to assess a lap band on multiple imaging modalities 3) Learn how to adjust a Lap Band. 4) Illustrate the spectrum of Lap Band post-surgical complications and review their treatment.

TABLE OF CONTENTS/OUTLINE


GIE176

Low kV CT Imaging of the Abdomen: Benefits, Pearls and Pitfalls

Education Exhibits

Location: GI Community, Learning Center

Certificate of Merit
Selected for RadioGraphics

Participants

Adeel Rahim Seyal MD : Grant, Siemens AG
Atilla Arslanoglu MD : Grant, Siemens AG
Azize Sahin MD : Nothing to Disclose
Samir Abboud MD : Nothing to Disclose
Jeanne Miriam Horowitz MD : Nothing to Disclose
Vahid Yaghmai MD (Presenter): Nothing to Disclose

TEACHING POINTS

Low kV is robust tool for reducing radiation dose from CT scans. There are significant clinical implications when lowering kV in abdominal imaging. Knowledge of these issues is essential for successful implementation of low kV CT imaging of the abdomen. The aim of this abstract is to provide a thorough review of the potential benefits that can be derived from low kV imaging of the abdomen including improved lesions conspicuity, improved contrast to noise ratio in CT angiography and lower dose of contrast material. We will also review the pitfalls associated with low kV imaging.

TABLE OF CONTENTS/OUTLINE

• Basic principles of low kV CT imaging • Effect of low kV on noise, image quality, CNR, radiation dose • Implementing reduced tube voltage in abdominal imaging • Clinical applications of low kV imaging in abdomen • Reducing intravenous contrast using low kV imaging. How? When? • Potential drawbacks of low kV imaging including photon starvation and image noise, potential missed vascular pathology and effect on lesion characterization based on density measurements
Material Separation Using Dual-energy CT (DECT): Current and Emerging Applications

TEACHING POINTS
DECT provides the capability to separate various materials by virtue of differences in their atomic numbers, and therefore attenuation profile, at different energies. This creates opportunities to generate material specific images to derive clinically useful information as outlined below.

TABLE OF CONTENTS/OUTLINE
- Iodine images allow tissue characterization (iodine content), assess tissue viability, grade liver fibrosis (iodine retention on delayed images), and improve assessment of vascular patency. In cancer patients, improved assessment of local/distant metastasis and quantified iodine can serve as a biomarker of therapeutic response. • Fat images detect and grade hepatic steatosis and characterize fat containing lesions (adenomas, AML) and vascular plaque. • Calcium images quantify bone mineral density, detect intralesional calcium, and characterize vascular plaque and renal stone composition. • Uric acid images diagnose UA stones for appropriate management and visualize urate crystals in the joint, differentiating primary gout vs. pseudo-gout. • Iron images detect and quantify tissue iron and monitor treatment. • Although not currently available, images specific to Gold (inflammation localization), Zinc (β cells in pancreas), Manganese (melanoma) and Copper (Wilson's) may be generated impacting diagnosis and treatment monitoring.

The Ostensible Gallbladder: Ultrasound of RUQ Pain beyond Cholecystitis

TEACHING POINTS
1. Review etiologies of RUQ pain not caused by the gallbladder. 2. Highlight the ultrasound appearance of reviewed pathology. 3. Provide an overview of disease management including correlative imaging with CT, MRI, and/or PET/CT.

TABLE OF CONTENTS/OUTLINE
While gallbladder pathology is the most common cause of right upper quadrant pain, numerous additional etiologies may cause a similar clinical picture. Ultrasound is frequently the triage examination, giving the radiologist an opportunity to discern the correct diagnosis or next management step. Using a quiz format, the differential diagnosis of RUQ pain will be reviewed, with emphasis placed on the ultrasound appearance of each disease process. Further characterization with CT, MR, and PET/CT imaging will be provided, followed by a brief discussion and synopsis of patient management. Cases will be presented by organ and disease process, including:
- Infectious and inflammatory: acute hepatitis (Hepatitis B, mononucleosis, and drug induced), hepatic abscess (bacterial and fungal), and cholangitis. Also pancreatic pseudocyst, pyelonephritis, and pyonephrosis.
- Vascular, including hepatic infarct, veno-occlusive disease, portal vein thrombosis, pseudoaneurysm formation.
- Neoplastic: Hepatic, biliary, and pancreatic tumors.
- Obstructive: Bowel, biliary, pancreatic and renal.

The Tip of the Iceberg: The Clue to Suspect Syndromes with Abdominal Involvement

TEACHING POINTS
A variety of syndromes involve abdominal organs. Sometimes abdominal manifestation could be an initial presentation of the
syndrome. Radiologists have an important role in suspecting syndromes and suggesting diagnostic workup for patients. Therefore, this exhibit will present the key images of abdominal manifestation of syndromes and also will review these syndromes including diagnostic and treatment methods.

TABLE OF CONTENTS/OUTLINE
1. Quizzes of various syndromes with key images. 2. Review of syndromes with abdominal involvement. 1) Imaging findings of syndromes 2) Diagnosis and brief review of treatment

GIE181

Tuberculosis: A Radiologic Review of Extrapulmonary Manifestations

Education Exhibits
Location: GI Community, Learning Center

Selected for RadioGraphics

Participants
Maria Jose Baladron MD (Presenter): Nothing to Disclose
Eugenio Zalaquett MD : Nothing to Disclose
Christine O. Menias MD : Nothing to Disclose
Ignacio Beddings MD : Nothing to Disclose
Pablo Bachler MD : Nothing to Disclose
Matias Gustavo Vargas Araya MD : Nothing to Disclose
Sanjeev Bhalla MD : Nothing to Disclose
Alvaro Huete Garin MD : Nothing to Disclose

TEACHING POINTS
1. To recognize that tuberculous infections are not limited to the chest 2. To learn the demographics, pathophysiology and clinical presentation of patients with extrapulmonary tuberculosis. 3. To review the spectrum of imaging findings of extrapulmonary tuberculosis through different imaging modalities.

TABLE OF CONTENTS/OUTLINE

GIE182

Up Against the Wall: A Spectrum of Abdominal Wall Abnormalities

Education Exhibits
Location: GI Community, Learning Center

Selected for RadioGraphics

Participants
Gabriela Gayer MD (Presenter): Nothing to Disclose
Amsalu Dabela-Biketi MD : Nothing to Disclose

TEACHING POINTS
1. Review a spectrum of common and unusual findings in the abdominal wall, including examples of different routes of pathological spread. 2. Construct a diagnostic approach to abdominal wall lesions on CT using attenuation characteristics (i.e. solid, cystic, calcified, and combinations), with special attention to overlapping imaging appearances. 3. Emphasize the importance of relevant clinical data in establishing the correct diagnosis.

TABLE OF CONTENTS/OUTLINE
1. Introduction 2. Diagnostic approach based on CT imaging features and pertinent history 3. Imaging algorithm for further workup 4. Challenge cases: congenital, infectious/inflammatory, neoplasm, iatrogenic 5. Summary

GIE183

Usual and Unusual Contents of Inguinal Hernia Sac: A Spectrum of Radiologic Findings

Education Exhibits
Location: GI Community, Learning Center

Selected for RadioGraphics

Participants
Hemang Kotecha DO : Nothing to Disclose
Eduardo Scortegagna MD : Nothing to Disclose
Heeseop Shin MD (Presenter): Nothing to Disclose
Young Hwan Kim MD : Nothing to Disclose

TEACHING POINTS
Brief review of the radiologic anatomy of the inguinal canal and inguinal hernias. Discuss imaging findings, pitfalls, and differential diagnosis of usual and unusual contents of inguinal hernia sac.

TABLE OF CONTENTS/OUTLINE
Although inguinal hernia is usually a clinical diagnosis, ultrasound, CT, and MRI have been increasingly used for diagnosis in clinically uncertain cases, preoperative evaluation of incarcerated hernia, and evaluation of postoperative complications. The most common cause of inguinal hernia is herniation of bowel with or without obstruction. Unusual hernia contents such as...
metastasis, undescended testicle, bladder, ovary, normal appendix, acute appendicitis (Amyand's hernia), lipoma and other tumors can pose a challenge for the surgeon if not properly diagnosed before surgery. Sometimes clinical diagnosis can be challenging, such as in obese patients and in those with chronic pain of unknown etiology. Ultrasound can be valuable when performed by experienced operators, CT scan can easily diagnose strangulated hernias and related complications, and MRI can be problem solving without radiation. Therefore, it is crucial for the radiologist to be familiar with the usual and unusual imaging findings of inguinal hernias, as well as incidentally identified normal structures within the inguinal canal.

**GIE184**

**Pre-Surgical CT-Guided Hookwire for the Correct Identification of Intraabdominal Masses at Surgery: Technique and Results from Our Experience**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Jonathan Hernandez MD (Presenter): Nothing to Disclose
Juan Carlos Pernas: Nothing to Disclose
Diana Hernandez: Nothing to Disclose
Carmen M. Perez MD: Nothing to Disclose
Magui Menso: Nothing to Disclose
Jesus Bollo: Nothing to Disclose

**TEACHING POINTS**

To review the indications and technique for the use of pre-surgical CT-guided hookwires for the detection of intraabdominal masses. To report the results from our experience.

**TABLE OF CONTENTS/OUTLINE**

INTRODUCTION Image-guided hookwires were used initially for the pre-surgical localization of non-palpable breast masses, with good results. Eventually, it led to the use of image-guided hookwires to localize non-palpable pulmonary, osteomuscular and abdominal lesions. However, there are not many reports in the literature about the placement of intraabdominal hookwires. INDICATIONS We will describe the indications for the procedure. TECHNIQUE We will also explain the different approaches for the placement of pre-surgical CT-guided intraabdominal hookwires. RESULTS FROM OUR EXPERIENCE We will show results from our experience with 6 patients who in the follow-up showed signs of intraabdominal tumoral recurrence in the imaging studies. We also discuss the outcome of the patients and complications CONCLUSIONS Percutaneous pre-surgical location with hookwires is an useful and safe method for localized resection, saving surgical time and improving the accuracy of the resected lesion with lower rate of complications.

**GIE185**

**About Time to Pay Closer Attention to Nonalcoholic Fatty Liver Disease and the Role of Imaging**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Samita Garg: Nothing to Disclose
Nizar Zein: Nothing to Disclose
Kavita Garg MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

Nonalcoholic fatty liver disease (NAFLD) is an important public health concern and a risk factor for cardiac disease, diabetes and cancer. Though patients with hepatic steatosis can be asymptomatic for years, a subset will progress to nonalcoholic steatohepatitis (NASH), cirrhosis and hepatoma. NAFLD includes a spectrum of histopathological changes ranging from simple steatosis to NASH to cirrhosis. Liver biopsy is considered a gold standard, however, ultrasound, CT and MR can be used to diagnose NAFLD noninvasively. Other diffuse hepatocellular diseases such as Hepatitis C, hemochromatosis, A1-antitrypsin can confound imaging findings. Emerging quantitative assessment methods such as elastography and MR appear promising, however prospective studies are warranted for validation.

**TABLE OF CONTENTS/OUTLINE**

Prevalence and histopathologic activity scores of NAFLD Typical, atypical findings and differential diagnosis of NAFLD on ultrasound, CT and MR. Pros and cons of different imaging modalities in NAFLD screening. Clinical associations of NAFLD including for liver transplant, gastric bypass surgery, chemotherapy, pancreatic fat and body composition are briefly discussed. Emerging quantitative assessment methods such as MR and elastography.

**GIE186**

**Congestive Hepatopathy: Imaging Findings**

*Education Exhibits*

*Location: GI Community, Learning Center*

- Certificate of Merit
- Selected for Radiographics

**Participants**

Michael Leigh Wells MD (Presenter): Nothing to Disclose
Joseph Poterucha: Nothing to Disclose
Eric Fenstad: Nothing to Disclose
Sudhakar Kundapur Venkatesh MD, FRCR: Nothing to Disclose
Phillip Matthew Young MD: Nothing to Disclose
Philip A. Araoz MD: Nothing to Disclose
**TEACHING POINTS**

Understand pathophysiology of congestive hepatopathy (CH). Imaging appearances of CH Role of MR Elastography

**TABLE OF CONTENTS/OUTLINE**

Background: CH refers to hepatic manifestations resulting from passive hepatic congestion due to cardiac causes. Prolonged CH may lead to liver fibrosis/cirrhosis. Significant liver fibrosis may develop before detection as liver dysfunction typically manifests late. Constrictive pericarditis in particular can result in rapid development of cirrhosis. Pathophysiology: CH results from increase in central venous pressure transmitted via inferior vena cava (IVC) and hepatic veins (HV) to sinusoids. Raised sinusoidal pressure, decreased hepatic venous blood flow and hypoxia results in degeneration of hepatocytes, particularly around central veins. Imaging findings: Dilated IVC and HVs; retrograde HV opacification at the early bolus phase; a diffusely mottled pattern of hepatic enhancement (nutmeg liver) and areas of patchy enhancement due to stagnant blood flow. Frequently extensive fibrosis with multiple regenerative nodules may be found. Magnetic resonance elastography (MRE) can demonstrate elevated liver stiffness secondary to liver fibrosis and may be useful in evaluation of fibrosis in CH. MRE can be easily performed after a cardiac MRI study. Preliminary experience with MRE in CH will be illustrated.

**GIE188**

Dual-energy CT: Applications in Liver Imaging

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

<table>
<thead>
<tr>
<th>Name</th>
<th>Disclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Javier Vallejos MD, MBA</td>
<td>Nothing to Disclose</td>
</tr>
<tr>
<td>Carlos Capunay MD</td>
<td>Nothing to Disclose</td>
</tr>
<tr>
<td>Patricia M. Carrascosa MD</td>
<td>Research Consultant, General Electric Company</td>
</tr>
</tbody>
</table>

**TEACHING POINTS**

1. To describe the technique and principles of dual-energy CT (DECT).
2. To discuss the potential applications of DECT in liver imaging.
3. To be familiar with the capabilities, strengths and limitations of DECT.

**TABLE OF CONTENTS/OUTLINE**


**GIE190**

Hepatic Diseases Characterized by Perivascular Distribution: Imaging Features, Differential Diagnosis with Pathological Correlation

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

<table>
<thead>
<tr>
<th>Name</th>
<th>Disclosure</th>
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</thead>
<tbody>
<tr>
<td>Akram Mohamed Shaaban MBBCh (Presenter)</td>
<td>Contributor, Amirsys, Inc</td>
</tr>
<tr>
<td>Christine G. Menias MD</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Bryan Robert Foster MD</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Khalef M. Elsayes MD</td>
<td>Nothing to Disclose</td>
</tr>
<tr>
<td>Maryam Rezvani MD</td>
<td>Nothing to Disclose</td>
</tr>
</tbody>
</table>

**TEACHING POINTS**

1. The learner should be able to list the different pathological entities characterized by periportal distribution
2. The reader should be able to compile a short list of differential diagnosis based on the imaging features

**TABLE OF CONTENTS/OUTLINE**

A. Perivascular fluid density
   1. Periportal edema and lymphedema
   2. Peribiliary cysts
   3. Caroli disease
   4. Biliary hamartomas

B. Perivascular enhancement
   1. Cavernous transformation of the portal vein
   2. Cholangitis (PSC, Pyogenic cholangitis, Viral cholangitis, AIDS-related cholangitis, Recurrent pyogenic cholangitis)
   3. Hepatitis
   4. Cholangiocarcinoma
   5. Metastases
   6. Periportal fibrosis (Congenital hepatic fibrosis, Schistosomiasis, Sarcoidosis)

C. Perivascular masses
   1. Lymphoma/PTLD
   2. Extramedullary hematopoiesis
   3. Neurofibromatosis
   4. Peliosis hepatis

D. Perivascular parenchymal abnormalities
   1. Perivascular steatosis
   2. Perivascular iron deposition
   3. Primary biliary cirrhosis
**GIE191**

**Hepatic Hemangioma…..or Not?**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Aytek Oto MD *(Presenter)*: Research Grant, Koninklijke Philips NV Consultant, Guerbet SA  
Richard L. Baron MD: Speakers Bureau, Bracco Group

**TEACHING POINTS**

Hemangiomas are the most common benign hepatic lesions and present in up to 30% of the population. In most cases, they have characteristic imaging findings allowing their reliable diagnosis, however, sometimes other benign and more importantly malignant liver lesions can mimic hemangiomas or hemangiomas may have atypical imaging characteristics and be mistaken for malignancy. The purpose of this exhibit is to review the potential pitfalls that can lead to challenges in the diagnosis of hemangiomas by presenting different cases with teaching points in a quiz format.

**TABLE OF CONTENTS/OUTLINE**

1. Review of the typical imaging characteristics of hemangiomas on US, CT and MRI  
2. Demonstration of imaging features of potential mimickers of hemangioma including malignant (HCC, cholangiocarcinoma, angiosarcoma, hypervascular and hypovascular metastasis) and benign (peliosis, vascular shunt, FNH, telangiectesia) focal liver lesions.  
3. Demonstration of atypical imaging features of hemangioma such as initial central enhancement, central scar, hyalinized hemangioma, atypical peripheral enhancement, very slow filling, heterogenous T2 signal and diffuse hemangiomatosis.  
4. Provision of practical clues to increase the confidence of radiologists when considering the diagnosis of hemangioma in different clinical and imaging scenarios and avoid the above pitfalls.

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**GIE192**

**Imaging Characteristics of Infiltrative Liver Disease**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Maryam Gul: Nothing to Disclose  
Ammar Ahmed Chaudhry MD *(Presenter)*: Nothing to Disclose  
Abbas Ahmed Chaudhry BSc: Nothing to Disclose  
Kevin S. Baker MD: Nothing to Disclose  
Javed Akhter Mallick MBBS: Nothing to Disclose  
Akhil Khan Pathan MS: Nothing to Disclose

**TEACHING POINTS**

1. Review clinical presentation and imaging findings of various infiltrative liver diseases including glycogen storage disease (e.g. Pompe’s disease, von Gierke's disease, etc), Mucopolysaccharidoses (Gaucher’s disease, Niemann-Pick disease, etc), metabolic (Wilson's disease, hemochromatosis), infectious hepatitis, leukemia, lymphoma and non-alcoholic steatohepatitis.  
2. Discuss different treatment options and prognosis of the aforementioned entities.

**TABLE OF CONTENTS/OUTLINE**

1. Pictorial (cartoon and/or radiographic) depiction of anatomic areas of disease involvement.  
2. Discussion of characteristic imaging findings (ultrasound, CT and MRI) of various infiltrative liver diseases processes.  
3. Review primary treatment options (including surgical and interventional radiology guided), imaging follow-up and prognosis.  
4. Flow chart highlighting key imaging features that can narrow the differential diagnosis.

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**GIE193**

**Intra-operative Doppler Ultrasound in Liver Transplant: What the Surgeon Wants to Know**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

Harshad Wankhedkar DMRD: Nothing to Disclose  
Sameer Ramchandra Kalgaonkar MD *(Presenter)*: Nothing to Disclose  
Barkha Keswani MD: Nothing to Disclose  
Vinay Kumaran MChir: Nothing to Disclose  
Ravi Ramakantan MD: Nothing to Disclose  
Charul Goyal MBBS: Nothing to Disclose  
Renu Bharne MBBS: Nothing to Disclose  
Abhisht Aggarwal MBBS: Nothing to Disclose  
Pravin Birangler MBBS: Nothing to Disclose

**TEACHING POINTS**

Doppler ultrasound aids in the diagnosis of vascular complications in the intra-operative setting, which permits immediate intervention and hence better surgical outcome. The reconstructed vessels are objectively assessed using following Doppler indices: Delayed Systolic Acceleration Time and tardus parvus hepatic artery waveform are strong predictors of hepatic artery stenosis. Hepatic artery Resistive Index of <0.6 is the most sensitive predictor of early hepatic artery thrombosis. Loss of triphasic hepatic venous waveform is indicative of venous outflow obstruction Intra-operative portal vein flow of >1 liter/min is a predictor of allograft and patient survival Intraoperative portal venous flow if >500ml/100g/min may require splenic artery ligation or creation of a shunt and if <100ml/100gm/min may require collateral ligation.
TABLE OF CONTENTS/OUTLINE
I. Indications
II. Scanning technique
   - Sterile preparation for intraoperative scanning
   - Optimization of doppler parameters
III. What the surgeon wants to know
   1. Hepatic arterial flow and doppler indices
      - Resistive Index
      - Peak Systolic Velocity
      - Systolic Acceleration Time
   2. Hepatic Venous waveform
   3. Portal Venous flow
      - Time Averaged Maximum Velocity and Flow Volume
      - Inflow modulation

GIE194
Ischemic Injuries after Liver Transplantation: A Pictorial Essay based on MDCT, angioCT and MR Imaging
Education Exhibits
Location: GI Community, Learning Center

Participants
Bernardo Canedo Bizzo MD (Presenter): Nothing to Disclose
Renata Rocha De Almeida: Nothing to Disclose
Alessandra Lopes Faria: Nothing to Disclose
Antonio Luis Eiras de Araujo: Nothing to Disclose
Leonardo Kayat Bittencourt MD, MSc: Nothing to Disclose
Emerson L. Gasparetto MD: Nothing to Disclose

TEACHING POINTS
The liver is subject to transplantation as part of the treatment for neoplastic lesions and liver failure. Patients may develop ischemic lesions following this surgical procedure, which should be differentiated from other categories of focal liver lesions, particularly tumor recurrence and infection. In this presentation, we aim to discuss the main imaging findings and the pathophysiology of each kind of hepatic ischemic injury, following liver transplantation.

TABLE OF CONTENTS/OUTLINE
- A quick review on the most common liver conditions that require transplantation (focus on cirrhosis and HCC).
- Anatomical description and schematic drawings of the most common surgical procedures of the liver transplantation.
- Imaging findings of the normal postoperative liver, based on MDCT, angioCT and MRI.
- Main imaging findings from hepatic ischemic injury liver transplantation procedure: Arterial (obstruction, stenosis, extrinsic compression, pseudoaneurysm and fistula); Portal (including portal vein, inferior vena cava and hepatic veins stenosis and thrombosis); secondary to hypovolemia; reperfusion lesions.

GIE195
LI-RADS v2014: Interpretation and Categorization of MRI Findings Using Hepatobiliary Agents
Education Exhibits
Location: GI Community, Learning Center
Certificate of Merit

Participants
Eduardo Almeida Cunha Costa MD (Presenter): Nothing to Disclose
Amol Shah BS: Nothing to Disclose
Masahiro Tanabe MD: Nothing to Disclose
Jay P. Heiken MD: Patent agreement, Covidien AG Patent agreement, Bayer AG
Kathryn Jane Fowler MD: Research support, Bracco Group
Claude B. Sirlin MD: Research Grant, General Electric Company Speakers Bureau, Bayer AG Consultant, Bayer AG

TEACHING POINTS
LI-RADS v2014 has been expanded to include hepatobiliary contrast agents. The purpose of this exhibit is to review hepatobiliary contrast agents content in LI-RADS v2.014. By viewing this exhibit viewers should be familiar with possible imaging appearances of hepatocellular carcinoma (HCC) at hepatobiliary agent-enhanced MRI as well as with the appearance of other malignant, pre-malignant and benign entities in patients with cirrhosis or other risk factors for HCC.

TABLE OF CONTENTS/OUTLINE
- Brief introduction to LI-RADS v.2014
- Introduction to hepatobiliary agents. Recognition of optimal and suboptimal uptake in delayed phase in patients with compensated and decompensated cirrhosis, and in non-cirrhotic livers.
- Illustrative cases of hepatobiliary agents-enhanced MRI using LI-RADS v.2014
- Summary

GIE196
Liver Dysfunction Imaging on MRI: Are You Working on Quantifying Fat, Fibrosis and Iron of the Liver?
Education Exhibits
Location: GI Community, Learning Center

Participants
Masahiro Okada MD (Presenter): Nothing to Disclose
Tetsuya Wakayama PhD: Employee, General Electric Company
Tomomi Koga: Nothing to Disclose
TEACHING POINTS
1. To define advanced MR sequences in liver imaging for fat, fibrosis and iron. 2. To introduce new liver MR imaging for the analysis of liver dysfunction. 3. To recognize pitfalls of liver MR imaging.

TABLE OF CONTENTS/OUTLINE
1. Advanced liver imaging for liver parenchymal imaging a) MR spectroscopy of fat b) Fat fraction analysis and T2* relaxometry to investigate deposit of fat and iron c) Dixon technique for water and fat imaging d) Liver-specific contrast agent (Gd-EOB-DTPA) to estimate liver function e) Time intensity curve analysis after Gd-EOB-DTPA injection f) T1 relaxometry for diffuse liver disease g) T1 relaxometry versus US elastography for liver fibrosis h) MR elastography 2. Presentation of liver imaging a) Fatty liver, Non-alcoholic steatohepatitis (NASH) b) Chronic hepatitis c) Liver cirrhosis 3. Strategy of therapy in patients with hepatocellular carcinoma and liver dysfunction 4. Pitfalls of MR imaging to image liver function

GIE199
Liver Segmentation: A Primer for Radiologists

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
Akshat Gotra MD (Presenter): Nothing to Disclose
Gabriel Chartrand BEng : Intern, Object Research Systems Inc
Kim-Nhien Vu MD : Nothing to Disclose
Franck Vandenbroucke-Menu MD : Nothing to Disclose
Claude Kauffmann PhD : Nothing to Disclose
Benoit Paul Gallix MD, PhD : Nothing to Disclose
Jacques A. De Guise : Research Grant, Emovi Inc Stockholder, Emovi Inc Spouse, CEO, Emovi Inc Research Grant, EOS imaging SA Royalties, EOS imaging SA Research Grant, ORS Research Grant, Dassault Systemes Research Grant, Useful Progress
An Tang MD : Speaker, Siemens AG Speaker

TEACHING POINTS
(1) To review the clinical indications for performing liver segmentation, (2) to illustrate various segmentation methods, and (3) to discuss the pros and cons of CT and MRI for liver segmentation.

TABLE OF CONTENTS/OUTLINE

GIE201
MR Findings of Budd-Chiari Syndrome

Education Exhibits
Location: GI Community, Learning Center

Participants
Patricia Borges Alla : Nothing to Disclose
Roberto Blashbly MD (Presenter): Nothing to Disclose
Gabriel Bolsi : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the pathophysiology and magnetic resonance imaging aspects at different stages of Budd-Chiari Syndrome (BCS). 2. To describe the vascular findings in acute stage, characterized by patchy enhancement and venous collateral pathways and in subacute and chronic stages, characterized by the nodular pattern, which includes regenerative nodules until hepatocellular carcinoma (HCC). 3. To show how to the gadoxetic acid emerged as an important tool on differentiating these two entities.

TABLE OF CONTENTS/OUTLINE
1. Pathophysiology of Budd Chiari Syndrome (BCS) 2. MR imaging aspects of BCS 3. Acute stage: imaging findings (liver morphology and enhancement pattern) 4. Subacute and chronic stages: imaging findings (vacular and nodular changes) 5. BCS’s nodular pattern: how to the gadoxetic acid can help distinguishing HCC from non-malignant lesions 6. Summary

GIE202
MRI Evaluation of Diffuse Liver Disease—A Review

Education Exhibits
Location: GI Community, Learning Center

Participants
Neil Shah MD (Presenter): Nothing to Disclose
TEACHING POINTS

1. Provide a brief, general overview of diffuse liver disease
2. Describe a standard MRI protocol for imaging diffuse liver disease
3. Show representative examples of and describe MRI findings for diffuse liver disease

TABLE OF CONTENTS/OUTLINE

Diffuse liver disease affects millions of people worldwide, with the radiologist's role becoming increasingly more important in diagnosis and guiding patient management and treatment. MRI is the modality that greatly aids in characterization of diffuse liver disease by allowing both morphologic and functional evaluation of hepatic tissue, with capabilities well beyond those of other noninvasive modalities. In this exhibit, we will review MRI diagnostic features of diffuse liver disease resulting from deposition and storage disease, abnormal perfusion, infectious and inflammatory processes, bile duct abnormalities, and malignancy. MRI Imaging Features of Diffuse Liver Disease --Deposition and Storage: Steatosis, Hemochromatosis --Vascular: Congestive hepatopathy, Budd Chiari --Infectious/Inflammatory: Hepatitis, Sarcoidosis --Bile Ducts: Primary sclerosing cholangitis --Malignancy: Lymphoma, Leukemia Summary: MRI provides a comprehensive evaluation of diffuse liver diseases including pathologies affecting bile ducts, vascular structures, etc. due to its superior soft tissue contrast.

GIE203

Overlap Syndromes of Autoimmune Chronic Liver Disease: What the Radiologist Needs to Know

Education Exhibits

Location: GI Community, Learning Center

Certificate of Merit

Participants

Ashlesha Satish Udare MBBS, MD (Presenter): Nothing to Disclose
Rashmi Rakesh Badhe : Nothing to Disclose
Bhawan Krishna Paunipagar MD : Nothing to Disclose
Satish Satish Gaitonde : Nothing to Disclose
Namita Kamath MD, MBBS : Nothing to Disclose
Ritesh Dholu MD : Nothing to Disclose
Shrinivas Balaji Desai MD : Nothing to Disclose

TEACHING POINTS

1. To present the International Autoimmune Hepatitis Group (IAIHG) classification of the Overlap syndromes
2. To understand its clinical, serological findings, histopathology and management
3. To elucidate the role of imaging in diagnosis, classification, prognosis and post-treatment follow-up of overlap syndromes

TABLE OF CONTENTS/OUTLINE

Definition: Overlap syndromes are distinct entities on their own, with a variety of autoimmune manifestations presenting in a susceptible individual. Clinical manifestations and Serological findings: Circulating auto-antibodies: ANA, SMA, anti-LKM-1, anti- LC1, and pANCA Histopathological features: Interface hepatitis, Portal inflammation, Biliary changes, Granulomas Imaging features: PSC-type overlap syndrome - Imaging features of PSC type: central macroregeneration, peripheral atrophy - US: Wall thickening, beading - MRCP features: biliary duct beading, diverticula - Liver specific contrast excretion pattern PBC (Primary Biliary Cirrhosis) type - hypointensity surrounding the portal venous branches on T1-weighted and T2-weighted images in patients with PBC, termed the "periportal halo sign." Evaluation of fibrosis with MR Elastography Screening for complications: IBD, cholangiocarcinoma and noncirrhotic portal hypertension Treatment and interventions

GIE204

Tips of Differentiation of Focal Hepatic Nodules in the Hepatobiliary Phase (HBP) of Gd-EOB-DTPA-enhanced MRI

Education Exhibits

Location: GI Community, Learning Center

Participants

Jeong Woo Kim MD : Nothing to Disclose
Chang Hee Lee MD (Presenter): Nothing to Disclose
Yang Shin Park MD : Nothing to Disclose
Jong Mee Lee : Nothing to Disclose
Jae Woong Choi MD : Nothing to Disclose
Kyeong Ah Kim MD : Nothing to Disclose
Cheol Min Park MD : Nothing to Disclose

TEACHING POINTS

1. To illustrate the pattern of various hepatic lesions with paradoxical uptake or unusual defect of the gadoxetic acid in HBP of liver MRI
2. To discuss how to use this knowledge of unusual pattern of Gd-EOB-DTPA for differential diagnosis of various hepatic lesions

TABLE OF CONTENTS/OUTLINE

1. Introduction 2. Typical and atypical imaging features of hepatic nodules in Gd-EOB-DTPA-enhanced MRI 1) Hepatocellular carcinoma 2) Metastasis from colon, breast, stomach, pancreas, etc 3) Cholangiocarcinoma 4) Focal nodular hyperplasia 5) Hepatic adenoma 6) Abscess 7) Eosinophilic infiltrations 3. Pattern analysis according to Gd-EOB-DTPA uptake 4. Summary and benefit of these imaging features of various hepatic lesions for differential diagnosis in clinical practice. Summary 1. Paradoxical uptake within hepatic lesions is not unusual finding on HBP of gadoxetic acid enhanced 3T MRI 2. The malignant nodule may not show a total defect on HBP of gadoxetic acid enhanced 3T MRI 3. FNH may show defect on HBP 4. Hepatic adenoma may also contrast uptake on HBP 5. The uptake pattern include total, peripheral, mixed, and target appearances 6. A pattern approach based image analysis may aid in making either a specific diagnosis or narrowing differential diagnosis of various hepatic lesions
Trouble Shooting for Arterial Phase Images of Gd-EOB-DTPA Enhanced Liver MR

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
Jimi Huh MD (Presenter): Nothing to Disclose
So Yeon Kim MD: Nothing to Disclose
Benjamin M. Yeh MD: Research Grant, General Electric Company Consultant, General Electric Company
Seung Soo Lee MD: Nothing to Disclose
Kyoung Won Kim MD: Nothing to Disclose
En-Haw Wu MD: Nothing to Disclose
Zhen Jane Wang MD: Nothing to Disclose
Liqin Zhao MD: Nothing to Disclose
Wei-Chou Chang MD: Nothing to Disclose

TEACHING POINTS
1. To describe factors the quality of arterial phase MR imaging with Gd-EOB-DTPA
2. To critically review the published literature, discuss the effects of various factors that influence Gd-EOB-DTPA arterial phase image quality
3. To propose appropriate strategies that can help improve the arterial phase enhancement

TABLE OF CONTENTS/OUTLINE
1. Challenges for arterial phase imaging (1) Temporal mismatch & weak arterial enhancement caused by the smaller administered volume and gadolinium content of Gd-EOB-DTPA than that of conventional extracellular gadolinium contrast agents (2) Acute transient dyspnea
2. Optimization strategies (1) Modify injection protocol • Slow injection rate • Increase in administered dose • Combined use of Gd-EOB-DTPA with conventional extracellular gadolinium contrast agents (2) Optimize image acquisition • Multiple arterial phase acquisitions • Accurate scan delay determination • 3T MR (3) Avoiding acute transient dyspnea • Risk factor identification and patient education (4) Improvement in image interpretation • Subtraction images • Awareness of characteristic Gd-EOB-DTPA enhancement patterns

Vascular Disturbances of the Liver and FNH-like Lesions: What Are They?

Education Exhibits
Location: GI Community, Learning Center

Participants
Luisa Costa Andrade (Presenter): Nothing to Disclose
Daniel Andrade MD: Nothing to Disclose
Maria Conceicao Sanches: Nothing to Disclose
Luis Curvo-Semedo MD, PhD: Nothing to Disclose
Filipe Caseiro-Alves: Nothing to Disclose

TEACHING POINTS
-To describe the imaging findings of focal liver lesions in the setting of vascular liver diseases, collected from our PACS from 2008 to 2013. -To explain the underlying pathophysiologic mechanism and rad-path correlation with cross-sectional imaging and hepatocyte-directed MR contrast agent. -To address the differential diagnosis and implications for patient management.

TABLE OF CONTENTS/OUTLINE
Benign focal liver lesions may be associated with congenital and acquired hepatic hemodynamic abnormalities. In this essay the authors will focus on the rad-path correlation of multianinar nodular regenerative hyperplasia that develop in response to local or diffuse venous and/or arterial flow disturbances. These lesions may be associated with different types of vascular liver diseases such as Budd-Chiari syndrome, Rendu-Osler-Weber disease, congenital portosystemic shunts, congenital absence of the portal vein or sinusoidal obstructive syndrome. The chronic vascular injury causes progressive peri-venular and peri-portal fibrosis, ultimately leading to non-cirrhotic portal hypertension, a hallmark of the later stages of the vascular insult. A series of cases retrieved from the Hospital database will be presented, focusing on the imaging features that allow the differential diagnosis especially with HCC and metastases in the oncologic patient.

WHY CLASSIFY!! The Clinical and Prognostic Implications of Classification Schemes Used in Hepato-biliary and Pancreatic Imaging: A Primer for Radiologists

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
Chandana G. Lall MD (Presenter): Nothing to Disclose
Puneet Bhargava MD: Editor, Reed Elsevier
Sadhna Verma MD: Nothing to Disclose
Roozbeh Houshyar MD: Nothing to Disclose
Mohammad Helmy MD: Nothing to Disclose
Garrett Graham Ward MD: Nothing to Disclose
Garrett Graham Ward MD: Nothing to Disclose
Martin Roberto Goyenechea MD: Nothing to Disclose

TEACHING POINTS
Educational Goals/Teaching Points: Highlight essential classification systems used in hepato-biliary and pancreatic imaging: Practical utility and clinical importance of accurate classification by radiologists. Surgical and prognostic implications of lesions and processes in these organs with relevant imaging.

TABLE OF CONTENTS/OUTLINE

GIE208
Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy (ALPPS): Review, Indications and Variations of this Liver Resection Technique

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
Diogo Torres Marques MD (Presenter): Nothing to Disclose
Luiz Tenorio de Brito Siqueira MD: Nothing to Disclose
Luciana Carmen Zattar MD: Nothing to Disclose
Regis Otavano Franca: Nothing to Disclose
Marcos Roberto Menezes MD: Speaker, HealthTronics, Inc. Proctor, HealthTronics, Inc
Giovanni Guido Cerri MD, PhD: Nothing to Disclose
Marcel Cerqueira Cesar Machado MD, PhD: Nothing to Disclose
Paulo Herman MD: Nothing to Disclose
Claudia Da Costa Leite MD, PhD: Researcher, Guerbet SA

TEACHING POINTS
- To present the ALPPS procedure and its variants.
- To recognise liver lesions amenable to ALPPS procedure.
- To discuss ALPPS controversial aspects and alternatives.

GIE209
Don’t Be Afraid of the Dark: A Practical Approach to T2-Hypointense Focal Liver Lesions

Education Exhibits
Location: GI Community, Learning Center

Participants
Bianca Guedes Ribeiro MD (Presenter): Nothing to Disclose
Romulo Varella MD: Nothing to Disclose
Natalia Sabaneeff MD: Nothing to Disclose
Augusto Guimaraes Altoe: Nothing to Disclose
Leonardo Kayat Bittencourt MD, Msc: Nothing to Disclose
Vitor Moreira Sardenberg MD: Nothing to Disclose

TEACHING POINTS
Focal liver lesions are common findings in magnetic resonance imaging (MRI) and the vast majority of them manifest as hyperintense on T2-weighted images. However, hypointense T2 images, although less common, can be found in numerous pathologies, and this finding may help to narrow the list of differential diagnoses. Focal liver lesions (both benign and malignant) with low signal intensity on T2-WI include: iron deposition, calcifications, blood products, necrosis/necrotic nodules and lesions containing mucin.

TABLE OF CONTENTS/OUTLINE
1. Introduction: The history of the ALPPS procedure and its relevance on treatment of multiple lesion liver resections. 2. Technique and variations: It will be didactically explained the resections and the relations used in the ALPPS procedure. 3. Cases review: a series of cases from our service will be used to exemplify the procedure and try to predict successful outcomes. 4. Discussion of ALPPS controversial aspects and its alternatives. 5. Conclusion. 6. Bibliographical references.

GIE212
Focal Nodular Hyperplasia (FNH): Classification and Mimics, Findings at MR Imaging Correlating with Histopathology

Education Exhibits
Location: GI Community, Learning Center

Participants
TEACHING POINTS

1. To demonstrate MRI characteristics of focal nodular hyperplasia and its classification (classic and non-classic types). To educate participants regarding variety of lesions which mimic focal nodular hyperplasia along with histopathological correlation and ensure treatment and management of such lesions.

TABLE OF CONTENTS/OUTLINE

FNH is a hyperplastic process in which all normal constituents of liver are present but in an abnormally organized pattern. The presentation includes review of MR examination for characterization of liver lesions such as FNH and its mimics using dedicated MRI abdomen protocol with and without contrast medium (Multihance) and hepatobiliary agents used for problem solving cases. Focal nodular hyperplasia is second most common benign liver tumor after hemangioma and is incidentally discovered during cross sectional imaging. FNH classification: Classic type (80%) Non-classic type (20%) includes - Telangiectatic FNH - FNH with cytologic atypia - Mixed hyperplastic and adenomatous FNH MIMICS: HCC Fibrolamellar, Cholangiocarcinoma Hypervascular metastases: Hepatic adenoma, Hemangioma, Nodular regenerative hyperplasia THID: Conclusion. MRI is invaluable tool in diagnosing primary liver lesions such as FNH and its mimics due to its excellent soft tissue contrast and helpful in management of such conditions.

GIE214

HCC- A to Z: A Comprehensive Review and Synopsis of Hepatocellular Carcinoma—A One Stop Shop!

Education Exhibits

Location: GI Community, Learning Center

Participants

Chandana G. Lall MD (Presenter): Nothing to Disclose
Puneet Bhargava MD : Editor, Reed Elsevier
Temel Tirkes MD : Nothing to Disclose
Priya Ranjit Bhosale MD : Nothing to Disclose
Sadna Verma MD : Nothing to Disclose
Joon-II Choi : Nothing to Disclose
Martin Roberto Goyenechea MD : Nothing to Disclose
Alampady Krishna Prasad Shanbhogue MD, MBBS : Nothing to Disclose

TEACHING POINTS

1. Pathophysiology: Genetic and phenotypic expression of HCC
2. Classic Imaging parameters that aid in making the diagnosis of HCC
3. Atypical Imaging features: A guide to making the correct diagnosis
4. Imaging parameters and their prognostic implications
5. Role of ultra high b value DWI if any
6. Brief overview of current treatment options in non transplant candidates

TABLE OF CONTENTS/OUTLINE

CONTENT ORGANIZATION

Demographics of HCC
Role of Imaging; Classic and Atypical Imaging features of HCC on MRI and CT Genetics of HCC: Role for chemotherapy tailored to Genotype; Tumor markers in biphenotypic HCC. Progenitor cell markers including OATP, epiCAM, K7, K19 etc. Prediction of tumor prognosis by imaging parameters: size, presence of a capsule, Early rim enhancement, intrasellar fat, enhancement characteristics, T1WI characteristics, Eovist uptake, Halo or corona enhancement etc.

Hepatic and Extrahepatic Metastatic Findings in Metastatic Uveal Melanoma: Making Sense of a Unique Malignancy

Education Exhibits

Location: GI Community, Learning Center

Participants

Amelia Wnorowski MD (Presenter): Nothing to Disclose
Flavius F. Guglielmo MD : Nothing to Disclose
Patrick L. O’Kane MD : Research Consultant, NPS Pharmaceuticals
Donald G. Mitchell MD : Consultant, CMC Contrast AB

TEACHING POINTS

1. The liver is usually the first metastatic site in uveal melanoma. There are common and uncommon appearances of liver metastases, some of which are almost unique to this disease.
2. There are common and uncommon locations of extrahepatic metastases. Many common locations of extrahepatic uveal melanoma metastases are infrequently seen with other malignancies.
3. Current therapies focus on controlling hepatic disease burden to improve survival. Imaging surveillance in these patients necessitates familiarity with the appearances of viable tumor and expected post-treatment change.
4. Abdominal MRI is particularly valuable in the diagnosis and follow-up of patients with metastatic uveal melanoma.
5. Awareness of the patterns of hepatic and extrahepatic uveal melanoma metastases can improve diagnostic accuracy.

TABLE OF CONTENTS/OUTLINE

Background 1. Uveal melanoma: Frequency of metastases, prognosis
2. Treatment options: Liver-directed therapy
Hepatic Hemangiomas and Other Hemangiomatous Lesions: CT and MR Imaging Manifestations, Pitfalls and Problem-solving MR Techniques

Education Exhibits
Location: GI Community, Learning Center

Participants
Kenji Matsuzaki MD, PhD (Presenter): Nothing to Disclose
Mayumi Takeuchi MD, PhD: Nothing to Disclose
Masafumi Harada MD, PhD: Nothing to Disclose

TEACHING POINTS
1. Hepatic hemangiomas and other hemangiomatous tumors and tumor-like lesions may show characteristic clinical and imaging manifestations reflecting their pathologic features. Various degeneration in hemangiomas, and surrounding parenchymal changes may influence the imaging manifestations of hemangiomas.
2. Recognizing the various imaging manifestations of hemangiomas and other hemangiomatous lesions, and making an accurate diagnosis by using problem-solving MR techniques are important for appropriate management of patients.

TABLE OF CONTENTS/OUTLINE
- Etiology, clinicopathologic features and imaging manifestations:
  - Cavernous hemangioma (Typical, Small high-flow, Giant, Pedunculated)
  - Sclerosed hemangioma and Solitary necrotic nodule as the end-stage of the disease
  - Hemangiomatosis
  - Angiomyolipoma / Epithelioid angiomyolipoma
  - Angiosarcoma
  - Peliosis hepatitis
- Degeneration of hemangiomas (Hyalinization, Cystic formation, Fibrosis, Calcification, Thrombosis)
- Surrounding parenchymal changes (Co-existing fatty infiltration of the liver with peritumoral focal spared areas, peripheral parenchymal retraction, arterial-portal venous shunts)
- Problem-solving MR techniques: Fat-saturation; Chemical shift imaging (CSI); DCE-MRI; DWI; SPIO-MRI; Gd-EOB-MRI

GIE217
Hepatic Hemangiomas: Atypical Appearances and Imitators

Education Exhibits
Location: GI Community, Learning Center

Participants
Kevin Firl (Presenter): Nothing to Disclose
Reena Chetna Jha MD: Consultant, CeloNova BioSciences, Inc

TEACHING POINTS
- Classic imaging features of hepatic hemangiomas
- Hepatic hemangiomas' atypical appearances on imaging
- Features of other uncommon hepatic lesions that simulate hemangiomas
- Importance of taking a history in indeterminate lesions

TABLE OF CONTENTS/OUTLINE
1. Classic imaging characteristics of hepatic hemangiomas a. unenhanced CT b. ultrasound c. Tc-99m labeled RBC Scan d. enhancement patterns i. interrupted/nodular ii. flash-filling iii. incomplete-filling iv. pathologic correlation 2. Atypical imaging appearances of hemangiomas a. the bright-dot sign b. intrahepatic arterio-portal shunting c. capsular retraction d. giant hemangiomas e. hyalinized hemangiomas f. hemangiomas in cirrhotic livers 3. Other uncommon hepatic lesions that may simulate hemangiomas a. hepatic sarcomas b. mucinous carcinoma metastasis c. epitheloid hemangioendothelioma d. peliosis hepatitis 4. Importance of history taking a. adenoid cystic carcinoma metastasis case

GIE219
Hepatocellular Carcinoma: The Evaluation after Therapy by Advanced Imaging Tools

Education Exhibits
Location: GI Community, Learning Center

Participants
Masahiro Okada MD (Presenter): Nothing to Disclose
Yuko Iraha: Nothing to Disclose
KIMEI AZAMA: Nothing to Disclose
Kazushi Numata: Nothing to Disclose
Tomomi Koga: Nothing to Disclose
Sadayuki Murayama MD, PhD: Nothing to Disclose

TEACHING POINTS
1. To know the therapies for HCC, such as radio-frequency ablation (RFA), transcatheter arterial chemoembolization (TACE) and molecular targeted drug (Sorafenib). 2. To review typical and atypical findings of HCC on CT, US and MRI. 3. To know guidelines of response evaluation after HCC therapy 4. To define diagnostic accuracy and difficulty for HCC recurrence after therapy on CT, US and MRI. 5. To define diagnostic solution of HCC diagnosis after therapy. 6. To know potential pitfalls and limitations of contrast enhanced CT, US and MRI in the diagnosis of HCC.

TABLE OF CONTENTS/OUTLINE
1 Morphology of HCC 2 Selection of HCC therapy • RFA • TACE • Molecular targeted drug (Sorafenib) 3 Classification of HCC • Borderline lesion • Early HCC • Advanced HCC 4 Modality of recurrence diagnosis of HCC • Dynamic CT and CT perfusion • Contrast-enhanced US • EOB-MRI and SPIO-MRI 5 Guidelines of response evaluation • Modified Response Evaluation Criteria in Solid Tumors (RECIST) • Response Evaluation Criteria in Cancer of the Liver (RECICL) 6 Complication of HCC therapy 7 Potential pitfalls and limitations on CT, US and MRI after therapy of HCC
Imaging of Liver Tumors Treated with Thermoablation: Atypical is not Always Pathologic!

Education Exhibits
Location: GI Community, Learning Center

Participants
Damien Bouda (Presenter): Nothing to Disclose
Maxime Ronot MD: Nothing to Disclose
Matthieu Lagadec MD: Nothing to Disclose
Blanche Bapst: Nothing to Disclose
Mohamed Abdel-Rehim MD: Nothing to Disclose
Gaspard D’Assignies MD: Nothing to Disclose
Vincent Barrau MD: Nothing to Disclose
Valerie Vilgrain MD: Nothing to Disclose

TEACHING POINTS
1. To review the spectrum of early and delayed normal imaging findings after thermoablation of hepatic tumors
2. To know the main atypical presentations of ablation area, and to differentiate them from local tumoral progression or complications
3. To know the schedule and imaging modalities of the patients’ follow-up

TABLE OF CONTENTS/OUTLINE
1. Normal aspect of ablation area: - Differences between RFA and MWA - Imaging features (CT, MRI, US, CEUS, CBCT, and PET-CT) - Immediate, early, and delayed aspects - Identification of complete ablation / residual tumor - Interest of diffusion-weighted images - Imaging follow-up 2. Atypical presentations: a - Ablation area: - Fatty tumors or scars - Presence of gas - Calcifications - Increase in size of the ablation area - Ghost lesion b - Adjacent liver modification: - Parenchymal retraction or atrophy - Infarction - Biliary and vascular modifications For each case, presentation of imaging features, clinical meaning, factors associated, and differentiation with main complications or local tumoral progression.

GIE221
It’s all Relative! Vascular Invasion in Hepatocellular Carcinoma: Current Recommendations and Future Directions

Education Exhibits
Location: GI Community, Learning Center

Magna Cum Laude

Participants
Gregor Martin Dunham MD (Presenter): Nothing to Disclose
Blake Carlson MD: Nothing to Disclose
Christopher Robert Ingraham MD: Nothing to Disclose
Mariam Moshiri MD: Consultant, Reed Elsevier Author, Reed Elsevier
Douglas S. Katz MD: Nothing to Disclose
Puneet Bhargava MD: Editor, Reed Elsevier
Jabi E. Shriki MD: Nothing to Disclose
James Burnett Gardner MD: Nothing to Disclose

TEACHING POINTS
1. Malignant vascular invasion is a major prognostic factor and historically considered an absolute contraindication to hepatic resection
2. Imaging signs such as “thread and streak sign” and “striated appearance” are key to the early detection in tumor thrombus
3. New surgical techniques and multimodality treatments are increasingly being employed in the setting of vascular invasion

TABLE OF CONTENTS/OUTLINE
1. Demonstrate vascular invasion appearance: US, MDCT, MRI, and angiography; with laparoscopic correlation 2. Imaging helps to direct the most appropriate management strategy and surgical approach: hepatic vs. portal vein extension; assessing segmental involvement; vascular variants; and the future liver remnant 3. Surgical options: right and left Hepatectomy; partial resection; two stage hepatectomy - portal vein embolization with delayed resection vs. associating liver partition and portal vein ligation for staged hepatectomy (ALPPS). Correlation with medical illustrations, gross pathology, and imaging will be provided 4. Role of interventional radiology: palliative vs. adjunct to surgery. Newer studies indicate expanded role for catheter-directed therapy, Yttrium-90, cryoablation-assisted resection, portal vein embolization, and irreversible electroporation 5. Current recommendations and future directions

GIE222
LI-RADS: An Essential Guide to the Radiologist

Education Exhibits
Location: GI Community, Learning Center

Participants
Rita De Cassia Pereira MD: Nothing to Disclose
Antonio Eiras-Araujo MD: Nothing to Disclose
Jaime Araujo Oliveira Neto MD: Nothing to Disclose
Rosana Souza Rodrigues MD, PhD: Nothing to Disclose
Daniella Braz Parente MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. Discuss the importance of LI-RADS implementation in cirrhotic liver MR exams as a tool for standardization of the reports
2. Review the MR imaging criteria of LI-RADS 2013.1 version
3. Illustrate the imaging feature observations according to each LI-RADS category
4. Discuss the limitations and future perspectives of LI-RADS
GIE224

Liver Metastasis from Colorectal Cancer: What the Radiologists Must Know to Deliver the Best Treatment

Education Exhibits
Location: GI Community, Learning Center

Participants
Yuko Nakamura MD (Presenter): Nothing to Disclose
Wataru Fukumoto: Nothing to Disclose
Yukiko Honda MD: Nothing to Disclose
Shuji Date: Nothing to Disclose
Kazuo Awai MD: Research Grant, Toshiba Corporation Research Grant, Hitachi Ltd Research Grant, Bayer AG Research Consultant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd

TEACHING POINTS
a. In patients with liver metastasis from colorectal cancer (LMCRC), surgical resection is the most effective, curative treatment. As both oncologic and functional outcomes are important, current treatment strategies must be understood. b. Gadoxetate disodium (EOB)-enhanced MRI is the preferred modality for detecting LMCRC in untreated patients. PET-CT helps to identify distant metastases and local recurrence. c. The prolonged administration of chemotherapy raises the risk for liver damage such as steatosis, sinusoidal injury, and steatohepatitis. Radiologists must be able to interpret imaging findings after treatments for LMCRC.

GIE226


Education Exhibits
Location: GI Community, Learning Center

Participants
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Gregor Martin Dunham MD (Presenter): Nothing to Disclose
Christopher Robert Ingraham MD: Nothing to Disclose
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Douglas S. Katz MD: Nothing to Disclose
Puneet Bhargava MD: Editor, Reed Elsevier
Neeraj Lalwani MD: Nothing to Disclose
Chandana G. Lall MD: Nothing to Disclose

TEACHING POINTS
1. Five-year recurrence of hepatocellular carcinoma after resection is greater than 50% 2. Understand the role of imaging in the work-up and management of recurrent HCC, including specific re-treatment considerations and the most current recommendations

GIE227

Optimal Imaging Method of Preoperative 3DCT for Malignant Liver Tumors

Education Exhibits
Location: GI Community, Learning Center
Certificate of Merit

Participants
Kouhei Harada RT (Presenter): Research Consultant, Nemoto Kyorindo Co, Ltd
Syuichi Honma RT: Nothing to Disclose
Ayaka Chiba: Nothing to Disclose
Yoshiya Oohashi: Nothing to Disclose
Tatsuya Imai: Nothing to Disclose
TEACHING POINTS

1. Demonstrate the necessity of preoperative 3DCT simulation
2. Advantages/disadvantages of the scanning method
3. Description of methods using clinical data for creating 3D fusion images necessary for preoperative simulation

TABLE OF CONTENTS/OUTLINE

Necessity of 3DCT Providing required preoperative information for simulation Automatic liver area classification using workstations Liver volume analysis Optimal Scan Conditions Determining optimal scan timing for hepatectomy Optimal contrast media volume Noise reduction using iterative reconstruction Benefits of 3D images for preoperative simulation Providing accurate tumors and vessel locations Liver resection line determination Remnant liver volume measurement Summary: Technical innovations in workstations have made it possible to generate important images before liver surgery. Workstations provide advance information including residual liver volume prediction, precise vascular anatomy, and depiction of accurate liver sections/segments to prevent postoperative liver failure and other surgical complications. The optimal conditions using contrast media and image capture timing are important for obtaining appropriate SD images. All planned processes and conditions are necessary to create informative 3D images to simulate potential liver surgery approaches.

GIE228

Peritumoral Enhancement of Hepatic Tumors and Tumorous Lesions: Analysis Based on the Hemodynamics Evaluated by Angiography-assisted CT and Histopathology

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants

Kazuto Kozaka MD (Presenter): Nothing to Disclose
Osamu Matsui MD: Research Consultant, Kowa Company, Ltd Research Consultant, Otsuka Holdings Co, Ltd Research Consultant, Eisai Co, Ltd Speakers Bureau, Bayer AG Speakers Bureau, Eisai Co, Ltd
Satoshi Kobayashi MD: Nothing to Disclose
Junichiro Sanada: Nothing to Disclose
Wataru Koda: Nothing to Disclose
Tetsuya Minami MD: Nothing to Disclose
Azusa Kitao: Nothing to Disclose
Dai Inoue: Nothing to Disclose
Norhide Yoneda: Nothing to Disclose
Kotaro Yoshida MD: Nothing to Disclose
Kazuhiko Ueda MD: Nothing to Disclose
Toshifumi Gabata MD: Nothing to Disclose

TEACHING POINTS

Understanding the features of peritumoral enhancement with underlying hemodynamic and pathologic changes in dynamic contrast enhanced imaging is essential for differential diagnosis and for realizing pathophysiology of hepatic tumor or tumorous lesions.

TABLE OF CONTENTS/OUTLINE

Outlines 1. Blood flow imaging techniques i. Dynamic CT/MRI, Contrast enhanced US ii. Angiography, Angiography assisted CT (CT during hepatic portoarteriography (CTAP), CT during hepatic arteriography (CTHA) and single level dynamic CTHA (SLD-CTHA)) 2. The classification of peritumoral hemodynamics based on angiography assisted CT i. Delayed ring/corona shaped peritumoral enhancement after the tumor enhancement ii. Early wedge or fan shaped peritumoral enhancement iii. Early ring shaped peritumoral enhancement iv. No or minimal peritumoral enhancement in a hypervascular tumor 3. The classification of tumor/surrounding hepatic parenchyma interface pathology i. Fibrous encapsulation pattern ii. Compressive pattern iii. Replacing infiltration pattern iv. Others 4. Correlation between peritumoral hemodynamics and interface pathology 5. Representative case review with special reference to conventional blood flow imaging

GIE230

Rare Primary Liver Tumors: Magnetic Resonance Imaging and Pathological Correlation

Education Exhibits
Location: GI Community, Learning Center

Participants

Faramarz Edalat MD (Presenter): Nothing to Disclose
Nima Kokabi MD: Nothing to Disclose
Juan Camilo Camacho: Nothing to Disclose
Courtney Ann Coursey Moreno MD: Nothing to Disclose
Pardeep Kumar Mittal MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to: • Explain the role of MRI as an invaluable tool in diagnosing rare liver tumors and its mimics due to its excellent soft tissue contrast • Review MR imaging characteristics of rare liver tumors • Understand the pathological correlation of rare liver tumors with their MR imaging findings • Discuss the role of MR imaging in supporting effective treatment decision making

TABLE OF CONTENTS/OUTLINE

• Basic approaches to rare liver tumors • MRI protocol for evaluation of rare liver tumors • MR imaging features and pathological correlation of rare liver tumors including epithelial hemangioendothelioma, hepatic angiosarcoma, biliary cystadenoma and cystadenocarcinoma, primary hepatic lymphoma and neuroendocrine tumors, and angiomyolipoma • Treatment approaches based on MRI findings • Conclusion
GIE231

Role of Imaging in Staging, Management and Follow-up of Patients with Hepatocellular Carcinoma (HCC) based on the Barcelona Clinic for Liver Cancer (BCLC) Staging System

Education Exhibits
Location: GI Community, Learning Center

Participants
- Asha Kandathil MD (Presenter): Nothing to Disclose
- Peter Shou-Cheng Liu MD: Nothing to Disclose
- William J. Weadock MD: Owner, Weadock Software, LLC
- Hero Kamal Hussain MD: Consultant, Bayer AG

TEACHING POINTS
1. BCLC staging system for hepatocellular carcinoma
2. Role of magnetic resonance imaging (MRI) in diagnosis and staging of HC
3. Treatment options available for various BCLC stages of HCC with focus on loco-regional therapeutic options such as percutaneous ablation, transarterial chemoembolization (TACE), radioembolization, stereotactic radiotherapy
4. Role of MRI in assessing therapeutic response in HCC

TABLE OF CONTENTS/OUTLINE
1. Overview of BCLC staging system for hepatocellular carcinoma
2. Case based presentation of various BCLC stages of HCC illustrating
   - MRI evaluation of tumor extent
   - appropriate loco-regional therapies
   - follow up MRI assessing post therapeutic response

GIE232

Spectrum of Hepatic Tumors with Delayed Extracellular Enhancement Effect on Hepatobiliary Phase of EOB-enhanced MRI: MR-pathologic Correlation

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
- Tatsuyuki Tonan MD (Presenter): Nothing to Disclose
- Kiminori Fujimoto MD, PhD: Nothing to Disclose
- Tsutomu Kumabe: Nothing to Disclose
- Shuji Nagata MD: Nothing to Disclose
- Akiko Sumi MD: Nothing to Disclose
- Masafumi Uchida MD, PhD: Nothing to Disclose
- Osamu Nakashima: Nothing to Disclose
- Koji Okuda: Nothing to Disclose
- Toshi Abe MD: Nothing to Disclose

TEACHING POINTS
1. To understand two enhancement patterns (types of gradual and persistent) of hepatic tumors on EOB-enhanced MRI for predicting pathologic characteristics (distribution and amount of intratumoral fibrous stroma, micro-vessels, and tumor cell).
2. To illustrate various tumors with each enhancement pattern.

TABLE OF CONTENTS/OUTLINE
Gd-EOB-DTPA combines the properties of a conventional non-specific extracellular and a hepatocyte-specific contrast agent. In this presentation, we evaluate the pathological characteristics of various hepatic tumors, which show extracellular enhancement effect on hepatobiliary phase, such as cholangiocellular carcinoma, cholangiocellular carcinoma, sarcomatous/sclerosing hepatocellular carcinoma, neuroendocrine tumors including carcinoid tumor and carcinoma, and primary hepatic lymphoma. They have various dynamic enhancement pattern (i.e., gradual and persistent enhancement) and variable delayed extracellular enhancement pattern on hepatobiliary phase according to various distribution and amount of intratumoral fibrous stroma, micro-vessels and tumor cell. While these imaging findings are not specific finding, to understand these imaging findings are helpful in diagnosis of hepatic tumors. Furthermore, evaluation of the intratumoral fibrous stroma may aid prognostic prediction of hepatic malignant tumor.

GIE234

Texture Analysis of Solid Abdominal Neoplasms: A Primer

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
- Adeel Rahim Seyal MD (Presenter): Grant, Siemens AG
- Atilla Arslanoglu MD: Grant, Siemens AG
TEACHING POINTS

Texture analysis applies advanced mathematical models to characterize lesions, thus advancing image analysis to the level where the human eye cannot reach. This exhibit will review the concepts and applications of this promising tool. We will also discuss its role as an imaging biomarker in abdominal imaging, adding information not readily accessible by visual analysis alone.

TABLE OF CONTENTS/OUTLINE

- The pixel and its numerical information
- The limits of human sight
- The noise in imaging
- Filters
- Statistical models used to characterize abdominal tumor texture
- Model based and transform-based methods
- Illustration of the current application of textural analysis in abdominal quantitative imaging
- Intuitive and interpretable features
- Future applications

GIE235

The Liver in Oncology: Metastasis and Post-Treatment Changes

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants

Maria Isabel Puig-Povendano (Presenter): Nothing to Disclose
EDUARD ANDIA: Nothing to Disclose
Ana Sanchez Marquez MD: Nothing to Disclose
Eva Maria Merino Serra MD: Nothing to Disclose
David Martinez De La Haza MD: Nothing to Disclose
David Coca Castro RN, RT: Nothing to Disclose
Maria Gonzalez Alvarez: Nothing to Disclose

TEACHING POINTS

The increase in treatment possibilities and the survival improvement in metastatic disseminated diseases urges radiologists to a more accurate description in number, location and vascular relations of liver metastasis. Familiarization with posttreatment changes relating to local therapy (surgery, radiofrequency, stereotactic body radiation therapy or transarterial chemoembolization) and after systemic treatment, (with typical conventional cytotoxic agents or molecular targeted therapy) is mandatory for the oncological radiologist.

Due to the increasing use of new molecular targeted therapy, features such as attenuation and contrast intake have to be taken into account when evaluating posttreatment response, besides morphologic parameters.

TABLE OF CONTENTS/OUTLINE

- Spectrum of findings in pretreatment metastatic lesions, focusing on MRI characteristics.
- MRI as the most accurate imaging modality in the detection and characterization of small lesions: DWI and biliary elimination contrasts.
- Posttreatment changes in liver parenchyma: steatosis, pseudocirrhosis, nodular regenerative hyperplasia.
- Posttreatment changes in metastatic lesions: Conventional chemotherapy, cytotoxic effects, RECIST evaluation. Molecular targeted chemotherapy changes in attenuation and vascularity: CHOI, Bevacizumab, immunomodulatory therapy.

GIE236

To Resect or Not to Resect: The Role of Preoperative Imaging for Evaluation of Colorectal Hepatic Metastases

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants

Nathan P. Hannemann DO: Nothing to Disclose
Michael Jason Reiter DO (Presenter): Nothing to Disclose
Ryan Becton Schwope MD: Nothing to Disclose
Christopher Joseph Lisanti MD: Royalties, Wolters Kluwer nv
Peter A. Learn MD: Nothing to Disclose

TEACHING POINTS

1. Resection of liver-limited metastases from colorectal cancer is the current standard of care
2. Selection criteria for hepatic resection of colorectal metastases include: attainability of complete removal of gross disease; adequate liver functional reserve following surgery (minimum of 25% of healthy liver in normal patients); and at least two contiguous hepatic sectors with sufficient vascular inflow and outflow
3. More than 3 masses, masses 5 cm or greater, and bilobar disease are negative prognostic factors but not exclusion criteria for resection
4. MRI is superior for the detection and characterization of liver metastases from colorectal cancer

TABLE OF CONTENTS/OUTLINE

1. Rationale for surgical treatment of colorectal hepatic metastases
2. Criteria used to select patients that will benefit from resection
3. Historic criteria
4. Current criteria
5. Spectrum of imaging appearances of colorectal hepatic metastases
6. Review sensitivities of various modalities (CT, MRI, PET)
7. Critical radiologic features which impact the surgeon’s decision
8. Number and location of the metastatic lesions
9. Total volume of metastatic lesions and volume of expected normal remaining hepatic
Understanding Gd-EOB-DTPA-enhanced MR Imaging of the Liver: Practical Approaches and Pitfalls

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Tsutomu Tamada MD, PhD (Presenter): Nothing to Disclose
- Katsuyoshi Ito MD: Nothing to Disclose
- Akira Yamamoto MD: Nothing to Disclose
- Atsushi Higaki MD: Nothing to Disclose
- Akiko Kanki MD: Nothing to Disclose
- Daigo Tanimoto MD: Nothing to Disclose
- Minoru Hayashida MD: Nothing to Disclose

**TEACHING POINTS**

To understand the pharmacologic characteristics of Gd-EOB-DTPA (EOB) To demonstrate the optimal protocol of EOB-enhanced MR imaging for the correct diagnosis of hepatocellular nodules in the chronic hepatitis or liver cirrhosis To illustrate the pitfalls of EOB-enhanced MR imaging for the detection of hepatocellular nodule in patients with chronic liver disease

**TABLE OF CONTENTS/OUTLINE**

- Pharmacologic characteristics of EOB - Pharmacokinetics - Comparison with Gd-DTPA - EOB-related acute transient dyspnea - Low tissue deposition of gadolinium in EOB Optimization of EOB-enhanced MR imaging protocol - Vascular phase imaging: Arterial phase imaging; injection rate, imaging timing, multiphase acquisition Interpretation on equilibrium phase - Hepatobiliary phase (HP) imaging: timing of acquisition, optimal flip angle, effect of hepatic function - Idea for shorten examination time - Proper protocol for the detection of hepatocellular nodules Pitfalls - Typical EOB-enhanced MR imaging findings reflecting multi-step hepatocarcinogenesis - Early enhancing lesions showing hypointensity on HP mimicking hypervascular HCC - Nodules showing high signal intensity on HP - Peripheral low intensity sign (target sign) on HP - Periportal high intensity sign on HP

Update on Hepatocellular Carcinoma (HCC): Categorization and Histopathologic Correlation

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Eduardo Jose Matta MD (Presenter): Research Consultant, Pacific-Link Consulting
- Venkateswar Rao Surabhi MD: Nothing to Disclose
- Verghese George MBBS: Nothing to Disclose
- Varaha Tammisetty MD: Nothing to Disclose

**TEACHING POINTS**

1. Review imaging characteristics of HCC on MDCT and DCE-MRI 2. Review HCC staging as it pertains to liver transplantation with attention 3. Categorize liver lesions according to OPTN/UNOS and LI-RADS criteria with special attention to new recommendations and policy changes 4. Correlate imaging characteristics to histopathologic samples 5. Describe imaging mimics and practical aids to accurately assessing for HCC

**TABLE OF CONTENTS/OUTLINE**


What You Need to Know About the Alphabet Soup of Hepatocellular Carcinoma Imaging

**Education Exhibits**

**Location:** GI Community, Learning Center

**Certificate of Merit**

**Participants**

- Atilla Arslanoglu MD (Presenter): Grant, Siemens AG
- Adeel Rahim Seyal MD: Grant, Siemens AG
- Azize Sahin MD: Nothing to Disclose
- Fernanda Dias Gonzalez Guindalini MD: Nothing to Disclose
- Frank H. Miller MD: Nothing to Disclose
- Vahid Yaghmai MD: Nothing to Disclose

**TEACHING POINTS**

Hepatocellular carcinoma (HCC) is the most common primary liver tumor in adults. The American Association for the Study of Liver Diseases (AASLD), the European Association for the Study of the Liver (EASL), Liver Imaging Reporting and Data System (LI-RADS), Model for End Stage Liver Disease (MELD), Milan criteria, modified Response Evaluation Criteria in Solid Tumors (mRECIST), Organ Procurement and Transplant Network (OPTN) and United Network for Organ Sharing (UNOS) have laid down guidelines for HCC. Our exhibit will review how and what these guidelines/organizations mean to the practice of abdominal imaging. This exhibit will "unlock" the current complexities of this process and familiarize abdominal radiologists with nuances that affect management of patients with chronic liver disease at risk for HCC.
TABLE OF CONTENTS/OUTLINE

- Brief introduction of the guidelines
- Diagnosis of HCC based on the available recommendations
- Guidelines used to determine treatment and response assessment of HCC
- Policies to decide liver transplant allocation in patients with HCC
- Comparison between different practice guidelines
- Role of these criteria in clinical radiology
- Pitfalls of different guidelines

GIE241

A Lesson Well Remembered: Gastrointestinal Pathology Presenting to the Gynaecologist

Education Exhibits

Location: GI Community, Learning Center

Participants

Preeti Arora MBBS (Presenter): Nothing to Disclose
Tanzilah Afzal Barrow MBCh: Nothing to Disclose
Marwa Gafar Mohamed Elsayed MBBS: Nothing to Disclose
Sathi Anandan Sukumar MD: Nothing to Disclose

TEACHING POINTS

1. Illustrate the importance of peritoneal anatomy & pattern recognition. 2. Demonstrate the wide range of, common & uncommon, gastrointestinal pathologies presenting with gynaecological symptoms. 3. Illustrate how careful interpretation of the imaging findings with clinical history can aid timely correct diagnosis & appropriate therapy initiation. 4. Highlight potential pitfalls.

TABLE OF CONTENTS/OUTLINE

1. Etiology of common & uncommon gastrointestinal pathology which may present with gynaecological symptoms. 2. Review main learning points for gynaecological radiologists. Case examples to include: • Cervical Malignancy (appendicular mucinous tumour, rectosigmoid cancer perforating into the vagina) • Ovarian Mass (spigelian hernia, Krukenberg tumours from GI malignancy) • Ovarian Cyst (sigmoid mesenteric cyst, appendicular mucoele) • Peritoneal Ovarian Metastases (stomach, pancreas & lower GI cancers) • Vulval Malignancy (anal carcinoma) • Vaginal Discharge (colovaginal fistula & pyometra secondary to diverticular abscess/malignancy) At the end of this exhibit the viewer should understanding that locating the lesion epicentre & understanding the pattern of peritoneal spread aids identification of cases in which underlying GI pathology accounts for the presenting gynaecological symptoms.

GIE242

A Review of MR Defecography: A Case-based Discussion of How to Perform and Interpret

Education Exhibits

Location: GI Community, Learning Center

Participants

J. Daniel Giardina MD (Presenter): Nothing to Disclose

TEACHING POINTS

To review the indications, anatomy, protocol, diagnostic imaging, and common pathologies encountered.

TABLE OF CONTENTS/OUTLINE

A. Clinical Indications/Epidemiology B. Anatomy C. MR Protocols/Procedure D. How to Interpret E. Case Examples of Common Pathologies

GIE244

Advanced Iterative Model Reconstruction in Improving Image Quality of CT Abdomen

Education Exhibits

Location: GI Community, Learning Center

Participants

Kenneth K. Lau (Presenter): Nothing to Disclose
Eileen C. Ang MBBS, BMedSc: Nothing to Disclose
Nicholas David Ardley: Nothing to Disclose
Kevin Buchan: Employee, Koninklijke Philips NV

TEACHING POINTS

Multiple reconstructive techniques including different forms of iterative reconstructions (IR) improve image quality (IQ)/spatial resolution whilst reducing radiation dose in CT. The latest iterative model reconstruction (IMR) is a knowledge-based algorithm with improved low contrast resolution and produces relatively noise-free images. Improved IQ greatly aids solid organ lesion detection and hence improves patient outcome. The aim of this exhibit is to assess the diagnostic utility of IMR in CT of abdomen.

TABLE OF CONTENTS/OUTLINE

The CT data sets of 100 patients (mean age of 68) were reconstructed using IMR and iDose IRs. 1. The image noise using SD of attenuation values of liver was significantly improved by 41.3% from iDose to IMR and 39-71% in other organs. 2. The margins and internal architecture of lesions in liver, kidneys and other solid organs were better defined in IMR. There was significant improvement of IQ assessment of liver lesion with Mann-Whitney test. 3. The ureteric visualization and calculus detection, and blood vessel details were enhanced on IMR due to reduction of image noise in the adjacent fat. IMR is superior to conventional iterative reconstruction by producing relatively ‘noiseless’ CT images that enables better lesion detection.

GIE245

Education Exhibits
Location: GI Community, Learning Center

Participants
Rafael Morcillo Carratala MD (Presenter): Nothing to Disclose
Victor Rodriguez MD: Nothing to Disclose
Paula Maria Hernandez Guilabert MD: Nothing to Disclose
Lina Marcela Cruz Hernandez ARRT: Nothing to Disclose
Ximena Aragon Tejada MD: Nothing to Disclose
Luis Garcia Sanz: Nothing to Disclose

TEACHING POINTS
The aim of this exhibit is:
1-To illustrate the normal anatomy and most common anomalies and diseases of the esophagus obtained with barium esophagogram
2-To demonstrate that barium studies are still the gold standard for the diagnosis of many esophageal pathologies.

TABLE OF CONTENTS/OUTLINE
Anatomy and terminology of the esophagus with barium studies
Imaging findings of esophageal anomalies and pathologies with barium studies
Impressions: physiological (aortic arch, left main bronchus, heart), vascular (aberrant right subclavian artery, right aortic arch, double aortic arch, right aortic arch with aberrant left subclavian artery, up hill esophageal varices), extrinsic (cardiomegaly with left atrial enlargement, multinodular goiter with intrathoracic extension)
Indentations: esophageal web, cricopharyngeal achalasia, large anterior cervical osteophytes, Schatzki ring, muscular or contractile or "A" ring
Diverticula: pulsion (Zenker diverticulum, epiphrenic diverticulum, midesophageal diverticula), traction
Impressions: peptic, neoplasm, corrosive ingestion, radiation esophagitis, idiopathic
Eosinophilic esophagitis
Intramural benign tumors: leiomyoma and others

Calcified Abdominal Mesenteric Masses: A Differential Diagnosis

Education Exhibits
Location: GI Community, Learning Center

Participants
Saro Manoukian MD (Presenter): Nothing to Disclose
Nicholas H. Shaheen MD: Nothing to Disclose
Daniel Kowal MD: Nothing to Disclose

TEACHING POINTS
The goals of this exhibit are as follows:
1. Explore the broad differential of calcified intra-abdominal mesenteric masses.
2. Review the characteristic CT imaging calcification patterns of these various masses including an emphasis on clinical history in order to improve diagnostic accuracy.

TABLE OF CONTENTS/OUTLINE

Classical Gas: What Every Radiologists Needs to Know about Unusual Gas in the Abdomen

Education Exhibits
Location: GI Community, Learning Center

Participants
Kathryn Darras MD (Presenter): Nothing to Disclose
Tim O’Connell MD, Meng: President, Resolve Radiologic Ltd
Silvia D. Chang MD: Nothing to Disclose
Alison Clare Harris MBChB: Nothing to Disclose

TEACHING POINTS
1. To review the pathogenesis, MDCT appearance, pathogenesis, differential diagnosis, and management of abnormal gas encountered in the abdomen by organ system.

TABLE OF CONTENTS/OUTLINE
Diffusion-weighted Imaging in the Gastrointestinal Tract and Peritoneum: How, When, and Why?

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
Maria Cruz Agetos Casais MD (Presenter): Nothing to Disclose
Sandra Baleato Gonzalez MD: Nothing to Disclose
Roberto Garcia Figueiras MD: Nothing to Disclose
Joan C. Vilanova MD, PhD: Nothing to Disclose
Carmen Villalba Martin MD: Nothing to Disclose

TEACHING POINTS
Diffusion-weighted imaging (DWI) is a magnetic resonance technique that gives us functional information about the analyzed tissues. Used in conjunction with other sequences available, it helps us to detect and characterize the lesions and even to predict a possible response to the specific treatments.

The aim of this exhibit is:
- To explain the principles of diffusion-weighted imaging in a friendly way.
- To know the limitations, the advantages and the tricks of this technique.
- To illustrate the specific findings of DWI in the gastrointestinal tract and peritoneum in a variety of conditions including malignant and benign processes.
- To discuss the specific clinical situations in which DWI is useful for pre- and post-treatment assessment.

TABLE OF CONTENTS/OUTLINE
1. Principles of DWI 2. When and why to use this technique 3. Important DWI findings by entities: a) Inflammatory conditions: inflammatory bowel disease, acute diverticulitis, appendicitis, colitis. b) Neoporative conditions: benign (poliposis) and malignant (gastric tumors, small bowel tumors, colorectal tumors, lymphoma). 4. Take home points

Expecting the Unexpected: A Survey of Intraluminal Foreign Bodies in the Gastrointestinal Tract

Education Exhibits
Location: GI Community, Learning Center

Participants
Jay A. Karajgikar MD (Presenter): Nothing to Disclose
Sushma Gaddam BS: Nothing to Disclose
Barak Friedman MD: Nothing to Disclose
Douglas S. Katz MD: Nothing to Disclose
John J. Hines MD: Nothing to Disclose

TEACHING POINTS
1. To recognize and become familiar with various foreign objects in the gastrointestinal tract, including objects or devices that are purposefully placed through surgery or endoscopy as well as accidentally ingested foreign objects. 2. To become familiar with complications associated with foreign objects, including migration, intussusception, perforation, obstruction, hemorrhage and abscess formation, and implications for patient management.

TABLE OF CONTENTS/OUTLINE
1. Background and epidemiology of gastrointestinal foreign bodies (Incidence, race/gender predilection, affected populations, morbidity/mortality). 2. Discussion of intra-luminal foreign bodies in three separate sections (Pathologic, Iatrogenic, Ingested) with numerous examples of each detailing imaging findings, treatment implications, and potential complications. 3. Pathologic foreign bodies (e.g. bezoar, gallstone ileus). 4. Iatrogenic foreign bodies with normal imaging findings and complications. - Complications include malpositioning, stent migration and occlusion, intussusception, perforation, obstruction. 5. Ingested foreign bodies (accidental or purposeful) with complications. - Complications include abscess, perforation, bowel obstruction, vessel thrombosis. - Examples of pathology mimicking foreign bodies and vice versa. 6. Summary and conclusions.

Extranodal Manifestations of Abdominal Lymphoma

Education Exhibits
Location: GI Community, Learning Center

Participants
Hannes Devos (Presenter): Nothing to Disclose
Frederik Vandenbroucke MD: Nothing to Disclose
Lode Ry Goethals MD: Nothing to Disclose
Yannick De Brucker: Nothing to Disclose
Bart Ilsen MD: Nothing to Disclose
Johan De Mey: Research Grant, General Electric Company
TEACHING POINTS
1. Differentiate between the different extranodal abdominal presentations of lymphoma.
2. Illustrate the imaging features of lymphoma in the liver, pancreas, spleen, kidney, adrenal, gastro-intestinal system and bladder.
3. Discuss the pitfalls and most common differential diagnoses.

TABLE OF CONTENTS/OUTLINE
1. Pathophysiology of different types of lymphoma, such as HL and NHL. 2. Review of the imaging features of lymphoma using CT and MRI, based on the organ in which the disease manifests itself. 3. Best diagnostic clues. 4. Summary.

GIE252
Gastro Intestinal Stromal Tumours Reexplored—Many Orthodox and Unorthodox Avatars: A Pictorial Essay

Education Exhibits
Location: GI Community, Learning Center

Participants
Rammohan Vadapalli MD (Presenter): Nothing to Disclose
Abhijit Roychowdhury MD : Nothing to Disclose
Harshavardhan KR MD : Nothing to Disclose
Abhinav Sriram Sriram Vadapalli : Nothing to Disclose
Pramod Kumar Reddy Kaila MD : Nothing to Disclose

TEACHING POINTS
To highlight the cardinal Imaging features of Gastro intestinal Stromal tumours with Pattern recognition approach on CT, MRI and PET-CT with Radio Pathological correlation. Familiarize the viewer with Spectrum of atypical Manifestations of GIST with Illustrative examples. Pathophysiology: Concepts of GIST at a Glance Magnetic resonance imaging (MRI) Imaging Avatars of GISTs: The masses tend to be isointense relative to skeletal muscle on T1-weighted images and hyper intense on T2-weighted images. Signal-intensity voids if gas in the tumour MR findings vary, owing to the degree of necrosis and haemorrhage. The solid components of the tumour show Heterogeneous enhancement Post contrast T1 images.

TABLE OF CONTENTS/OUTLINE
-Cardinal CT and MRI findings of GIST are described with clinical Examples with a emphasis on Pattern Recognition-Endoluminal, Exophytic / ExoEnteric with homogenous CT attenuation -Atypical Features like large size, Heterogeneity, Enhancing borders, Multiloculated cystic Pattern Calcifications, necrosis, bubble-lucencies, matrix air, Fluid Fluid levels Adjacent visceral Invasion are Illustrated with a brief discussion on Differential Diagnosis -GISTs with Hepatic, peritoneal and Bone metastases are highlighted to familiarize the viewer with the malignant Variant.

GIE253
Getting at the Heart of the Matter: The Heart in Abdominal Disease

Education Exhibits
Location: GI Community, Learning Center

Participants
Joseph Mansour (Presenter): Nothing to Disclose
Sanjeev Bhalla MD : Nothing to Disclose
Kristopher W. Cummings MD : Research Consultant, Biomedical Systems Research Consultant, Medtronic, Inc
Fernando R. Gutierrez MD : Nothing to Disclose
Julie Tanios el-Ferzli MD : Nothing to Disclose
Christine O. Menias MD : Nothing to Disclose
Rita Chahinian MD : Nothing to Disclose

TEACHING POINTS
1. Review abdominal entities that may result in cardiac manifestations
2. Review cardiac entities that may result in abdominal manifestations

TABLE OF CONTENTS/OUTLINE
1. Introduction 2. Case-Based Review: Cases of Cardiac manifestations of abdominal entities a. Metastases from abdominal organs i. Myocardial metastases from abdominal organs (renal cell, colorectal carcinoma) ii. Pericardial metastases from abdominal organs iii. Intracameratal metastases (hepatocellular, renal cell, uterine tumors) b. Fistulization between stomach and coronaries c. Cardiocytic tumors causing valvular vegetations and endocardial fibroelastosis d. Mass effect on heart from abdominal viscera i. Swallow syncope from large hernia ii. Bowel herniation to the pericardial space 3. Case-Based Review: Abdominal Manifestations of Cardiac entities a. Infarcts from endocarditis and ventricular thrombi b. Cardiac cirrhosis c. Hemolysis from mechanical valves d. Retrograde flow in hepatic veins from tricuspid regurgitation SUMMARY The heart is included in every cross-sectional study of the abdomen. Radiologists must include it in their search pattern as it may be involved with abdominal diseases and in certain situations, a cardiac finding may explain the abdominal ones.

GIE255
How to Manage a Splenic Nodule?

Education Exhibits
Location: GI Community, Learning Center
Certificate of Merit

Participants
Catherine Ridereau-Zins MD (Presenter): Nothing to Disclose
Julien Hoareau MD: Nothing to Disclose
Patrick Tchouante: Nothing to Disclose
Cosmina Raluca Nedelcu MD: Nothing to Disclose
Christophe Aube MD, PhD: Speaker, Bayer AG Support, General Electric Company

TEACHING POINTS
1. to explain how to characterise a splenic nodule on different imaging techniques
2. to discuss how to integrate clinical and biological data and associated lesions to obtain the diagnosis
3. to explain how and when to perform US-guided splenic biopsy
4. to review the main etiologies

TABLE OF CONTENTS/OUTLINE
How to manage a splenic nodule How to characterise on imaging cystic or solid lesions How far to go Conclusion: Diagnosis is not easy without clinical data. Some lesions can be identified easily: cysts, hemangioma. US-guided splenic biopsy can be performed in case of doubt. Rare etiologies can be suggested rarely.

GIE256
Imaging of Gastrointestinal Stromal Tumors (GIST) and Associated Syndromes

Education Exhibits
Location: GI Community, Learning Center

Participants
Angela Hissei Motoyama Caiado MD: Nothing to Disclose
Giselle Warmbrand MD: Nothing to Disclose
Carlos Alberto Matsumoto MD: Nothing to Disclose
Dario Ariel Tiferes MD (Presenter): Nothing to Disclose
Gustavo S.P. Meirelles MD, PhD: Partner, DICOM Grid Stockholder, Fleury Group
Rogerio Caldana MD, PhD: Nothing to Disclose

TEACHING POINTS
1. Identify the typical imaging findings of GIST at initial presentation and after treatment.
2. Recognize associated syndromes.
3. Discuss the differential diagnosis.

TABLE OF CONTENTS/OUTLINE
GIST are the most frequent mesenchymal tumors of the gastrointestinal tract. They originate in Cajal interstitial precursor cells and express a KIT, tyrosin kinase growth factor receptor (CD 117), which distinguish GIST from other mesenchymal neoplasms. The stomach is the most commonly affected site, followed by the small intestine, anus, rectum, colon and esophagus. Generally, they arise within the muscularis propria, and presents as circumscribed and heterogeneous masses. When they grow towards the bowel lumen may reduce it, causing obstruction symptoms. Necrosis, hemorrhage or cystic degeneration may occur, forming cavitations which eventually ulcerate the mucosa and communicate with the intestinal lumen. Metastases occur more frequently in the liver, peritoneum and less frequently in the lungs. Typically, after chemotherapy hepatic metastases become homogeneously cystic. Most GIST are sporadic, but they may occur as part of hereditary familial or idiopathic syndromes, including neurofibromatosis type 1, Carney’s triad and the Carney-Stratakis syndrome. This study demonstrates selected cases from a review of 120 CT scans of 20 patients with GIST.

GIE259
Infectious Mimics of Abdominal Neoplasms: What to Look for

Education Exhibits
Location: GI Community, Learning Center

Participants
Jessica J. Kraeft MD (Presenter): Nothing to Disclose
Peter F. Hahn MD, PhD: Stockholder, Abbott Laboratories Stockholder, Covidien AG Stockholder, CVS Caremark Corporation Stockholder, Kimberly-Clark Corporation Stockholder, Landauer, Inc

TEACHING POINTS
1. Infection can present as mass-like lesions in the liver, spleen, gallbladder and gastrointestinal tract, mimicking neoplasm. 2. Imaging findings suggesting infection will be described.

TABLE OF CONTENTS/OUTLINE
Cases will be presented in a quiz format. Key differential diagnostic points will be discussed. Cases include: • Hepatobiliary neoplasms (hepatocellular carcinoma, cholangiocarcinoma, metastases) versus infection: o Xanthogranulomatous cholecystitis o Hydatid disease o Bartonella o Actinomyces o Fasciola hepatica • Splenic neoplasms (metastases, lymphoma) vs infection: o Pneumocystis jiroveci o Cryptococcus neoformans o Leishmaniasis o Malaria o Melioidosis • Gastrointestinal tract neoplasm (adenocarcinoma) vs infection o Amebiasis o Schistosomiasis

GIE260
Infiltrative Disease of the Mesentery: Beyond the Misty Mesentery

Education Exhibits
Location: GI Community, Learning Center

Participants
Michael Leigh Wells MD (Presenter): Nothing to Disclose
Thomas Duncan Atwell MD: Nothing to Disclose
Jeff L. Fidler MD: Nothing to Disclose
John M. Barlow MD: Nothing to Disclose
Sudhakar Kundapur Venkatesh MD, FRCR: Nothing to Disclose
Patrick Wade Eiken MD: Nothing to Disclose

TEACHING POINTS
1) A "misty" or infiltrative appearance of the mesentery may be due to multiple etiologies with considerable variation in clinical management; categories include hemorrhage, edema, lymphatic fluid, protein, fibrosis, inflammation, and tumor ("HELPFIT").
2) Clinical history and additional findings such as lymphadenopathy, solid mass or abnormalities of the abdominal organs will help to narrow the differential diagnosis.

TABLE OF CONTENTS/OUTLINE
Intro - Definition of imaging findings and general categories of disease Categories and case examples
Hemorrhage: Trauma, aneurysm General: Anasarca, cirrhosis, nephropathy, hypoproteinemia Local: Bowel obstruction, venous thrombosis, arterial embolism/dissemination, vasculitis, radiation
Lymphatic: Lymphatic obstruction, lymphangiectasia, lymphangiomata, lymphangiomata
Protein: Amyloidosis
Fibrosis: Fibromatoses
Inflammatory infiltration: Pancreatitis, appendicitis, diverticulitis Sclerosing mesenteritis, pseudotumor, IgG4, sarcoidosis, celiac sprue, erdehaim-chester
Tuberculosis
Tumor: Lymphoma, metastatic disease, plexiform neurofibroma, mesothelioma, castleman's disease, lipoma, myolipoma, liposarcoma

GIE262
Jelly Belly: Imaging of Pseudomyxoma Peritonei (PMP)

Education Exhibits
Location: GI Community, Learning Center

Participants
Joseph Mansour (Presenter): Nothing to Disclose
Christine G. Menias MD: Nothing to Disclose
Julie Tanios el-Ferzli MD: Nothing to Disclose
Wissam Mansour: Nothing to Disclose
Raghid Nahih Kikano MD: Nothing to Disclose
Sanjeev Bhalla MD: Nothing to Disclose

TEACHING POINTS
1. Review epidemiology, clinical presentation, and pathological features of PMP 2. Review tumor behavior including the pathophysiology of disease spread and treatment options. 3. To review the cross sectional imaging findings in PMP

TABLE OF CONTENTS/OUTLINE
1. Epidemiology, clinical presentation, and tumor pathological features of PMP. 2. Tumor behavior, pathophysiology of disease spread and treatment options a. Distribution related to peritoneal fluid absorption and gravity b. Treatment of PMP and PMP-type conditions 3. Cross-sectional imaging findings of PMP with examples. a. CT scan features of PMP b. Role of MRI c. Differentiation of PMP from disseminated mucinous carcinomatosis by imaging 4. Conclusion SUMMARY Pseudomyxoma peritonei (PMP) is a rare condition characterized by a productive mucinous ascites, filling the peritoneal cavity. PMP is a histologically benign peritoneal tumor and is not to be confused with disseminated mucinous carcinomatosis. PMP can originate from many organs, ruptured appendiceal mucinous adenoma and low grade ovarian neoplasms being the most common. Cross sectional imaging is crucial in assessing this condition and operability. The purpose of this exhibit is to illustrate the key imaging features, how they help differentiate PMP from peritoneal carcinomatosis and determine choice of treatment.

GIE263
Let's Cone It Down: CT Features of Diseases Involving the Ileocecal Area

Education Exhibits
Location: GI Community, Learning Center

Participants
Margaret Skaug: Nothing to Disclose
Joseph McLaughlin: Nothing to Disclose
Edward Chia-Hsing Chen MD: Nothing to Disclose
Jennifer Flanagan: Nothing to Disclose
Vasantha Vasan MD (Presenter): Nothing to Disclose

TEACHING POINTS
Acute abdominal pain is the second leading cause for an emergency room visit after chest pain in adults. A vast proportion of this is for right lower quadrant pain and CT is the modality of choice for evaluating this. Although appendicitis is the most common clinical concern there are several other diseases that involve the ileocecal area and present with RLQ pain. In this exhibit we will review the key CT (inflammatory bowel disease, appendicitis, epiploic appendagitis, typhilitis, mesenteric adenitis), Infections (TB, amebiasis), neoplasms ( adenocarcinoma, lymphoma, carcinoind) and other conditions including ischemia, cecal volvulus and intussusception which involve the ileocecal area. Emphasis will be on key features that help diagnose or narrow the differential diagnosis along with clinical history and lab work.

TABLE OF CONTENTS/OUTLINE
Overview Review the normal anatomy of the ileocecal area Factors to evaluate i.e bowel wall thickening, mesenteric stranding,
lymphadenopathy, sinus/fistulous tracts, abscess, pneumatosis coli, free air Key features of common infectious, inflammatory, neoplastic and other miscellaneous conditions affecting the ileocecal area

### GIE264

**Liver Transplant Complications: Not Only a Transplantation Centers’ Issue**

*Education Exhibits*

*Location: GI Community, Learning Center*

#### Participants
- Ivo Ferreira (Presenter): Nothing to Disclose
- João André Oliveira: Nothing to Disclose
- Daniel Baby: Nothing to Disclose
- Manuela Certo MD: Nothing to Disclose
- Manuela Franca MD: Nothing to Disclose
- Leonardo Kayat Bittencourt MD, MSc: Nothing to Disclose

#### TEACHING POINTS
- Comprehend the normal anatomy of the transplanted liver.
- Understand radiologic findings as an important tool to diagnosis liver transplant complications so as to define the best therapeutic approach.
- Recognize that nowadays, transplanted patients are evaluated in several medical services and therefore, all radiologists need to know their possible complications.
- Review common and uncommon imaging findings of liver transplant complications, namely those related to: hepatic artery, portal vein, inferior vena cava and bile duct.

#### TABLE OF CONTENTS/OUTLINE

1. Hepatic artery: stenosis; thrombosis; pseudoaneurysm and arteriovenous fistulas.
2. Portal vein: stenosis; thrombosis.
3. Inferior vena cava and hepatic veins: stenosis; thrombosis.
4. Bile duct: stenosis; obstruction; leak.
5. Others: hematoma; collections, hepatocellular carcinoma, intestinal occlusion.

### GIE265

**Non-Neoplastic Abdominopelvic Lymphadenopathy: A Comprehensive Review**

*Education Exhibits*

*Location: GI Community, Learning Center*

#### Participants
- Elina Zaretsky MD, MA: Nothing to Disclose
- Alexander Cates Kagen MD: Speakers Bureau, Bayer AG
- Neil Theise MD: Nothing to Disclose
- Galina Levin MD: Nothing to Disclose
- Christine O. Menias MD: Nothing to Disclose
- Alampady Krishna Prasad Shanbhogue MD, MBBS: Nothing to Disclose
- Francesco Priamo MD (Presenter): Nothing to Disclose

#### TEACHING POINTS
- Enlarged lymph nodes are common imaging findings on routine multi-detector computed tomography, ultrasound, and magnetic resonance examinations of the abdomen and pelvis. The purpose of this exhibit is: 1) To list the non-neoplastic causes of lymphadenopathy in the abdomen and pelvis. 2) To review the epidemiological, clinical and pathological features of non-neoplastic entities presenting with abdominopelvic lymphadenopathy. 3) To present the characteristic imaging features (MDCT, MRI, US) with emphasis on pattern approach to differential diagnosis.

#### TABLE OF CONTENTS/OUTLINE

1. Review of major nodal stations in the abdomen and pelvis.
2. Present clinical, pathological and imaging features of a wide array of non-neoplastic conditions resulting in abdominopelvic lymphadenopathy including, but not limited to: Nonspecific lymphoid hyperplasia, Viral infections (HIV, HBV, HCV Infectious mononucleosis), Whipple disease, Celiac disease, Autoimmune diseases (ex. SLE), Castleman’s disease, Kikuchi lymphadenitis, Granulomatous lymphadenitis (ex. Sarcoidosis, Chron’s, TB, Syphilis), Rosai-dorman disease (sinus histiocytosis), Storage disorders, and drugs.
3. Discuss a pattern approach based on clinical and imaging features.

### GIE266

**P.O.E.M. Procedure: What the Radiologist Needs to Know for This New Surgical Intervention for Achalasia**

*Education Exhibits*

*Location: GI Community, Learning Center*

#### Participants
- Brian Williams MD (Presenter): Nothing to Disclose
- Rishi Kumar Maheshwary MD: Nothing to Disclose
- Matthew Scott Hartman MD: Nothing to Disclose

#### TEACHING POINTS
- Review pathophysiological findings of achalasia.
- Radiographic work-up of achalasia.
- Discuss POEM procedure.
- Radiographic findings status post POEM.
- Radiographic complications status post POEM.

#### TABLE OF CONTENTS/OUTLINE

1. Table of Contents Pathophysiology of achalasia Review imaging of achalasia work up Discuss and illustrate POEM procedure
2. Normal postoperative radiographic findings Complications associated with POEMs procedure.
Spectral Detector Computed Tomography (Dual-layer CT): Initial Experience in Abdominal Imaging

**Participants**
Luis Alberto Landeras MD (Presenter): Institutional Grant support, Koninklijke Philips NV
Prabhakar Rajiah MD, FRCR: Institutional Research Grant, Koninklijke Philips NV

**TEACHING POINTS**
- To review the basic principles of spectral computed tomography imaging
- Understand the principles of spectral detector CT imaging compared to other available spectral CT alternatives
- Demonstrate different applications of spectral detector CT imaging in abdominal and pelvic imaging

**TABLE OF CONTENTS/OUTLINE**
1. Introduction
2. Principles of Spectral CT
3. CT image reconstruction
4. Applications - Image optimization
   a. Monoenergetic imaging
   b. Metallic artifact reduction
   c. Virtual nonenhanced imaging
   d. Renal stone assessment
5. Focal mass characterization
6. Hypervascular lesions
7. Hypoattenuating mass
8. Cystic lesions
9. The suboptimal CT angiography
10. Radiation dose

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Swallowing Disorders due to Cervical Spinal Fixation: Diagnosis by Videofluoroscopy

**Participants**
Alberto Ivo Carbo MD (Presenter): Nothing to Disclose
Matthew Morgan: Nothing to Disclose
Anne Hollister MD: Nothing to Disclose
Peeyush Bhargava MD, MBA: Nothing to Disclose

**TEACHING POINTS**
- To describe the postsurgical techniques and complications of cervical spinal surgery like infection, hemorrhage and neurologic and muscular damage
- To discuss the pathophysiology of the swallowing changes produced by the surgery
- To review the radiological diagnosis and therapeutic consequences
- To show sample cases of abnormal swallowing disorders due to surgery by fluoroscopy or rapid radiographic sequences

**TABLE OF CONTENTS/OUTLINE**
- Cervical spinal fixation: Surgical techniques
- Post surgical complications that may affect the swallowing mechanism
- Pathophysiology of swallowing disorders attributed to cervical fixation
- Radiologic diagnosis and significance for treatment
- Sample cases documented by videofluoroscopy, rapid radiographic sequences, plain film and MDCT

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The Fluoroscopic Swallowing Examination: Imaging Findings Essential to Decide and Drive the Rehabilitative Process

**Participants**
Alberto Ivo Carbo MD (Presenter): Nothing to Disclose
Matthew Morgan: Nothing to Disclose
Michael Colter Gates MD: Nothing to Disclose
Thomas Gates MD: Nothing to Disclose

**TEACHING POINTS**
- To describe the indications and technique of the fluoroscopic examination of abnormal swallowing personalized for a personalized ad tailored rehabilitation of swallowing disorders
- To review the abnormal radiologic findings and underlying pathophysiology essential to deciding the swallowing rehabilitative process
- Abnormal radiologic findings to be discussed in the exhibit include premature mouth leakage, nasopharyngeal regurgitation, delayed triggering of pharyngeal swallow, deficiency of bolus constrictor muscles, laryngeal penetration and aspiration, reduced hyolaryngeal elevation, residue in the vallecula and pyriform sinuses and diminished, delayed opening and early closing of the cricopharyngeus
- To became familiar with indications and rationale of the compensatory strategies used by Speech-Language-Pathologists (SLP) to treat swallowing dysfunctions
- To understand how the reported radiologic abnormalities will influence the patient’s management, especially in the instances where the SLP that will treat the patient is not present for the study

**TABLE OF CONTENTS/OUTLINE**
- Indications and technique of fluoroscopic swallowing examination
- Abnormal radiologic findings and pathophysiology
- Therapeutic maneuvers used by SLP to improve swallowing disorders
- Sample cases documented by rapid digital sequences and videofluoroscopy

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The Not So Silver Lining: The Spectrum of Peritoneal Disease in the Adult
TEACHING POINTS

1. To review the anatomy and physiology of the peritoneum and the peritoneal spaces. 2. To provide an approach to evaluating images with suspected peritoneal disease. 3. To discuss the pathogenesis, MDCT appearance, differential diagnosis, and management of peritoneal pathology including latest recommendations for treating metastatic disease such as intraperitoneal chemotherapy. 4. To highlight new imaging techniques being used to evaluate the peritoneum, specifically DWI and Dual Energy CT.

TABLE OF CONTENTS/OUTLINE


GIE273
The Peritoneal Metastasis of Gastric Cancer on Spectral CT: Uncommon Sites and Uncertain Signs

TEACHING POINTS

1. To introduce how to improve the detection of unobvious peritoneal metastasis lesions. 2. To briefly review the common sites and signs of peritoneal metastasis of gastric cancer. 3. To illustrate the uncommon sites of peritoneal metastasis. 4. To introduce the uncertain signs of peritoneal metastasis.

TABLE OF CONTENTS/OUTLINE

1. How to improve the detection ability: 1) Multi-planar reconstruction and reasonable reading order to guarantee the full detection. 2) Wide window to demonstrate the fat tissue structures clearly. 3) Spectral CT to improve the resolution and facilitate quantitative evaluation. 2. Common sites and signs of peritoneal metastasis: 1) Omental cake. 2) Thickening or nodular of parietal peritoneum. 3. Uncommon sites of peritoneal metastasis: 1) Transverse mesocolon. 2) Hepatogastric ligament. 3) Perihepatic peritoneum 4) Bilateral paracolic sulci 5) Small mesenteric. 4. Unobvious signs of peritoneal metastasis 1) Smudge sign: mild type, slightly and evenly increased fat density appeared as GGO; moderate type, unevenly increased fat density, with patchy-like or intensive GGO; severe type, unevenly and obviously increased fat density, with multiple strands, curls sign or blurred small nodules. 2) Small amount of ascites (>50ml): >90% probability of metastasis. 3) The opportunity to perform diagnostic laparoscopy.

GIE274
The Slowest Bowel Movement You've Ever Had—Bowel Motility and Our Experience with High Field Strength (3.0T) Dynamic MR Enterography

TEACHING POINTS

By acquiring real-time images from dynamic volumetric cine loops status post glucagon administration, evaluation of the bowel with MR Enterography is quickly becoming an invaluable tool for evaluation of various conditions (particularly for Inflammatory Bowel Disease management). Although this exam is typically performed at 1.5 T, we have experienced superior spatial/temporal resolution and SNR at 3.0 T MRI. 1. Review normal magnetic resonance imaging (MRI) anatomy and appearance of the abdominal contents at 3.0 T during MR Enterography. 2. Illustrate MRI findings in various gastrointestinal pathologic conditions. 3. Discuss the subtle nuances and techniques needed to optimize MR Enterography at 3.0 T.

TABLE OF CONTENTS/OUTLINE

1. Anatomic diagrams and review of abdominal anatomy, with pictorial review of small and large bowel motility during MR Enterography. 2. Imaging presentation of gastrointestinal pathologic conditions (imaging of routine and complicated Inflammatory Bowel Disease, potential mimickers, and a few other unusual conditions that can be encountered). 3. Discussion of 3.0 Tesla MRI Enterography techniques used at our institution that maximize our equipment as well as potential pitfalls. Use of negative oral contrast, glucagon, diffusion weighted imaging, and dynamic cine loops allows imaging the bowel to best
The Wheel of the Mesentery: Imaging Spectrum of Primary and Secondary Mesenteric Neoplasms—How the Radiologist Can Help Plan the Treatment

Education Exhibits
Location: GI Community, Learning Center

Cum Laude
Selected for RadioGraphics

Participants
Stephanie Nougaret MD (Presenter): Nothing to Disclose
Yuliya Lakhman MD: Nothing to Disclose
Caroline Reinhold MD, MSc: Nothing to Disclose
Helen Clare Addley MRCP, FRCR: Nothing to Disclose
Elisabeth Delhom: Nothing to Disclose
Boris Guiu MD: Nothing to Disclose
Evis Sala MD, PhD: Nothing to Disclose

TEACHING POINTS
Describe the normal anatomy of the mesentery and its relationships to the other peritoneal folds. Identify the CT and MRI appearances of common and rare primary mesenteric neoplasms using a dedicated algorithm. Describe the different patterns of spread of secondary mesenteric neoplasms. Recognize the common appearance on CT and MRI of secondary mesenteric neoplasms and their pitfalls. Propose a treatment algorithm and describe the sites of the mesentery in which surgical debulking or resection may be difficult.

TABLE OF CONTENTS/OUTLINE
1- Normal Anatomy of the Mesentery
2- CT and MRI appearances of common and rare primary mesenteric neoplasms
2-1- Tumor types
2-2- Algorithm for interpretation (Purely cystic masses, Solid masses, Mixed solid/cystic masses, Infiltrative masses, Stellate masses)
3- Routes of dissemination of secondary tumors of the mesentery
4- Appearances of secondary mesenteric neoplasms: Pearls and Pitfalls.
4-1- Imaging pattern (Infiltrative: the misty mesentery, Clustered, Extensive)
4-2- Early stage findings
4-3- Complications
5- Treatment of primary and secondary mesentery neoplasms
5-1- Treatment algorithm
5-2- Reseable and non resecable sites of the mesentery: How the radiologist can help plan the surgical approach.

Transitions in GastroIntestinal Imaging: How Did We Get Here? From Barium Studies to CT Scans

Education Exhibits
Location: GI Community, Learning Center

Participants
Andrew Joseph Barrow MD (Presenter): Nothing to Disclose
Chitra Ambat Chandrasekhar MBBS: Nothing to Disclose
Agnes Maria Guthrie MD: Nothing to Disclose

TEACHING POINTS
1. Correlate cross sectional imaging findings in the usual and unusual presentations of disease entities of the esophagus, stomach and small bowel with corresponding findings on conventional barium studies. 2. To help understand the “pros versus cons” of one modality over the other.

TABLE OF CONTENTS/OUTLINE
1. Exemplify the cross sectional imaging findings in common and seldom encountered upper gastrointestinal pathology as seen on CT scans and to demonstrate the corresponding findings on barium studies. 2. Discuss the single versus double contrast barium or water soluble contrast techniques and validate their usefulness and feasibility. With increasing use of cross sectional imaging, Computed Tomography (CT) scans have emerged as the mainstay for imaging of Gastrointestinal (GI) pathology. CTs have been touted as the “modality of choice” and useful for evaluating the entire GI tract, there is still a very strong role for imaging with conventional barium or water soluble contrast studies. The use of fluoroscopy and the live “hands on” approach to imaging with an Upper Gastrointestinal study is helpful in many instances where the CT scan is equivocal. Conventional contrast studies expedite patient triage and management. In many instances, a barium or water soluble contrast exam may corroborate or confirm the CT imaging findings and may “clinch” the diagnosis.

Tumor and Tumor-like Conditions of the Anal and Perianal Canal Is
### Certificate of Merit

Selected for RadioGraphics

### Participants

- Christine O. Menias MD (Presenter): Nothing to Disclose
- Khaled M. Elsayes MD: Nothing to Disclose
- Amy Kyö Hara MD: Nothing to Disclose
- Ania Zofia Kielar MD: Nothing to Disclose
- Venkateswar Rao Surabhi MD: Nothing to Disclose
- Kumaresan Sandrasegaran MD: Nothing to Disclose
- William Christopher Baughman MD: Nothing to Disclose
- Venkata S. Katabathina MD: Nothing to Disclose
- Akram Mohamed Shaaban MBCh: Contributor, Amirsys, Inc
- Rex Albert Parker MD: Nothing to Disclose

### TEACHING POINTS

Review imaging features of tumors and tumor-like conditions of the anal and perianal region at CT and MR. Discuss the epidemiology, clinical presentation, and management of tumors and tumor-like conditions of the anal and perianal canal.

### TABLE OF CONTENTS/OUTLINE

- Tumors and tumor-like conditions of the anal and perianal canal including: Squamous cell/adeno carcinoma, GIST, Lymphoma, Angiomyxoma, Condyloma, Neurogenic tumors, Fournier gangrene, and other infections. Neuroendocrine tumors, Melanoma.
- Management and therapeutic options. The anal canal is defined as the terminal part of the large intestine, beginning at the upper anorectal ring and passing through the pelvic floor to end at the anus. The most important macroscopic landmark in the mucosa is the dentate (pectinate) line composed of the anal valves and the bases of the anal columns.
- The most frequent neoplasms of this region are human papilloma virus (HPV-) associated squamous cell carcinomas and adenocarcinomas. Other tumors that occur in the anal/perianal canal include melanoma, lymphoma, GIST, neurogenic tumors, and metastases. Tumor-like conditions such as condyloma, and inflammatory and infectious conditions can also involve the anal and perianal canal. The purpose of this exhibit is to illustrate the common and uncommon tumors and tumor-like conditions of the anal and perianal canal.

### GIE278

**Understanding, Performing and Reading CT Scan in Parietal Abdominal Wall Repair Surgery**

### Education Exhibits

### Location: GI Community, Learning Center

### Participants

- Catherine Ridereau-Zins MD (Presenter): Nothing to Disclose
- Elodie Sibileau MD: Nothing to Disclose
- Jerome Lebigot MD: Nothing to Disclose
- Cosmina Raluca Nedelcu MD: Nothing to Disclose
- Aurelien VENARA MD: Nothing to Disclose
- Christophe Aube MD, PhD: Speaker, Bayer AG Support, General Electric Company

### TEACHING POINTS

- To expose main surgical procedures (indications and types of prosthetic meshes) to explain the CT scan technique to illustrate CT normal findings to review postoperative complications findings.

### TABLE OF CONTENTS/OUTLINE

- Background: Surgical procedures Imaging: how to perform a CT exam of the abdominal wall how to read it CT normal findings CT pathological findings Conclusion: Parietal postoperative complications are not common. CT scan allows a clear visualization of the prosthesis. The worse complication is infection of the prosthesis.

### GIE279

**You Ain't Spleen Nothing Yet! Image Gallery of Unusual Splenic Pathology**

### Education Exhibits

### Location: GI Community, Learning Center

### Participants

- Alexander Somwaru MD: Nothing to Disclose
- Stanley S. Siegelman MD: Nothing to Disclose
- Karen Margaret Horton MD: Nothing to Disclose
- Pamela Tecce Johnson MD (Presenter): Research funded, Becton, Dickinson and Company

### TEACHING POINTS

- Benign spleen lesions are common incidental findings on abdominal CT exams. Infrequently, primary and secondary malignancies and other unusual pathologies can be encountered in the spleen. The purpose of this exhibit is to demonstrate the CT appearance of various unusual pathologic processes in the spleen.
- Review the imaging features of primary and secondary splenic malignancies.

### TABLE OF CONTENTS/OUTLINE

- Technique limitations of arterial phase imaging differential diagnosis based on enhancement characteristics Case Series: Leukemia Non Hodgkin’s Lymphoma Hodgkin’s Lymphoma Metastatic disease (lung cancer, urothelial cancer, ovarian cancer, renal cell carcinoma, melanoma) Primary tumors (epithelioid angiosarcoma, histiocytic angiosarcoma, pleomorphic angiosarcoma).
### GIE280
**A Clinical Review of Acute Pancreatitis, the Revised Atlanta Classification, Imaging, and Therapies**

*Education Exhibits*

*Location: GI Community, Learning Center*

#### Participants
- Mark Patrick Trahan MD (Presenter): Nothing to Disclose
- Aalok Bipin Turakhia MD: Nothing to Disclose
- Aarti Sekhar MD: Nothing to Disclose
- Michael Terrence Osipow MD: Nothing to Disclose

#### TEACHING POINTS
- Teaching Points: During the first week, clinical parameters guide treatment of pancreatitis. An awareness of the patient's clinical history and onset of symptoms is critical for appropriate application of the terminology. Utilizing preferred terminology allows effective communication with referring clinicians and directs appropriate management. Treatment of fluid collections varies with collection type - for example, walled off necrosis usually requires more aggressive percutaneous drainage and/or minimally invasive surgical necrosectomy.

#### TABLE OF CONTENTS/OUTLINE
- Background: Acute pancreatitis can present with a myriad of imaging findings. The Atlanta Classification of Acute Pancreatitis was devised in 1992 and revised in 2008 to address the inconsistent nomenclature used to describe pancreatitis. The goal of this educational exhibit is to provide radiologists with a review of the Revised Atlanta Classification, preferred terminology, and relevant imaging examples.
- Outline: Epidemiology of acute pancreatitis and a brief historical perspective
- Clinical diagnosis/risk stratification of patients including the appropriate role of imaging
- Review of Revised Atlanta Classification (see chart #1) including relevant terminology with examples
- Indications and special considerations for interventional versus surgical treatment

### GIE281
**Fat-Containing Lesions of the Pancreas**

*Education Exhibits*

*Location: GI Community, Learning Center*

#### Participants
- Chris Somerville MD (Presenter): Nothing to Disclose
- Mitchell E. Tublin MD: Nothing to Disclose

#### TEACHING POINTS
- Only one fatty abnormality of the pancreas is common - fatty parenchymal replacement. Some of its many variations can mimic other fatty lesions.
- All other fatty pancreatic lesions are rare.
- Focal fatty replacement can mimic a lipoma.
- Near-complete fatty atrophy can be difficult to differentiate from lipomatous pseudohypertrophy. However, these distinctions are academic, as all are incidental findings.
- Fat does not occur in adenocarcinoma, neuroendocrine tumors, or cystic neoplasms of the pancreas.
- Liposarcoma is the only malignant fat-containing lesion of the pancreas. It is exceedingly rare.
- Any fatty abnormality of the pancreas containing homogenous fat and no solid or enhancing components is an incidental finding.

#### TABLE OF CONTENTS/OUTLINE
- Intro o Fat on CT, MR, US o regional anatomy of pancreas
- Fatty replacement o Partial - diffuse, focal o Complete - atrophy - enlargement - cystic fibrosis, lipomatous pseudohypertrophy, Shwachman-Diamond Syndrome, duct obstruction - Masses o Hypoplasia o Lipoma o Liposarcoma o Teratoma o Angiomyolipoma/PEComa - Work-up and clinical significance

### GIE282
**Fat-Containing Lesions of the Pancreas: CT and MR Imaging Features with Pathological Correlation**

*Education Exhibits*

*Location: GI Community, Learning Center*

#### Participants
- Yoshihiko Fukukura MD, PhD (Presenter): Nothing to Disclose
- Koji Takumi: Nothing to Disclose
- Junichi Ideue: Nothing to Disclose
- Tomokazu Umanodan: Nothing to Disclose
- Tomohide Yoneyama: Nothing to Disclose
- Hiroto Nakajima: Nothing to Disclose
- Masanori Nakajo MD: Nothing to Disclose
- Takashi Yoshinara MD, PhD: Nothing to Disclose

#### TEACHING POINTS
- Fat-containing pancreatic lesion is unusual and cross-sectional imaging findings of fat-containing lesions can help in characterizing pancreatic lesions. The purposes of this exhibit are: 1. To illustrate CT and MR imaging findings of fat-containing pancreatic lesions with histopathologic correlation. 2. To discuss the imaging differential diagnosis of fat-containing pancreatic lesions.

#### TABLE OF CONTENTS/OUTLINE
1. How to identify intralesion fat.
2. Review of CT and MR imaging findings of fat-containing pancreatic lesions (fatty replacement, lipoma, liposarcoma,
hamartoma, teratoma, lymphoepithelial cyst, neuroendocrine tumor, and metastases from renal cell carcinoma and hepatocellular carcinoma), with histopathological correlation.
3. Highlight key differential diagnostic points of fat-containing pancreatic lesions.
4. Summary: The identification of fat within a pancreatic lesion can lead to the correct diagnosis along with other radiological findings and the clinical information.

GIE283

Heads or Tails: Case Based Review of Pancreatic Masses

Education Exhibits
Location: GI Community, Learning Center

Participants
Nina Woldenberg MD (Presenter): Nothing to Disclose
Cecilia Matilda Jude MD: Author, UpToDate, Inc
Jeffrey Petersen MD: Nothing to Disclose
Rinat Masamed MD: Nothing to Disclose
Barbara M. Kadell MD: Nothing to Disclose
Maitraya K. Patel MD: Nothing to Disclose

TEACHING POINTS
Ductal adenocarcinoma is the most common pancreatic neoplasm. The spectrum of pancreatic tumors is broad however, and includes other exocrine and non exocrine cell types. The clinical features of the patient, including age and gender, in combination with the imaging appearance can frequently lead the radiologist to a specific pathologic diagnosis. The key radiologic findings on CT, US and MRI of the range of pancreatic tumors and tumor-like conditions, with clinical and selected pathologic correlation will be reviewed.

TABLE OF CONTENTS/OUTLINE
Comprehensive, multiple choice question case-based review of the spectrum of tumors and tumor-like conditions of the pancreas with special attention to key cross-sectional imaging features and clinical management. Pathologic correlation will be provided when appropriate. Spectrum of pancreatic neoplasms include adenocarcinoma, mucinous cystic neoplasm, serous cystadenoma, intraductal papillary mucinous neoplasm, solid pseudopapillary neoplasm, acinar cell cystadenocarcinoma, paraganglioma, pancreatic neuroendocrine tumors, lymphoma, intraductal oncocytic papillary neoplasm, osteoclast giant cell tumor, as well as metastasis and the pancreatic tumors related to Von Hippel-Lindau syndrome. Tumor-like conditions including focal autoimmune pancreatitis and lipomatous pseudohypertrophy will be presented.

GIE284

High-quality 2D and 3D CT Imaging of Pancreato-Biliary Diseases with Small Focal Spot and Iterative Model Reconstruction Techniques

Education Exhibits
Location: GI Community, Learning Center

Participants
Masafumi Uchida MD, PhD (Presenter): Nothing to Disclose
Yukiko Kunou: Nothing to Disclose
Shinichi Tokuyasu RT: Employee, Koninklijke Philips NV
Akiko Sumi MD: Nothing to Disclose
Hidefumi Kuroki RT: Nothing to Disclose

TEACHING POINTS
Early detection and accurate diagnosis of pancreato-biliary tumors remain crucial to increase the rate of curative surgery. 1) To describe the basics of small focal spot and iterative model reconstruction techniques for pancreato-biliary diseases 2) To understand the clinical utility of the technique for high-quality 2D and 3D CT, illustrated through representative examples of clinical studies.

TABLE OF CONTENTS/OUTLINE
1. The theoretical background of high-quality CT imaging with a small focal spot (focal spot size in the X-ray tube) and the iterative model reconstruction (full iterative reconstruction) technique 2. The protocol for CT imaging of the pancreato-biliary system using high image-quality techniques with contrast-enhanced CT 3. A review of the high-quality 3D CT findings - Fine vascular anatomy of the pancreato-biliary system 4. Comparison of the usual CT and high-quality CT images of the pancreato-biliary system with respect to their clinical utility.

GIE285

Incidental Pancreatic Lesions: Imaging Diagnosis and Management Considerations

Education Exhibits
Location: GI Community, Learning Center

Participants
Jessica Lai MD (Presenter): Nothing to Disclose
Stephen Thomas MD: Nothing to Disclose
Aysegul Cansu: Nothing to Disclose
Melvy Sarah Mathew MD: Nothing to Disclose
Aytekin Oto MD: Research Grant, Koninklijke Philips NV Consultant, Guerbet SA

TEACHING POINTS
Review characteristic imaging findings of incidental pancreatic lesions.
Discuss guidelines for the work-up and management options.
Provide a suggested approach to evaluating incidental pancreatic lesions.

**TABLE OF CONTENTS/OUTLINE**

Problem of incidental pancreatic lesions Goals and work-up options Guidelines -International consensus -ACR Our suggested approach (reviewing imaging findings and recommended management of lesions) -Is a lesion cystic or a mimic? Duodenal diverticulum Solid lesions (adenocarcinoma, metastases, rare tumors) Vascular lesions (thrombosed pseudoaneurysm, varices) -Does the lesion communicate with the pancreatic duct? IPMN -Is the lesion macrocystic? Serous cystadenoma IPMN -Is the lesion solid? Focal fat Pancreatic adenocarcinoma Islet cell tumor Pancreatic duct stricture Intrapancreatic spleen

**GIE287**

**Novel CT Imaging Techniques and Strategies for Diagnosing Pancreatic Neoplasms: What the Radiologist Should Know**

*Education Exhibits*

*Location: GI Community, Learning Center*

**Participants**

- **Xiao Zhu Lin MD (Presenter):** Nothing to Disclose
- **Kemin Chen MD, PhD:** Nothing to Disclose
- **Fuhua Yan:** Nothing to Disclose

**TEACHING POINTS**

1. To review conventional CT and its limitations for diagnosing pancreatic neoplasms
2. To illustrate novel CT imaging techniques for diagnosing pancreatic neoplasms
3. To demonstrate optimal strategies using these techniques by presenting experimental data and clinical images

**TABLE OF CONTENTS/OUTLINE**

1. Conventional CT and its limitations in diagnosing pancreatic neoplasms -limited density resolution/ indeterminate lesion -beam-hardening (BH) effect/ limited spatial resolution
2. Novel CT imaging techniques -monochromatic imaging/optimal CNR technique and BH reduction -material density imaging -spectral HU curve -high definition CT (HDCT) and iterative reconstruction (IR)
3. Optimal strategies for pancreatic CT

**GIE288**

**Pancreas Transplants: From Surgical Basics to Imaging Pearls**

*Education Exhibits*

*Location: GI Community, Learning Center*

*Cum Laude*

**Participants**

- **Marc D. Kohli MD (Presenter):** Research Grant, Koninklijke Philips NV Research Grant, Siemens AG
- **Angela K. Shah RT:** Nothing to Disclose
- **Paul Haste MD:** Nothing to Disclose
- **Kumaresan Sundrasegaran MD:** Nothing to Disclose
- **Richard Mangus MD:** Nothing to Disclose
- **Jonathan A. Fridell MD:** Nothing to Disclose

**TEACHING POINTS**

- Identifying the location and type of vascular and enteric anastomoses are critical to accurate imaging follow up. Pulse wave doppler findings of reversed diastolic arterial flow to the transplant pancreas suggests venous thrombosis
- Multiphase CT protocol with enteric contrast is important in detecting vascular and enteric complications.

**TABLE OF CONTENTS/OUTLINE**

- Patient selection for pancreas transplant
- Surgical Techniques/Anatomy (Historical techniques, Current techniques, Vascular supply)
- Post operative complications (Early, Late)
- Ultrasound Imaging Considerations (Technique, Pitfalls, Goals of ultrasound evaluation, Case Examples)
- CT (Protocol and rationale, Case Examples)
- Image Guided Biopsy (Rationale, technique, complications)
- Summary

**GIE289**

**The Revised Atlanta Classification for Acute Pancreatitis: Start Using It in Your Practice!**

*Education Exhibits*

*Location: GI Community, Learning Center*

*Selected for RadioGraphics*

**Participants**

- **Bryan Robert Foster MD (Presenter):** Nothing to Disclose
- **Kyle Jensen MD:** Nothing to Disclose
- **Gene Bakis MD:** Nothing to Disclose
- **Akram Mohamed Shaaban MBBCh:** Contributor, Amirsys, Inc
- **Fergus V. Coakley MD:** Nothing to Disclose

**TEACHING POINTS**

- The revised Atlanta classification updates terminology used in the imaging evaluation of acute pancreatitis. Imaging is crucial in
severe pancreatitis after the 1st week and directs treatment. Morphologic assessment of fluid collections is an important part of
the revised Atlanta classification and is defined by the collection contents and by the time since the onset of symptoms. Use of
the revised Atlanta classification in radiology reporting facilitates accurate communication amongst members of the care team
and underscores the radiologist's important role in the treatment of patients with acute pancreatitis.

TABLE OF CONTENTS/OUTLINE

1. Clinical diagnosis and overview of acute pancreatitis. 2. Presentation of the new revised Atlanta classification and comparison
with the original Atlanta Classification. 3. Early vs. late phase. 4. Interstitial edematous pancreatitis vs. necrotizing pancreatitis.
5. Pancreatic vs. peripancreatic necrosis. 6. Multimodality imaging examples: acute peripancreatic fluid collection, acute necrotic
collection, pseudocyst, walled off necrosis. 7. Disconnected duct syndrome. 8. Infected collections and pitfalls. 9. Illustrated
surgical and interventional approaches used. 10. Suggestions for reporting the Revised Atlanta Criteria.
1. A wide variety of GI tract diverticular disease extends beyond the left lower quadrant. Diverticula can occur anywhere along the GI tract and have the potential to be symptomatic.

2. Imaging studies, including barium examinations and cross-sectional imaging (CT), are essential in diagnosing symptomatic diverticular disease and identify complications.

**TABLE OF CONTENTS/OUTLINE**

The role of conventional GI studies and CT for the diagnosis of symptomatic diverticular disease will be highlighted. Acute and chronic complications associated with various common and uncommon diverticula will be outlined. Clinical and imaging features of the following GI tract diverticular diseases will be discussed: pharyngeal Zenker’s diverticulum Killian-Jamieson diverticulum mid-esophageal tuberculosis-related traction diverticulum epiphrenic diverticulum congenital gastric diverticulum duodenal diverticulum and diverticulitis right-sided diverticulitis complicated sigmoid diverticulitis colonic diverticulitis containing carcinoma giant colonic diverticulum.

**GIE294**

**Congenital, Developmental, and Inherited Small Bowel Diseases in Adults: From Pathophysiology to Imaging and beyond!**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

Bo Li MD (Presenter): Nothing to Disclose
Alampady Krishna Prasad Shanbhogue MD, MBBS : Nothing to Disclose
Christine O. Menias MD : Nothing to Disclose
Ting Yin Tao MD, PhD : Nothing to Disclose
Elizabeth Fowler Sheybani MD : Nothing to Disclose
Sadhna Verma MD : Nothing to Disclose

**TEACHING POINTS**

*To illustrate the embryological developmental pathway of the small bowel (creation of the primitive gut tube, the midgut, and formation of the mesentery).

*To graphically illustrate the embryological defects associated with each congenital small bowel anomaly.

*To discuss the clinical and imaging characteristics of congenital, developmental, and inherited small bowel abnormalities presenting in adolescence and adulthood, with implications on management.

**TABLE OF CONTENTS/OUTLINE**

*Embryological developmental pathway of the small bowel with graphical illustration of defects which lead to the specific congenital anomaly. *Clinical and imaging manifestations of congenital small bowel anomalies presenting in adulthood, including Meckel’s Diverticulum, Malrotation, Midgut Volvulus, Duodenal Web, Enteric Duplication Cyst, Meconium Ileus Equivalent, and Internal Hernias. *Inherited small bowel diseases in adults such as Celiac disease, Small Bowel Polyposis Syndromes, Neurofibromatosis and Hereditary Hemorrhagic Telangiectasia. Summary: A wide array of congenital, developmental, and inherited abnormalities of the small bowel present in adulthood with varied clinical and imaging manifestations. Diagnosis and treatment may be delayed due to nonspecific clinical presentation. Imaging plays a crucial role in the diagnosis and management.

**GIE295**

**Crohn’s Disease and Secondary Gastrointestinal Malignancy: Morphological Findings with MRI and CT and How Novel Functional MRI Sequences Can Improve Diagnostics**

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

Anne Negard MD, PhD (Presenter): Nothing to Disclose
Kathrine Roe : Nothing to Disclose
Jorgen Jahnssen MD, PhD : Nothing to Disclose
Bo Daniel Karlsson MD : Nothing to Disclose
Stein Harald Holmedal MD : Nothing to Disclose
Njal Bakka MD : Nothing to Disclose
Arne Faerden MD, PhD : Nothing to Disclose
Morten Vatn : Advisor, Genetic Analysis
Anne Hansen Ree MD, PhD : Nothing to Disclose

**TEACHING POINTS**

1. To present morphological findings of Crohn’s disease (CD) and secondary malignancy with conventional Magnetic Resonance Imaging (MRI) and Computer tomography (CT) and to discuss the limitations of these techniques to distinguish inflammation from malignancy of the gastrointestinal (GI) tract.

2. To describe novel functional MRI sequences as diffusion-weighted imaging (DWI), spectroscopy, magnetization transfer (MT) and dynamic contrast enhanced imaging (DCE) and to discuss how these techniques can improve the differentiation of inflammation and secondary malignancy in CD.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction 2. CT technique 3. MRI technique with morphological sequences 4. CT and MRI findings in CD 5. CT and MRI findings of secondary GI malignancy 6. Novel functional MRI sequences The major teaching points of this exhibition are: 1. MRI and CT findings of CD are increased bowel wall thickness with skip lesions in between, combs sign and if the patient develops fistulas, the finding of extraintestinal tubular structures. 2. Secondary malignancy can be suspected if an expansive lesion of the bowel or the fistula develops. 3. Morphological image findings of CD and secondary malignancy overlap and the introduction of novel functional MRI sequences may improve this differentiation.
Crohn’s Disease Complications: A Radiologic-Pathologic Correlation

Education Exhibits
Location: GI Community, Learning Center

TEACHING POINTS
Discuss gastrointestinal anatomy. Give an overview of the disease clinical manifestations, progression and pathophysiology. Review common characteristic pathologic bowel changes seen in different imaging modalities. Review imaging of common lesions and correlate with pathological findings. Acknowledge the importance of imaging in the assessment of extraluminal complications, disease distribution, and disease activity, as well as evaluation of unreachable bowel segments proximal to strictures encountered at colonoscopy. Discuss strengths and limitations of imaging in characterizing lesions and assessing bowel damage.

TABLE OF CONTENTS/OUTLINE
Crohn disease may involve any part of the digestive tract, although small bowel involvement occurs in almost 70% of the patients. It has a relapsing and remitting course, requiring frequent imaging studies to monitor disease activity and complications. We review the radiological features of Chron’s disease and its complications (including fistulae, abscesses, fibrotic strictures, adhesions and related neoplasia) with pathological correlation. Knowledge of the radiological features of Crohn disease and its complications is essential for adequate patient management.

CT Imaging of Various Gastric Lesions: A Pictorial Review

Education Exhibits
Location: GI Community, Learning Center

TEACHING POINTS
1. To introduce clinical manifestations, etiology, pathology and CT images of various gastric lesions. 2. To discuss the diagnostic imaging and differential diagnosis of the various gastric lesions.

TABLE OF CONTENTS/OUTLINE
We present the following various gastric lesions and discuss the diagnostic imaging and differential diagnosis. 1. Benign tumors a. Neoplastic -Gastrointestinal stromal tumor (GIST) ·Lipoma ·Leiomyoma ·Schwannoma, etc b. Non-Neoplastic ·Hamartomatous polyp ·Lymphangioma, etc 2. Malignant tumors ·Adenocarcinoma ·Lymphoma ·Gastrointestinal stromal tumor (GIST) ·Metastatic tumor ·Carcinoid, etc 3. Others ·Peptic ulcers ·Acute gastric mucosal lesion (AGML) ·Eosinophilic gastroenteritis (EG) ·Hereditary angioedema (HAE) ·Anisakiasis ·Empysema, ·Diffuse cystic malformation ·Heterotopic pancreas, etc

CT of Uncomplicated and Complicated Gastric Volvulus: Unraveling the Imaging Findings with Volumetric Date Set Interpretations

Education Exhibits
Location: GI Community, Learning Center

TEACHING POINTS
1. Identify and classifying gastric volvulus. 2. Identify CT findings important to differentiate between uncomplicated and complicated gastric volvulus.

TABLE OF CONTENTS/OUTLINE
Introduction to Gastric Volvulus
- Etiology
- Incidence/Prevalance
Classification of two major types
CT-Enteroclysis and Enterography: How, When, Why and What

**Education Exhibits**

**Location:** GI Community, Learning Center

**Participants**

- Catarina Afonso Silva MD (Presenter): Nothing to Disclose
- Dean Daniel T. Maglinte MD: Consultant, Cook Group Incorporated

**TEACHING POINTS**

- Review the technical aspects and clinical indications of each technique
- Tips and tricks to avoid pitfalls
- Discuss the pros and cons of each technique

**TABLE OF CONTENTS/OUTLINE**

The diagnostic evaluation of small-bowel (SB) diseases has changed profoundly during the past few decades. The role of radiology in the investigation of SB diseases remains poorly understood by the referring physicians and radiologists who perform the examinations. Progress in imaging of the SB during the past few decades is due largely to refinements in the application of orally ingested conventional abdominal and pelvic CT or MR imaging with intravenous contrast. CT-enterography (CTe) and enteroclysis (CTE) improve visualization of the small bowel mucosa and wall in comparison with traditional CT and fluoroscopic studies. Evidence- and experience-based analyses have shown that examinations that distend the SB diagnose smaller, early lesions and allow confident exclusion of SB disease. Knowing the pros and cons of both tests is essential to avoid delays in the diagnosis which can influence prognosis. A pictorial review of SB pathology is presented for each method highlighting the pitfalls and shortcomings of each technique. How they performed, when and why they should be applied and what should we look for in each examination, to reach for the diagnosis is thoroughly reviewed.
TEACHING POINTS
To recognize the most important imaging findings of non-neoplastic conditions of the duodenum. To be aware of the most frequent imaging appearances of duodenal neoplasms.

TABLE OF CONTENTS/OUTLINE
The duodenum, being the first section of the small intestine, has some peculiarities that make it prone to a variety of conditions, either neoplastic or non-neoplastic. In this pictorial essay we will review the most frequent tumors of the duodenum (adenocarcinoma; lymphoma; GIST; lipoma; metastasis) and also some rare ones (Brunner’s gland hamartoma; juvenile polyposis), focusing mainly on CT and upper gastrointestinal series findings. We will also discuss imaging findings of non-neoplastic conditions, such as congenital (situs inversus; malrotation; diverticula), traumatic (iatrogenic rupture; hematoma), inflammatory (groove pancreatitis; duodenitis; celiac disease; Crohn’s disease; fistulas) and other emergency situations (gallstone ileus; afferent loop syndrome; internal hernia; varices; superior mesenteric artery syndrome). We will review all these conditions in alphabetical order, with at least one condition for each letter of the alphabet, in a two-part educational exhibit (part I - from letter A to letter K and part II - from letter L to letter Z).

GIE303
Duodenal Imaging: An Alphabet of Pathology (Part II)
Education Exhibits
Location: GI Community, Learning Center

Participants
Daniel Andrade MD (Presenter): Nothing to Disclose
Luisa Costa Andrade: Nothing to Disclose
Jorge Brito MD: Nothing to Disclose
Luis Curvo-Semedo MD, PhD: Nothing to Disclose
Filipe Caseiro-Alves: Nothing to Disclose

TEACHING POINTS
To recognize the most important imaging findings of non-neoplastic conditions of the duodenum. To be aware of the most frequent imaging appearances of duodenal neoplasms.

TABLE OF CONTENTS/OUTLINE
The duodenum, being the first section of the small intestine, has some peculiarities that make it prone to a variety of conditions, either neoplastic or non-neoplastic. In this pictorial essay we will review the most frequent tumors of the duodenum (adenocarcinoma; lymphoma; GIST; lipoma; metastasis) and also some rare ones (Brunner’s gland hamartoma; juvenile polyposis), focusing mainly on CT and upper gastrointestinal series findings. We will also discuss imaging findings of non-neoplastic conditions, such as congenital (situs inversus; malrotation; diverticula), traumatic (iatrogenic rupture; hematoma), inflammatory (groove pancreatitis; duodenitis; celiac disease; Crohn’s disease; fistulas) and other emergency situations (gallstone ileus; afferent loop syndrome; internal hernia; varices; superior mesenteric artery syndrome). We will review all these conditions in alphabetical order, with at least one condition for each letter of the alphabet, in a two-part educational exhibit (part I - from letter A to letter K and part II - from letter L to letter Z).

GIE304
Gastric Cancer: MDCT Characterization and Pattern of Spread of Disease
Education Exhibits
Location: GI Community, Learning Center

Participants
Alejandro Perez Martinez: Nothing to Disclose
Pilar Sanchez Camacho (Presenter): Nothing to Disclose
Rafael Morcillo Carratala MD: Nothing to Disclose
Lina Marcela Cruz Hernandez ARRT: Nothing to Disclose
Ivan Mauricio Vargas Orozco MD: Nothing to Disclose
Andres Enriquez-Puga MBCN, MSc: Nothing to Disclose
Carmen Cereceda Perez MD: Nothing to Disclose

TEACHING POINTS
The propose of this exhibit is:
1.- To review the proper imaging technique needed to accomplish a correct MDCT gastric study
2.- To discuss the more relevant imaging findings of different kinds of gastric cancer, highlighting those key to differential diagnosis
3.- To explain the pattern of growth and spread of gastric cancers, which is essential to understand the pathology and the imaging findings.

TABLE OF CONTENTS/OUTLINE
- Imaging technique for MDCT gastric studies
  Patient preparation
  Contribution of reformatted images
- MDCT imaging findings of gastric cancer including:
  Premalignant lesions
  Early and advanced gastric carcinoma
  Early and advanced GIST
  Gastric lymphoma
  Gastric neuroendocrine Tumors
  Rare Tumors
  Mimics and pitfalls
- Patterns of growth and spread of the different tumors
- Summary and conclusions
Imaging Clues to Duodenal Pathology: A Pictorial Review

Education Exhibits
Location: GI Community, Learning Center

Participants
Micheal H. Raj MD (Presenter): Nothing to Disclose
Priya Kumar Shah MD: Nothing to Disclose

TEACHING POINTS
1. Perforation of the anterior wall of the duodenum will often present with free air and fluid in the peritoneal cavity, whereas perforation involving the posterior wall will often have walled-off fluid collections in the retroperitoneum. 2. Duodenal diverticula are important to identify prior to attempting endoscopic retrograde cholangiopancreatography and may have complications (inflammation, perforation, bezoar formation). 3. Like pancreatic injuries, duodenal injuries rarely occur in isolation and the presence of one injury should prompt a more thorough evaluation for coexisting injuries (solid organs, lumbar spine, and vascular) as these coexisting injuries are associated with significantly increased morbidity and mortality.

TABLE OF CONTENTS/OUTLINE
Normal Appearance
Congenital/Acquired
a. Duplication cyst
b. Duodenal diverticula (extraluminal and intraluminal)
c. Duodenal diverticulitis
d. Perforated duodenal diverticulitis

Inflammatory
a. Duodenitis
b. Ulcer
c. Perforated ulcer
d. Aortoduodenal fistula

Mechanical obstruction
a. Gallstone
b. Annular pancreas
c. Superior mesenteric artery syndrome

Neoplasm
a. Lipoma
b. Gastrointestinal stromal tumor
c. Adenocarcinoma
d. Lymphoma

Trauma
a. Duodenal hematoma
b. Perforation

Imaging Features of Gastrointestinal Stromal Tumors Pre- and Post- Treatment: Revisited

Education Exhibits
Location: GI Community, Learning Center

Participants
Bethany Milliron MD (Presenter): Nothing to Disclose
Juan Camilo Camacho: Nothing to Disclose
Abhilhit Datir MD: Nothing to Disclose
Courtney Ann Coursey Moreno MD: Nothing to Disclose
Pardeep Kumar Mittal MD: Nothing to Disclose

TEACHING POINTS
- Review pertinent pathophysiology of gastrointestinal stromal tumors
- Describe imaging findings of gastrointestinal stromal tumor at presentation with implications on treatment planning/options
- Discuss imaging findings following various treatment approaches

TABLE OF CONTENTS/OUTLINE
1. Review of gastrointestinal stromal tumors pathophysiology and clinical features
a. Activating mutations (KIT and PDGFRA)
b. Epidemiology
c. Signs and symptoms at presentation
2. CT and MR findings at presentation
a. Common sites - GI tract, mesentery and retroperitoneum
b. Metastatic disease - hepatic and peritoneal disease
c. What do clinicians want to know to plan treatment?
i. Relationship between mass and gastrointestinal wall
3. Post-Treatment studies
a. Normal post treatment change versus recurrence
4. Summary - Gastrointestinal stromal tumors are the most common mesenchymal tumors of the GI tract - CT and MRI are the imaging methods of choice for detection, staging, treatment (surgical) planning, and follow-up of gastrointestinal stromal tumors

Imaging Spectrum of Post-operative Complications of Bariatric Surgeries

Education Exhibits
Location: GI Community, Learning Center

Participants
Malaz Musa: Nothing to Disclose
Ahmed Derwish: Nothing to Disclose
Adham Darweesh: Nothing to Disclose
Shaimaa Abdelhassib Aabdelrafeh MBCh: Nothing to Disclose
Ahmed Monier Sherif MBBCh, FRCR (Presenter): Nothing to Disclose
Amal Airashid MBBS: Nothing to Disclose

TEACHING POINTS
1. This pictorial review describe the spectrum of imaging findings of the stomach and small bowel after Bariatric surgeries, thus help radiologists understand the variations in the anatomy and complications after different types of bariatric surgeries.
2. To familiarize the radiologists with the imaging findings of complications of the bariatric surgeries.

TABLE OF CONTENTS/OUTLINE
- Description of the different categories of bariatric surgeries and how it is performed.
- The Fluoroscopic and computed tomography findings of post bariatric surgeries illustrating different radiological pictures of the postoperative anatomical variations.
- Review how to approach fluoroscopic and CT evaluation of complications of bariatric surgeries in particular:
1. Roux-en-Y gastric bypass (RYGB)
2. Laparoscopic adjustable gastric banding (LAGB)
3. Laparoscopic gastric sleeve (LGS)
Inflammatory Fibroid Polyps of the Gastrointestinal Tract: Imaging Spectrum with Pathologic Correlations and Mimickers

Education Exhibits
Location: GI Community, Learning Center

Participants
Ga Jin Han (Presenter): Nothing to Disclose
Jin Hee Kim MD: Nothing to Disclose
Seung Soo Lee MD: Nothing to Disclose
Seong Ho Park MD: Research Grant, DONGKOOK Pharmaceutical Co, Ltd Research Grant, General Electric Company
Jong Seok Lee: Nothing to Disclose
Hyun Kwon Ha MD: Nothing to Disclose

TEACHING POINTS
1. To present the broad spectrum of imaging features of inflammatory fibroid polyps (IFPs) in the gastrointestinal tract, from the stomach to the colon, and their pathologic correlations on the basis of our experience with 122 pathology-proven cases during the past 13 years.
2. To point out characteristic imaging features of IFP which can be helpful to differentiate it from mimickers.

TABLE OF CONTENTS/OUTLINE
Content Organization: 1. Imaging spectrum of IFPs and pathologic correlations (1) Stomach (2) Duodenum (3) Jejunum and ileum (4) Colon 2. Characteristic imaging features of IFPs 3. Mimickers of IFPs and differential diagnosis Summary: Imaging features of IFPs and their locations may be variable. It is important that radiologists be aware of these diverse imaging manifestations of IFPs as well as their characteristic imaging features to better differentiate this condition from its mimickers.

MDCT of Small Bowel Obstruction: Imaging Features, Pitfalls and Radiologic Techniques

Education Exhibits
Location: GI Community, Learning Center

Participants
Hidenobu Takagi MD (Presenter): Nothing to Disclose
Masashi Tsuda: Nothing to Disclose
Kei Takase MD, PhD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is:
1. To review and describe the imaging findings in small bowel obstruction (SBO) on MDCT.
2. To learn what radiologists need to know about SBO for clinical management and treatment decisions.
3. To illustrate various challenging cases.

TABLE OF CONTENTS/OUTLINE
1. Pathophysiology of SBO, with emphasis on closed loop obstruction
2. Review of imaging findings:
   • Localization of SBO (Ascites, mesenteric and bowel edema)
   • Severity of SBO (Bowel wall attenuation and enhancement)
   • Cause of SBO (Adhesion, band, foramen and congenital defect)
3. The radiologic aproach to clinical decisions
4. Various demonstrable cases: analysing various internal hernias
5. Summary

Monitoring Crohn's Disease with Cross Sectional Imaging: Still A Lot of Room to Grow

Education Exhibits
Location: GI Community, Learning Center

Participants
Jordi Rimola MD (Presenter): Consultant, Robarts Clinical Trials Research Group
Tomas Ripollés MD: Nothing to Disclose
Sonia Rodriguez MD: Nothing to Disclose
Miriam Cuatrecasas: Nothing to Disclose
Ingrid Ordas: Nothing to Disclose
Julian Panes: Nothing to Disclose

TEACHING POINTS
1. To discuss the relevance of monitoring Crohn's disease by imaging modalities.
2. To become familiar with useful radiological signs after medical treatment of Crohn's disease.
3. To understand the changes which occur after recurrence in Crohn's disease.
A) What techniques are available for monitoring Crohn’s disease (CD) and what are the pros and cons of each: 
• Clinical symptoms 
• Biomarkers (CRP, calprotectin,..) 
• Endoscopy 
• Cross-sectional imaging 
B) What are the gains and possibilities of monitoring CD by cross sectional imaging 
C) What is known and what are the limitations of cross-sectional imaging for monitoring CD 
D) Providing representative examples including US, CTE and MRE with correlation to endoscopic and/or pathological findings, knowing the changes of the lesions after treatment could be used to confirm the disease activity state and to improve patient management 
E) Future trends and directions 

Preliminary evidence suggests that in CD a state of remission beyond the simple control of clinical symptoms, and including healing of lesions, may be associated with better disease outcome. Monitoring the disease through the use of cross-sectional imaging is gaining increased acceptance as it has advantages over endoscopy, but also limitations that should be made aware.

GIE313

MR Enterographic Manifestations of Crohn’s Disease and Other’s Conditions

Education Exhibits
Location: GI Community, Learning Center

Participants
Javier Vallejos MD, MBA (Presenter): Nothing to Disclose
Claudia Analia Alvarez MD : Nothing to Disclose
Carlos Capunay MD : Nothing to Disclose
Patricia M. Carrascosa MD : Research Consultant, General Electric Company

TEACHING POINTS
1- To describe technical considerations for achieve an optimal small-bowel MR study. 
2- To discuss the advantages and limitations of MR imaging of the small bowel. 
3- To determine the role of MR enterography in evaluation of Crohn disease and others small bowel conditions.

TABLE OF CONTENTS/OUTLINE

GIE314

MR Enterography in the Assessment of Crohn’s Disease

Education Exhibits
Location: GI Community, Learning Center

Participants
Steven Peti MD (Presenter): Nothing to Disclose
Iakovos Koutras MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To discuss the indications of MR Enterography in Crohn's disease. 2. To review the imaging protocol and contrast agents used. 3. To illustrate the various MR findings of Crohn's disease.

TABLE OF CONTENTS/OUTLINE
Introduction Indication of MR enterography in Crohn's disease MR Enterography technique Small Bowel findings Extraenteric findings Colonic findings Summary

GIE316

Occult Abdominal Hernias - How Critical Is Imaging?

Education Exhibits
Location: GI Community, Learning Center

Participants
Chinmay Bhimaji Kulkarni MBBS, MD (Presenter): Nothing to Disclose
Srikanth Moorthy MD : Nothing to Disclose
Sreekummar K P MBBS, MD : Nothing to Disclose
Nirmalkumar Prabhu : Nothing to Disclose
Rajesh Ramaiah Kannan MD : Nothing to Disclose

TEACHING POINTS
1. To understand the basic anatomical background of various internal hernias and other rare clinically occult hernias. 
2. Role of imaging techniques in diagnosing clinically undetectable hernias with emphasis on Computed Tomography. 
3. How imaging helps in appropriate management of these patients?

TABLE OF CONTENTS/OUTLINE
Anatomy and mechanism of hernia. 
Imaging features. 
Critical role of imaging in management of patients.
Our Experience with the CT Enterography and the Inflammatory Bowel Disease

Education Exhibits
Location: GI Community, Learning Center

Participants
Ana Maria Vargas Diaz MD (Presenter): Nothing to Disclose
Jacinto Grasa: Nothing to Disclose
Marta Celia Lobo Garcia MD: Nothing to Disclose
Cristina Fernandez Rey: Nothing to Disclose
Francisco Javier Rodriguez Recio MD: Nothing to Disclose

TEACHING POINTS
To analyze the CT enterography radiological findings in patients with inflammatory bowel disease (activity and complications), as well as perform a diagnostic approach in patients with high suspicion.
To present the experience in our service since this technique was introduced in January 2011 to the present.
To review the current literature

TABLE OF CONTENTS/OUTLINE
The introduction of neutral oral contrast agent and the improvement of the luminal distention, have offer a new specific technique of the small intestine known as CT enterography. This technique can evaluate inflammatory bowel disease, vascular malformations and small intestine tumors. We have evaluated the signs of active inflammatory stenosis: mucosal hyperenhancement, wall thickening, mural stratification, increased attenuation of mesenteric fat and prominent vasa recta; as well as signs of complications such as abscesses, fistulas and obstruction. We evaluate the inactive disease with radiological findings of submucosal fat deposition, pseudosacculation, surrounding fibrofatty proliferation and fibrotic stenosis. The importance of being familiar with the radiological findings of active and non-active disease becomes important because the first one is susceptible to medical treatment while the second one may require surgical procedures such as resection of the affected segment.

Performing Upper Gastrointestinal Examinations to Assess Gastric Bypass Surgeries: How We Do It, Tips, and Pitfalls

Education Exhibits
Location: GI Community, Learning Center

Participants
Ichiro Ikuta MD, MMedSc (Presenter): Nothing to Disclose
Thomas Michael Cullen MD: Nothing to Disclose
Taneya Lamb MD: Nothing to Disclose
Henry Chow Chow DO: Nothing to Disclose
Andrew Shih MD: Nothing to Disclose

TEACHING POINTS
-We review how to modify an upper gastrointestinal exam for post-surgical gastric bypass patients.
-We will demonstrate the expected appearance for post-operative Roux-en-Y gastric bypass, gastric sleeve, and gastric band procedures. -We will then demonstrate complications that may arise.
-Finally, we will review techniques to reduce radiation exposure to levels as low as reasonably achievable.

TABLE OF CONTENTS/OUTLINE
A. Anatomy Review B. Modifying Technique to Accomodate Obese Patients C. Expected Post-Operative Appearance D. Complications E. Differential Diagnosis F. Radiation Exposure Optimization (As Low As Reasonably Achievable)

Spread Patterns on MDCT in Gastric Carcinoma: Everything a Radiologist Needs to Know

Education Exhibits
Location: GI Community, Learning Center

Certificate of Merit

Participants
Mario Gerardo Santamarina MD (Presenter): Nothing to Disclose
Ignacio Beddings MD: Nothing to Disclose
Stefano Edoardo Rinaldi: Nothing to Disclose
Hector Opazo Sanchez MD: Nothing to Disclose
Mariano Volpacchio MD: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose

TEACHING POINTS
1- To review the diagnosis of gastric carcinoma on MDCT
2- To discuss a detailed knowledge of the different spread patterns of gastric carcinoma
3- To illustrate and demonstrate gastric cancer spreads patterns on MDCT

TABLE OF CONTENTS/OUTLINE
-Epidemiology.

-Gastric carcinoma diagnosis: Pathologic and MDCT features

-Gastric carcinoma spread patterns: Pathologic and MDCT features

-Summary:
Gastric carcinoma is one of the leading causes of cancer mortality worldwide, despite a general decrease in its incidence.
State-of-the-art MDCT not only allows to demonstrate the primary lesion but display characteristic findings reflecting its spread patterns: 1- Direct extension, 2- Lymphatics spread: intramural spread and regional lymph nodes, 3- Metastasis to the peritoneum, and 4-Hematogenous spread.
The assessment of direct transmural and extraserosal spread of disease, nodal involvement and distant metastasis, has improved markedly with the advent of MDCT with its superb spatial and temporal resolution and its ability for multiplanar image reconstruction coupled with optimal contrast wall enhancement.

GIE323

This May Be Hard to Swallow: A Pictorial Review of Esophageal Adenocarcinoma

Education Exhibits
Location: GI Community, Learning Center

Participants
Jennifer Flanagan (Presenter): Nothing to Disclose
Shaun Michael Nordeck MS, RRA : Research Grant, Toshiba Corporation
Vasantha Vasan MD : Nothing to Disclose
Richard Charles Batz MD : Nothing to Disclose

TEACHING POINTS

Adenocarcinoma is the most common esophageal cancer in the U.S. and often in an advanced stage when diagnosed. The five year survival rate depends heavily on the stage at diagnosis; therefore early detection is of utmost importance. This educational exhibit will review esophageal adenocarcinoma and its presentation across the imaging spectrum (i.e. UGI, PET/CT, CT, EUS, EGD) and review the pitfalls/mimics that may present.

TABLE OF CONTENTS/OUTLINE
I. Anatomy review of GI tract with special emphasis of GE junction II. Brief overview of esophageal adenocarcinoma (incidence, risk factors, clinical presentation, work-up, treatment and prognosis) III. Pictorial review of esophageal adenocarcinoma and key imaging features across the imaging spectrum (i.e. UGI, PET/CT, CT, EUS, EGD) IV. Review pitfalls / mimics V. Summary of teaching points

HPE002-b

Ethical Issues in Radiology Publication and Peer Review

Education Exhibits
Location: NA

Selected for RadioGraphics

Participants
Douglas S. Katz MD (Presenter): Nothing to Disclose
Jason C. Hoffmann MD : Consultant, Merit Medical Systems, Inc
Puneet Bhargava MD : Editor, Reed Elsevier
Mariam Moshiri MD : Consultant, Reed Elsevier Author, Reed Elsevier
Erick Marc Remer MD : Nothing to Disclose
Darienne Segura RT : Nothing to Disclose
Nicole Bielawski : Nothing to Disclose
Michael Nathan Patlas MD, FRCPC : Nothing to Disclose

TEACHING POINTS

Radiology researchers, authors, reviewers, and editors have all been under increasing scrutiny in recent years for their academic research, publications, and related activities. Some research and publication practices are clearly unethical, such as academic fraud and duplicate publications. However, other practices fall into a grayer area, such as conflicts of interest, variants of duplicate publication, and unblinding of reviewers and authors during the peer review process. The purpose of this exhibit is therefore to call attention to these topics as they apply to academic radiology, using specific examples from the literature, and quotation of position statements and opinion papers from authorities, particularly past and present journal editors.

TABLE OF CONTENTS/OUTLINE
We will review the following topics: academic fraud and other related scientific misconduct; plagiarism; duplicate publication and its variants; the criteria for authorship; IRB approval and informed consent; HIPAA; conflicts of interest, disclosures, and industry and other relationships; and blinding and unblinding of reviewers and authors, as well as other problems and ethical dilemmas in the peer review process. We will review these issues in some detail, with overviews as well as specific citations of case examples in the imaging literature, and potential solutions.

HPE003-b

Perceived Impact of Radiation Exposure During Radiology Residency on Fertility Among Current Female Radiology Residents

Education Exhibits
Location: NA
Participants
Michelle Elizabeth Naylor MD (Presenter): Nothing to Disclose
Elizabeth M. Johnson MD : Nothing to Disclose
Robert Alan Koenigsberg DO : Nothing to Disclose

TEACHING POINTS
1. Investigate the level of awareness and understanding amongst female radiology residents about the amount of radiation they are exposed to during their training, and the effects it may or may not have on fertility. 2. Assess if and how possible radiation exposure affects any decisions female residents make during their training in regards to pregnancy planning. 3. Discuss female medical student and resident education on the impact of radiation, including effects on fertility.

TABLE OF CONTENTS/OUTLINE
1. Investigate the level of awareness and understanding amongst female radiology residents about the amount of radiation they are exposed to during their training, and the effects it may or may not have on fertility. 2. Assess if and how possible radiation exposure affects any decisions female residents make during their training in regards to pregnancy planning. 3. Discuss female medical student and resident education on the impact of radiation, including effects on fertility.

HPE004-b
Video Based Educational Program for Appropriate Utilization of CT Radiation Dose

Education Exhibits
Location: NA

Participants
Atul Padole MD (Presenter): Nothing to Disclose
Ranish Deedar Ali Khawaja MD : Nothing to Disclose
Roberto Lo Gullo MD : Nothing to Disclose
Sarabjeet Singh MD : Research Grant, Siemens AG Research Grant, Toshiba Corporation Research Grant, General Electric Company Research Grant, Koninklijke Philips NV
Anders Persson MD, PhD : Nothing to Disclose
Mannudeep K. S. Kalra MD : Nothing to Disclose
Alexi Otrakji MD : Nothing to Disclose
Minal C. Jagtiani MBBS, MD : Nothing to Disclose
Madan M. Rehani : Nothing to Disclose

TEACHING POINTS
Teaching points: Appropriate radiation dose utilization is important in CT scanning. Our exhibit will highlight our personal experience and content to teach the audience in a simplified "easy to understand" manner. 1. Importance of appropriate indication for CT scanning 2. Selecting and setting indication appropriate CT protocols 3. Scan parameters that help in appropriate dose utilization in CT 4. Good habits that help in radiation dose optimization 5. Pitfalls and errors in CT scanning that can affect associated radiation doses 6. Checking radiation doses to ensure appropriate use

TABLE OF CONTENTS/OUTLINE
We will create and use our short video/animation clips to help audience understand the following 1. Effect of scan parameters on CT radiation dose 2. Effect of radiation dose on image quality and certain lesions 3. Iterative image reconstruction: How to set them up 4. Important "Always Do" prior to CT scanning 5. Critical "Never Do" in CT scanning 6. Dose checks and alerts: rational response

HPE005-b
Practical and Interactive Approach to ACGME Health Economics Requirements: A Resident Primer

Education Exhibits
Location: NA

Participants
Nii O. Koney MD, MBA (Presenter): Nothing to Disclose
Mustafa Syed DO : Nothing to Disclose
Munir Ghesani MD : Nothing to Disclose
Nolan J. Kagetsu MD : Spouse, Employee, Pfizer Inc

TEACHING POINTS
Using the new ACGME milestone model, we have designed an interactive and practical case-based approach to educating residents and fellows about health economics requirements. 1. Attendees will have a better understanding of the alphabet soup involved in the reimbursement process such as ICD, MPFS, RVRVU, CMS, CPT, RCU and how they all relate to one another. We will pay particular attention to the looming transition to ICD-10 and ways it can affect the bottom line of radiology departments. 2. Attendees will be introduced to the basic radiology revenue cycle model and practical ways to improve efficiency 3. Attendees will be introduced to emerging payment models and practical steps that need to be taken in the current system to ensure a bright future for radiology

TABLE OF CONTENTS/OUTLINE
* Case Study introduction * Overview of ACGME Diagnostic Radiology Health Economics Requirements: - Level 1: Types of payors and the reimbursement mechanism - Level 2: Relative costs of common procedures - Level 3: Technical and professional components of imaging costs - Level 4: Productivity measurements - Level 5: The radiology revenue cycle * Emerging payment models * Take Home points
HPE007-b
Diagnostic Intensity in End of Life Patients

Education Exhibits
Location: NA

Participants
Myriam Irislimane (Presenter): Nothing to Disclose
François Lamontagne: Nothing to Disclose
Lucie Brazeau-Lamontagne MD: Nothing to Disclose

TEACHING POINTS
Explore end of life (EOL) diagnostic intensity with the aim of improving quality of care. Explore the need for a patient-centered approach from the communication angle between physicians.

TABLE OF CONTENTS/OUTLINE
Advance care planning is relevant at the EOL. Lack of diagnostic advance care planning carries the risk of unwanted and unnecessary tests from the perspective of the patients. Unwanted and unnecessary diagnostic tests, in turn, would overstress limited resources and financial constraints on the health care system. To our knowledge, this is one of the first studies addressing diagnostic intensity in EOL. Patients with known metastatic cancer seemed a representative and traceable group. Given the high risk of thromboembolic events associated with cancer, pulmonary angioscans (PAS) are frequently prescribed to rule out pulmonary embolism. We aimed to explore the informed consent in a cohort of patients with documented metastatic cancer who underwent PAS while hospitalized. We conducted a single-center retrospective study from 01-01-2012 to 31-12-2012. Forty-five patients met the criteria. Seven were hospitalized in the palliative care unit and 38 on the acute care wards. None of the explicit documentations of the desired levels of care specifically addressed diagnostic procedures as care. More detailed data will be presented on the poster.

HPE008-b
Contrast Enhanced Ultrasound as a 24/7 Service. How to Set It Up

Education Exhibits
Location: NA
Certificate of Merit

Participants
Demosthenes D. Cokkinos MD (Presenter): Nothing to Disclose
Eleni Antypa: Nothing to Disclose
Christina Sierrou MD: Nothing to Disclose
Stylianos V. Benakis MD: Nothing to Disclose
Anna Skoula: Nothing to Disclose
Ploutarhos A Piperopoulos MD, PhD: Nothing to Disclose

TEACHING POINTS
Tips for setting up a round-the-clock service for Contrast Enhanced Ultrasound (CEUS).

TABLE OF CONTENTS/OUTLINE
Basic knowledge of physics and explanation of haemodynamic behaviour of US contrast agents, as well as machine settings. Introductory steps for performing a CEUS examination. How to present the technique to clinicians, who are usually unaware of its indications. Tips to facilitate learning the technique by Radiologists in training: initial scanning of patients with simple diagnostic questions, scheduling CEUS examinations at beginning or end of session, placing IV catheters in advance, minimising clip storing to avoid memory load, transferring clips-images to PCs, reviewing scans on workstations, etc. Description of CEUS examination protocols for various emergency indications in the abdomen, neck and extremity vessels, scrotum etc. Review of contraindications, limitations and safety matters.

HPE009-b

Education Exhibits
Location: NA

Participants
Rounak R. Bafana MD (Presenter): Nothing to Disclose
Shehbaz Shaikh MD: Nothing to Disclose
Safwan Halabi MD: Nothing to Disclose

TEACHING POINTS
1. To describe the concept of concierge and second opinion radiology services. 2. To describe the services offered by concierge and second opinion radiology services. 3. To describe the business and cost models in concierge and second opinion services. 4. To discuss the current and future applications into the delivery of health care.

TABLE OF CONTENTS/OUTLINE
HPE100

Do Radiologist Get $? DRGs and the Federal Reimbursement System

*Education Exhibits*

*Location: NA*

Selected for RadioGraphics

**Participants**

Simcha B. Rimler MD (Presenter): Nothing to Disclose  
Deborah L. Reede MD: Nothing to Disclose  
Brian David Gale MD: Board Member, SaferMD, LLC

**TEACHING POINTS**

Teaching Points After viewing this exhibit you will understand the: 1. Historical context of federal payments for healthcare 2. Relevance of DRG to patient care and physician/hospital reimbursement 3. Potential future of the federal reimbursement system

**TABLE OF CONTENTS/OUTLINE**

Changes in the Federal government's 2014 Final Rule will have an important impact on Medicare reimbursement for imaging studies, particularly CT and MR. Radiologists are responsible for the education of clinicians and patients about diagnostic imaging services. This encompasses both the clinical and economic impact of their imaging decisions. Therefore, radiologists must be familiar with diagnostic related groups (DRGs) to understand their impact on patient care and service reimbursements for in-patient procedures. This exhibit begins with a pre-test of open ended questions about DRG's and the prospective payments system. Using a sample patient we demonstrate the new payment methodology and how different decisions (i.e. choice of hospital, co-morbidities, complications, length of stay and unnecessary studies) affect hospital and professional financial results. A post-test is included to reinforce the salient teaching points.

HPE101

Radiology Reimbursement Decoded: What you Need to Know but Were Afraid to Ask

*Education Exhibits*

*Location: NA*

Certificate of Merit

**Participants**

Ajay Dilip Wadgaonkar MD (Presenter): Nothing to Disclose  
David M. Yousem MD: Royalties, Oakstone Publishing, LLC Author with royalties, Reed Elsevier Research Grant, Bayer AG

**TEACHING POINTS**

Few newly practicing radiologists and even fewer radiology trainees receive adequate exposure to the business of radiology, much less the details of radiology reimbursement. However, to remain competitive in a rapidly changing healthcare environment, the modern radiologist must have at least a basic knowledge of the reimbursement process. The aim of this exhibit is to: 1. Discuss ICD-9-CM and CPT coding 2. Describe the resource-based relative value scale and its elements, including the technical and professional components of payment 3. Introduce the revenue cycle and accounts receivable 4. Describe current and future challenges shaping radiology reimbursement, including the Affordable Care Act and capitation

**TABLE OF CONTENTS/OUTLINE**


HPE102

The Physician Quality Reporting System: Measures Relevant to Radiology - What You Don't Know Will Cost You

*Education Exhibits*

*Location: NA*

**Participants**

Christopher John Moran MD (Presenter): Nothing to Disclose  
Munir Ghesani MD: Spouse, Employee, Pfizer Inc  
Nolan J. Kagetsu MD: Nothing to Disclose  
Mustafa Syed DO: Nothing to Disclose  
Andrew John Evans MD: Nothing to Disclose

**TEACHING POINTS**

- To provide an up-to-date listing of PQRS measures relevant to radiology.  
- To present rationale for these metrics while highlighting the relationship to appropriate use guidelines.  
- To review the legislative history of PQRS metrics and discuss future applications.  
- To demonstrate the economic implications of PQRS reporting bonus and readjustment payments.  
- To discuss the use of PQRS metrics on Physician Compare, a CMS website presenting physician demographic and quality metric information.  
- To list PQRS reporting and participation methods.

**TABLE OF CONTENTS/OUTLINE**
I. PQRS Background
   a. Legislative
   b. Economic Implications
   c. Reporting and Participation
II. PQRS Measures Relevant to Radiology
   a. Diagnostic
   b. Interventional
   c. Nuclear Medicine
d. Radiation Oncology
   e. Optimizing Patient Exposure to Ionizing Radiation
   f. Tips for Compliance with PQRS Measures
III. PQRS Metric Publication
   a. Physician Compare
IV. Discussion

HPE103
"A Cut Above": New Techniques For Residents To Learn Interventional and Angiographic Procedures Utilizing Simple Balloon Models: A Pictorial Review

Education Exhibits
Location: NA

Participants
Perry S. Gerard MD (Presenter): Nothing to Disclose
Amrita Kaur Arneja MD : Nothing to Disclose
Christopher Michael Harain MD : Nothing to Disclose
Sam J. McCabe MD : Nothing to Disclose

TEACHING POINTS
We discuss the conventional methods of learning the concepts of angiographic and interventional procedures. We review various methods used to train radiology residents in the performance and interpretation of angiographic and interventional procedures utilizing simple balloon models. We further discuss the use of balloon models to assist in educating the referring physician about the various procedures and assist in patient education and obtaining consents.

TABLE OF CONTENTS/OUTLINE
-Background on resident training for performance and interpretation of angiographic and interventional procedures, and need for innovative teaching methods. -Conventional methods of learning angiographic and interventional procedures. -Demonstrate a unique method of teaching various procedures utilizing simple balloon models, which includes: Balloon angioplasty, Stent and IVC filter placement, Angiographic diagnostic procedures and intervention, Abscess drainage, dialysis graft intervention Catheter and line placement, TIPS, biliary and GU intervention, and foreign body retrieval. -Discussion of using these methods for resident teaching, educating referring physician, patient education and obtaining consent. -Conclusion with summary and various applications.

HPE105
Contrast Extravasation: Management Guidelines for the Radiologist

Education Exhibits
Location: NA

Certificate of Merit

Participants
Khalid Walid Shaqdan MD (Presenter): Nothing to Disclose
Shima Aran MD : Nothing to Disclose
Ajay K. Singh MD : Nothing to Disclose
Elmira Hassanzadeh MD : Nothing to Disclose
Hani H. AbuJudeh MD, MBA : Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

TEACHING POINTS
• Contrast extravasation (CE) is not an infrequent event. • Intravenous contrast agents are commonly used for both computed tomography (CT) and magnetic resonance (MR) imaging to aid in the detection, characterization, and staging of disease • While extravasation injuries are usually minor and resolve spontaneously, some cases result in serious complications • The aim of this exhibit is to provide a literature review of risk factors that increase the possibility of a patient developing CE, and discuss the most recent guidelines for extravasation management.

TABLE OF CONTENTS/OUTLINE
• Defining Contrast Extravasation • Risk factors o Mechanical o Physiologic o Pharmacologic • Clinical manifestation of Contrast Extravasation • Contrast Media and administration methods • Vascular Access for administration of contrast guideline o Mechanical injections o Power injections o Central lines • Management of contrast extravasations guideline o Safety reporting o Inpatients o Outpatients o Emergency

HPE106
Dose Optimization for Personnel during Interventional Procedures

Education Exhibits
Location: NA

Certificate of Merit

Participants
TEACHING POINTS

The increased number of interventional procedures leads to higher radiation exposure for personnel. We give physicians useful tips for dose optimization and how to increase awareness of scatter radiation.

TABLE OF CONTENTS/OUTLINE

Firstly, it is important to **optimize the patient dose**, as this directly affects the operator dose. Besides minimizing acquisition protocol and fluoroscopy time, other factors that decrease patient dose are using **low dose fluoroscopy** (fig 1), optimizing **patient and detector position** (fig 2), optimizing zoom and collimation, using tube filtration, and avoiding steep angulations (fig 3).

To further protect the operator, lead shielding can be employed. The **effect of lead shielding** is evaluated by measuring scatter dose profiles in the x-ray room (fig 4). In circumstances where shielding is not possible, it is advised to increase the distance to the patient. In particular, when using lateral fluoroscopy, the dose can be reduced by standing at the detector side instead of the tube side (fig 5). The **visualization of scatter radiation** leads in practice to more **awareness** for, and a reduction of, scatter radiation.

Above mentioned points should be instructed to new residents. By actively coaching the physician and monitoring scatter dose during the interventional procedure, considerable dose reduction can be achieved.

HPE107

**Give 'Em What They Want: Matching Resident Reviews with Resident Expectations**

*Education Exhibits*

**Location: NA**

**Participants**

Judah Burns MD (Presenter): Nothing to Disclose
Daniel Ariel Krieger MD: Nothing to Disclose
Mordecai Koenigsberg MD: Nothing to Disclose

**TEACHING POINTS**

1. Resident evaluation and feedback should provide a comprehensive picture of resident performance, incorporating both objective and subjective measures
2. ACGME milestones are an incomplete measure of resident achievement
3. Resident evaluation forms query data from varied sources to create a holistic assessment of progress and deficiencies

**TABLE OF CONTENTS/OUTLINE**

The ACGME Milestones project and NAS create an opportunity to revise traditional methods of resident evaluation. Clinical Competency Committees (CCC) derived Milestones standards do not fully reflect resident participation and accomplishment. The semi-annual evaluation affords an opportunity for more meaningful and resident-focused interval measurement of learning and academic involvement, which is assessed using an evaluation form that serves as a tool for CCC review.

This exhibit outlines the components of a thorough semi-annual evaluation form, and provides guidance as to how the information is collated. Specific components may include:

- Objective exam scores
- Longitudinal summary of milestones achievement
- Graphical representation of resident performance
- Resident learning portfolio
- Case logs
- Scholarly activity
- Teaching activities
- Departmental/hospital service
- Awards
- Faculty comments from rotations
- CCC summary

HPE110

**Imaging Safety Considerations in the Pregnant Patient: Management Principles Based Upon New ACR Practice Guidelines**

*Education Exhibits*

**Location: NA**

**Participants**

David Pinter MD (Presenter): Nothing to Disclose
Justin McCloskey BA: Nothing to Disclose
Matthew Scott Hartman MD: Nothing to Disclose
Margaret Eddy Blackwood MS: Nothing to Disclose
Xi Xue: Nothing to Disclose

**TEACHING POINTS**

1. Educate clinicians on principles of radiation and imaging safety, with a focus on the pregnant patient and fetus.
2. Discuss diagnostic imaging considerations, including potential risks and pregnancy screening, in females of reproductive age in accordance with new ACR guidelines.
TABLE OF CONTENTS/OUTLINE
Radiation basics - Ionizing radiation - Stochastic versus deterministic effects - Dosimetry Diagnostic imaging safety considerations in the pregnant patient - Identification and screening - Radiation risks and adverse outcomes - MRI - V/Q scan - Use of contrast media Imaging management principles Interactive clinical cases to reinforce teaching points Summary and pearls

HPE112
MRI: Mapping Radiology Information
Education Exhibits
Location: NA

Participants
Fadi Toonsi MBBS,FRCP (Presenter): Nothing to Disclose
Wid Kattan MBBS, MA : Nothing to Disclose
Jeffrey Chankowsky MD : Nothing to Disclose

TEACHING POINTS
This exhibit discusses: 1- The concept of mind mapping including benefits of their use as an educational tool. Mind mapping involves arranging the details of a subject under general headings, which provides learners with a clear view of the "big picture" as well as a way to see links, compare similarities, and recognize relationships within large bodies of information. Collectively these features help organize knowledge in a way that enhances retrieval and promotes clinical reasoning. 2- How to create a mind map, including various software applications that help create digital mind maps. To maximize their effectiveness, mind maps are built using the following structure: central topic, main topic, subtopics, floating topics, relationship arrows, boundaries, markers and notes. 3- Example mind maps in radiology. Mind maps can be used effectively in the field of radiology. Example topics include creating differential diagnosis lists, outlining disease summaries, reading studies by using a mind map checklists. Other example topics are discussed.

TABLE OF CONTENTS/OUTLINE
1- Background on mind maps as an educational tool. 2- How to create a mind map: - Structure of a mind map. - Software applications to design digital mind maps. 3- Radiology mind maps examples

HPE113
Teaching and Learning Image Interpretation Skills (A Guide for Teachers and Learners)
Education Exhibits
Location: NA

Participants
Ibrahim Ali Alorainy MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. Learn about skills that help in correct imaging interpretation and reduce errors
2. Learn how different skills interact to better outline diseases and refine differential diagnoses
3. Learn how to simplify image interpretation and build logical interpretation system for radiology residents

TABLE OF CONTENTS/OUTLINE
These skills will help radiology residents to correctly interpret images and reduce errors, and help radiology teachers in teaching logical system for interpretation. Each skill will be illustrated by cases that will also show how different skills interact at the same time to reach better diagnosis. 1. Identify your patient 2. Identify exam attributes 3. Judge exam adequacy 4. Recognize normal anatomy 5. Think real estate (location, size, shape, content, neighborhood) 6. Lesion pattern 7. Lesion behavior 8. Cut and paste / cover test 9. Cause and Effect relation 10. Compare paired organs/ sides 11. If you see one, look for another 12. Organ counting 13. Hidden areas/slices/series 14. Look at the previous exams and reports 15. 2nd look for normal exam 16. The answer is always on the image 17. On follow up, there is a change until proven otherwise 18. Have a system for interpretation 19. Put things in context 20. Know your expected role

HPE114
That's not Appropriate! Educating the Radiology Resident about ACR Appropriateness Criteria in Neuroimaging
Education Exhibits
Location: NA

Participants
Dana Lin MD : Nothing to Disclose
Daniel S. Chow MD (Presenter): Nothing to Disclose
Randy Yeh MD : Nothing to Disclose
Angela Lignelli-Dipple MD : Nothing to Disclose

TEACHING POINTS
Widespread emphasis on ordering the most appropriate imaging study for patients has been advocated by the American College of Radiology (ACR). As we enter a new era of healthcare insurance, cost-effective care will undoubtedly include avoiding wasteful imaging. The responsibility to provide such care is shared by both radiologists and ordering physicians. Radiology residents need to be trained in gaining specific knowledge that can guide clinical colleagues in ordering the most appropriate imaging study for a specific clinical indication. The purpose of this exhibit is to provide A selected review of common indications that lead to inappropriate neuroimaging studies Alternative imaging options if the most appropriate imaging study in each of the clinical scenarios cannot be obtained, Quiz questions to interactively test the learner's knowledge. All recommendations in this exhibit follow the American College of Radiology Appropriateness Criteria.
**TABLE OF CONTENTS/OUTLINE**

1. Background of ACR Appropriateness Criteria
2. Presentation of ACR Neurologic Imaging Criteria, with emphasis on:
   a. Cerebrovascular Disease
   b. Focal Neurologic Deficit
   c. Head Trauma
   d. Headache
   e. Hearing loss and/or Vertigo
   f. Seizures and Epilepsy
3. Case-based Self-Assessment questions using clinical vignettes
4. Summary

**HPE115**

The Basics for Interpretation: A Radiologist's Guide for Evaluating and Comparing Imaging Modalities

*Education Exhibits*

*Location: NA*

**Participants**

- **Kevin Psoter (Presenter):** Nothing to Disclose
- **Bahman Sayyari Roudsari, MD, PhD:** Nothing to Disclose
- **Michael L. Richardson, MD:** Nothing to Disclose

**TEACHING POINTS**

The purpose of this educational exhibit is: 1. To review the fundamental concepts for evaluating and comparing imaging modalities, with particular emphasis on binary and continuous outcome measures. 2. To describe the diagnostic utility of combined radiologic and laboratory studies. 3. To describe intra and inter-observer variability in imaging studies.

**TABLE OF CONTENTS/OUTLINE**

1. Defining diagnostic efficacy
2. Comparing outcomes among various imaging modalities
3. Incorporating multiple imaging modalities into clinical decision making: making ROC curves for evaluating an imaging modality
4. Reporting and interpreting inter- and intra-observer agreement studies
5. Evaluation of the reproducibility of an imaging modality
6. Conclusions

**HPE116**

Billing Compliance for Radiologists

*Education Exhibits*

*Location: NA*

**Certificate of Merit**

**Participants**

- **Brian David Gale, MD (Presenter):** Board Member, SaferMD, LLC
- **Stephen Anthony Waite, MD:** Nothing to Disclose
- **Deborah L. Reede, MD:** Nothing to Disclose

**TEACHING POINTS**

1. Major billing compliance regulations that affect radiology practices
2. New mechanisms of compliance enforcement
3. Potential areas where non compliance may occur

**TABLE OF CONTENTS/OUTLINE**

This educational exhibit will be presented as a review followed by quiz questions. They key topics will include:

- Increasing risk of CMS compliance enforcement penalties
- Major billing compliance regulations that affect radiology practices
- New mechanisms of compliance enforcement

**HPE118**

Decisions Involved in Equipment Acquisition: What Radiologists Need to Consider

*Education Exhibits*

*Location: NA*

**Participants**

- **Kushal Parikh, MD (Presenter):** Nothing to Disclose
- **Richard K.J. Brown, MD:** Investor, RadExchange, LLC
- **Michael Kasotakis, MD:** Nothing to Disclose
- **Shane A. Wells, MD:** Nothing to Disclose
- **Ruth C. Carlos, MD, MS:** Nothing to Disclose
- **Nishant Patel, MD:** Nothing to Disclose
- **Geri Will:** Nothing to Disclose

**TEACHING POINTS**

**HPE118**

Decisions Involved in Equipment Acquisition: What Radiologists Need to Consider

*Education Exhibits*

*Location: NA*

**Participants**

- **Kushal Parikh, MD (Presenter):** Nothing to Disclose
- **Richard K.J. Brown, MD:** Investor, RadExchange, LLC
- **Michael Kasotakis, MD:** Nothing to Disclose
- **Shane A. Wells, MD:** Nothing to Disclose
- **Ruth C. Carlos, MD, MS:** Nothing to Disclose
- **Nishant Patel, MD:** Nothing to Disclose
- **Geri Will:** Nothing to Disclose
TEACHING POINTS

1. Learn the elements that hospital administrators consider so that you will be able to more effectively communicate the need for new equipment acquisitions.
2. Learn why understanding the underlying business plan may increase your influence in the decision-making process.
3. Learn how to increase the likelihood of acquiring new equipment for radiology versus competing interests in the institution.

TABLE OF CONTENTS/OUTLINE

Items to consider in the analysis of equipment acquisition.

Why:
- Why do we need/want new equipment?

What:
- What is the status of the expected market for our services?
- What are our options and their respective costs/benefits?
- What will it cost, financially and non-financially?
- What are the different financial options (i.e. leasing vs. outright purchasing)?
- What are the regulatory ramifications?

How:
- How will the equipment be acquired and implemented into the workflow?

When:
- When will the implementation occur?
- When can we expect to see the benefits?

Who:
- Who is needed to make the project work?

HPE119

Helping Others “Choose Wisely”: A Case-based Approach to Avoiding Unnecessary Imaging

Education Exhibits
Location: NA

Participants
Jennifer Soun MD (Presenter): Nothing to Disclose
Daniel S. Chow MD: Nothing to Disclose
Akash D. Shah MD: Nothing to Disclose

TEACHING POINTS

The Choosing Wisely initiative started by the American Board of Internal Medicine aims to improve quality of care for patients by reducing unnecessary tests and procedures. These initiatives include evidence-based recommendations from 52 specialty societies, many of which are imaging focused. Therefore, it is important for the radiologist to be familiar with these guidelines in order to help referring physicians choose the most appropriate exam and avoid unnecessary tests. The purpose of this exhibit is 1) to describe the radiologists' role in the Choosing Wisely campaign and 2) to provide an organized series of clinical vignettes highlighting important imaging "don'ts" of Choosing Wisely.

TABLE OF CONTENTS/OUTLINE

A. Background of Choosing Wisely
B. The radiologists' role in Choosing Wisely
C. Case-based review of Choosing Wisely imaging "don'ts" will be presented in a clinical vignette quiz format with a discussion of evidence supporting each answer following each case. Cases will be organized by imaging subspecialty:
- Cardiothoracic
- Gastrointestinal
- Genitourinary
- Musculoskeletal
- Neuroimaging
- Nuclear medicine
- Pediatric
- Ultrasound

HPE120

Abdominal Incidentaloma Quiz: A Review of the ACR Incidental Findings Committee Recommendations

Education Exhibits
Location: NA

Participants
Milana Flusberg MD: Nothing to Disclose
Fernanda Samara Mazzaroli MD: Nothing to Disclose
Sarah Kyung Oh MD: Nothing to Disclose
Zina Joan Ricci MD: Nothing to Disclose
Alia M. Rozenblit MD: Nothing to Disclose
Victoria Chernyak MD (Presenter): Nothing to Disclose

TEACHING POINTS

Incidental lesions are commonly found on abdominal imaging studies and in clinical practice, the recommendations for the management of these lesions often vary widely between radiologists. The purpose of this exhibit is to allow the radiologists to test their pre-existing knowledge of ACR management guidelines of various intra-abdominal incidental lesions and to review these ACR guidelines in detail. This educational activity will help improve the consistency of management recommendations of the incidental lesions found in clinical practice.

TABLE OF CONTENTS/OUTLINE

The cases will be presented in a quiz format highlighting key points of ACR management guidelines. Several diagnostic
scenarios requiring specific management decisions will be presented for each organ system. Incidental lesions in the following organs will be covered: Kidney Adrenal Liver Pancreas Gallbladder Common duct Spleen Lymph nodes Ovary Vascular

HPE121

Communicating Radiation Dose and Risk to Patients Undergoing CT Examination: A Clinician's Guide

Education Exhibits
Location: NA

Participants
Mark Robert Green MD (Presenter): Nothing to Disclose
Phuong-Anh Thi Duong MD : Nothing to Disclose
Maria Christina Shiau MD : Nothing to Disclose

TEACHING POINTS
Starting July 2014, dose information will be included on radiology reports as a Joint Commission requirement. This information may be foreign to most clinicians. The purpose of this exhibit is to review: 1) Basic radiation biology and radiation dose measurement on CT examination 2) Interpretation of the included dose information 3) Limitations of dose measurement and risk assessment, and 4) Strategies to effectively communicate risk to patients

TABLE OF CONTENTS/OUTLINE
1. Define dose and address dose normalization factors. Define equivalent and effective dose. Review deterministic vs stochastic effects.
2. Review interpretation of reported dose by defining DLP and CTDI. Provide examples of converting reported dose to effective dose.
3. Limitations of dose measurement and radiation risk estimate (risk estimates at low dose; extrapolation/Linear no threshold model, latency period to cancer induction, CT phantoms, patient size).
4. Strategies to communicate patient risk: Risk communication pitfalls (Gigerenzer, et al.), Risk from radiation exposure over natural incidence (Cancer), use of visual aids, address numeracy deficiencies, risk based on age, risk compared to background radiation vs everyday risks, risk of exam vs. risk of missed diagnosis). Provide resources for imaging alternatives (ACR appropriateness criteria)

HPE122

Latest Technology in CT Mechanical Power Injectors: What you Need to Know

Education Exhibits
Location: NA

Participants
Atilla Arslanoglu MD (Presenter): Grant, Siemens AG
Adeel Rahim Seyal MD : Grant, Siemens AG
Lee Goodwin : Nothing to Disclose
Vahid Yaghmai MD : Nothing to Disclose

TEACHING POINTS
Mechanical power injectors are important in optimizing contrast enhancement in MDCT. This exhibit will review the essential concepts in design and utility of modern power injectors in order to enable radiologists optimize the CT protocols. The role of new mechanical injectors in optimizing images, workflow and contrast use will be discussed.

TABLE OF CONTENTS/OUTLINE
• Design of modern injectors: single versus double syringe • Challenges with optimizing the rate of injection: what type of intravenous access is acceptable and what does the pressure gauge tell you? • Common and uncommon causes of injector failure • Controlling iodine flux • Incorporation into scanner control • Clinical examples of how images can be optimized • Data mining for contrast utilization

HPE123

Radiologic Eloquence: Incorporating Strunk and White's "The Elements of Style" into Reporting

Education Exhibits
Location: NA

Participants
Corey K. Ho MD (Presenter): Nothing to Disclose
Sandor Abraham Joffe MD : Nothing to Disclose
Robert Daniel Irish MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. Review the ACR Practice Guidelines for Communication of Diagnostic Imaging Findings 2. Emphasize the importance of being clear and concise in reports. 3. Incorporate literary guidelines outlined in 'The Elements of Style' to improve clarity and style within radiologic reports.

TABLE OF CONTENTS/OUTLINE
HPE125

**Focused Professional Practice Evaluation (FPPE) of Radiologists - A CMS and Joint Commission Requirement**

*Education Exhibits*

*Location: NA*

**Participants**

Jonathan B. Kruskal MD, PhD (Presenter): Author, UpToDate, Inc

**TEACHING POINTS**

By viewing this exhibit, the learner will be able to:

1. Explain the different types of FPPE evaluations that apply to radiologists
2. Describe clinical examples of what generates a radiologist FPPE
3. Describe data sources that are used to evaluate performance
4. Describe a suggested ad hoc committee composition for performing a review
5. Describe the FPPE process and possible outcomes and actions

**TABLE OF CONTENTS/OUTLINE**

The current Joint Commission and CMS requirements for OPPE and FPPE of Radiologists Differences between OPPE and FPPE Metrics and options for ongoing and focused professional performance evaluation of radiologists What data generates a performance-related FPPE Policies governing performance of an FPPE Practical steps in performing a comprehensive and systematic radiologist Outcomes from the FPPE FPPE Pitfalls, lessons learned and constructive suggestions

HPE126

**Health Failure Mode and Effects Analysis: Enhancing the Radiologists Understanding**

*Education Exhibits*

*Location: NA*

**Participants**

Khalid Walid Shaqdan MD (Presenter): Nothing to Disclose
Shima Aran MD: Nothing to Disclose
Elmira Hassanazadeh MD: Nothing to Disclose
Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

**TEACHING POINTS**

• Health Failure Modes and Effects Analysis (HFMEA) is a prospective risk assessment tool originally developed in the manufacturing industry, and is now being used in health care to proactively recognize risks to patient safety and lessen medical/health care errors. • In the radiology department, HFMEA can be a useful approach for a number of common sources of error, including patient identification, preparation, and consent; radiation exposure, monitoring during an examination, and maintenance of a safe working environment. • The purpose of this exhibit is to understand this quality assessment technique so that the reader can understand and perform the process on their own.

**TABLE OF CONTENTS/OUTLINE**

• Definition of Health Failure mode and Effects Analysis (HFMEA) • Joint commission on Accreditation of Healthcare Organization standards (JCAHO) requirements when to use Health Failure mode and Effects Analysis • Common sources of error in radiology • How to perform Health Failure mode and Effects Analysis: o Step 1 - Define the Topic o Step 2 - Assemble the Team o Step 3 - Graphically Describe the Process o Step 4 - Conduct a Hazard analysis o Step 5 - Define Actions and Outcome Measures • Examples of Health Failure mode and Effects Analysis used in Radiology • Limitations and difficulties of Health Failure mode and Effects Analysis

HPE127

**Improving Patient Flow in Seven Radiology Modalities within 6 Months**

*Education Exhibits*

*Location: NA*

**Participants**

Laura Tibor MBA, BEng (Presenter): Nothing to Disclose
Stacy R. Schultz BA: Nothing to Disclose

**Selected for RadioGraphics**
TEACHING POINTS
a. Demonstrate how Value Stream Mapping and associated Lean tools can lead to improved patient flow in multiple Radiology workflows b. Demonstrate the level of impact teams can have within a short timeframe c. Share our most impactful improvements d. Articulate lessons learned

TABLE OF CONTENTS/OUTLINE
Launching the Initiative Active and Supportive Leadership Basic Process Improvement Education Clear Expectations and Alignment Change Management Structure and Support for the Projects Engaged Modality Teams Self-appointment Project Managers Process Improvement Coaches Collaborative Learning Sessions Standardized Process Improvement Tool Set Post Project Accountability and Sustainment Transition Plan Post Project Updates to Quality Committee Case Study Examples Overall Collective Impact Lessons Learned

HPE128

Key Performance Indicators in Radiology

Education Exhibits
Location: NA

Participants
Elmira Hassanzadeh MD (Presenter): Nothing to Disclose
Khalid Walid Shaqdan MD: Nothing to Disclose
Shima Aran MD: Nothing to Disclose
Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

TEACHING POINTS
The purpose of this exhibit is: 1. To define performance indicators(PIs) and to introduce Donabedian's model for quality assessment 2. To demonstrate the 7 steps of developing PIs 3. To learn how stakeholders influence the process of choosing performance indicators 4. To discuss the strategic area in radiology practice, that should be evaluated in priority by using performance indicators 5. To review the main characteristics of key performance indicators(KPIs) and their usefulness in health care improvement 6. To give examples of potential radiology specific KPIs 7. To discuss the optimal quantity and radio of PI and KPI s for radiology practice 8. To describe best ways of implementation and interpretation of KPIs in radiology department

TABLE OF CONTENTS/OUTLINE
• Performance indicators: definition and types • Seven steps to develop performance indicators • Key performance indicators • Potential key performance indicators in radiology • Potential pitfalls in utilization and implementation of indicators

HPE129

Meeting the Quality Mandate: Radiology Quality and Safety Informatics Tools

Education Exhibits
Location: NA

Participants
Christopher Geordie Roth MD (Presenter): Author, Reed Elsevier
Huan Dong MD: Nothing to Disclose
Paras Lakhani MD: Nothing to Disclose
Caryn Karff MS, ARRT: Nothing to Disclose
Richard Joseph Thomas Gorniak MD: Speaker, Koninklijke Philips NV
Adam Eugene Flanders MD: Nothing to Disclose
Vijay Madan Rao MD: Nothing to Disclose

TEACHING POINTS
1. This exhibit will demonstrate the spectrum of informatics tools and how they can help to improve quality and safety in various aspects of radiology practice. 2. Relevant regulatory and legislative actions addressing healthcare quality and safety that affect the practice of radiology will be reviewed. 3. How radiology informatics tools can help meet regulatory requirements will be discussed.

TABLE OF CONTENTS/OUTLINE

HPE130

Peer Review in Radiology: Current Status, Review of Literature

Education Exhibits
Location: NA

Participants
TEACHING POINTS

The purpose of this exhibit is: 1. To overview the peer review as a performance measure. 2. To discuss selection of cases in peer review process (reactive/proactive). 3. To gain awareness of the methods of reviewing the selected cases and the scoring systems. 4. To discuss the management of discrepancies observed as a result of the peer review process( committee/ single reviewer) 5. To discuss the guidelines to be applied regarding the results(educational ,self-improvement goals/sanctions/focused peer review) 6. To describe obstacles in the process of peer review (confidentiality issues/just culture/high work load). 7. To overview of available IT tools for peer review process. 8. To overview the RADPEER™.

TABLE OF CONTENTS/OUTLINE

- Why and how to measure performance
- Steps in radiology peer review
- Case selection
- Review process
- Guidelines
- Methods for reducing bias in peer review process
- Obstacles and limitation of peer review implementation
- Current status of peer review in radiology/efficient systems: review

HPE131

Quality and Safety: Basic Concepts for the Radiologist

Education Exhibits
Location: NA

Participants
Khalid Walid Shaqdan MD (Presenter): Nothing to Disclose
Shima Aran MD: Nothing to Disclose
Elmira Hassanzadeh MD: Nothing to Disclose
Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

TEACHING POINTS

- Enhancing value of patient care in radiology requires proficient management of key safety, quality, and cost metrics.
- Continuously assessing clinical outcomes with the aid of quality improvement tools allows us to identify problems, and direct our efforts to areas that need the most improvement to maintain high standards of patient care.
- Knowledge of basic quality concepts must be understood in order to incorporate effective quality and safety processes in everyday care.

TABLE OF CONTENTS/OUTLINE

- Quality and safety of care
- Swiss cheese model
- Structural elements and techniques
- Indicators or metrics
- Quality control
- Quality assurance
- Continuous quality improvement
- Root cause analysis
- Health failure mode effect analysis
- Radiology quality map

HPE132

Root Cause Analysis: Basic Understanding for the Radiologist

Education Exhibits
Location: NA

Participants
Khalid Walid Shaqdan MD (Presenter): Nothing to Disclose
Shima Aran MD: Nothing to Disclose
Elmira Hassanzadeh MD: Nothing to Disclose
Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

TEACHING POINTS

- Medical errors are usually the result of several combined factors, and these factors can be grouped into several categories: Institutional, organizational, work environment, staffing, task-related, and patient characteristics.
- Root Cause Analysis is a retrospective approach used to get to the "Root Cause" of the problem, which when identified and resolved, prevents recurrence of the problem. RCA is designed to help identify not only what and how an event occurred, but more importantly why it happened.
- This exhibit will explain root cause analysis so that the reader can understand and perform the processes on their own.

TABLE OF CONTENTS/OUTLINE

- Definition of Root Cause Analysis
- Joint commission on Accreditation of Healthcare Organization standards (JCAHO) requirements when to use Root Cause analysis
- How to perform Root Cause Analysis
- Tools and techniques: Five rules of causation, Six thinking hats, Charts and graphical tools
- Key roles in RCA
- Examples of Root Cause analysis in Radiology
- Limitations and difficulties of Root Cause Analysis

HPE133

Six Sigma and Lean Concepts in Radiology

Education Exhibits
Location: NA

Participants
Elmira Hassanzadeh MD (Presenter): Nothing to Disclose
Khalid Walid Shaqdan MD: Nothing to Disclose
Shima Aran MD: Nothing to Disclose
Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press
TEACHING POINTS
The purpose of this exhibit is: 1. To introduce the concepts of six sigma and lean 2. To explain the goals of lean manufacturing 3. To demonstrate 7 types of waste, aimed to be eliminated using a lean thinking system 4. To review the five steps of problem solving methodology in six sigma process (DMAIC) 5. Introducing the main goal of six sigma : to reach over 99.99966% error-free practice 6. To review the implementation of six sigma and lean in healthcare

TABLE OF CONTENTS/OUTLINE
• Lean: an overview • Six sigma: an overview • Lean and six sigma in health care

HPE134
The Anatomy and Essential Components for a Successful Practice Quality Improvement Project

Education Exhibits
Location: NA

Selected for RadioGraphics

Participants
Jonathan B. Kruskal MD, PhD (Presenter): Author, UpToDate, Inc
David B. Larson MD, MBA: Nothing to Disclose

TEACHING POINTS
After viewing this exhibit, the viewer will be able to:
1. Describe the required elements of a PQI project
2. Compare requirements for individual and group projects
3. Discuss the spectrum of available options for identifying a PQI project
4. Describe the essential steps in initiating, managing, completing and disseminating a PQI project

TABLE OF CONTENTS/OUTLINE
What is PQI, and what is the PQI project?
What are the required elements to meet step IV of the MOC requirements?
Group versus individual projects.
Using Peer Review as your PQI project.
Improvement domains: patient safety, process improvement, professional improvement, customer feedback.
Specific analytical tools, references and project examples from each domain.
What projects does the RSNA currently facilitate?
How can I access and use the RSNA PQI templates?

HPE135
The Ins and Outs of Imaging Potentially Retained Surgical Items

Education Exhibits
Location: NA

Certificate of Merit

Participants
William Walter MD (Presenter): Nothing to Disclose
Seymour Sprayregen MD: Nothing to Disclose
Jeffrey Michael Levsky MD, PhD: Nothing to Disclose
E. Stephen Amis MD: Nothing to Disclose
Linda Broyde Haramati MD, MS: Investor, OrthoSpace Ltd Invester, Kryon Systems Ltd Spouse, Board Member, Bio Protect Ltd Spouse, Board Member, OrthoSpace Ltd Spouse, Board Member, Kryon Systems Ltd

TEACHING POINTS
1. Understand the role of imaging for perioperative evaluation of surgical item miscounts
2. Review the radiographic appearance of many different surgical items and their mimics
3. Understand the limitations of intraoperative radiography

TABLE OF CONTENTS/OUTLINE
1. Review of guidelines for managing surgical item miscounts
   a. Current clinical practice in operative imaging for retained surgical items
   b. Dedicated imaging of miscounted items
2. Review of imaging appearance of surgical items
   a. Dedicated radiographs of miscounted items: retractors, clamps, scissors, trocars, forceps, suction cannula, marking pen, surgical sponge, gauze pad, cottonoid, laparoscopic pads with radiofrequency tags, microclip, suture needles of various size, and broken instruments
   b. Examples of retained surgical items on radiography, CT, MRI, and fluoroscopy
   c. Complications of various retained items: gossypiboma, abscess, and bowel perforation
   d. Mimics of retained surgical items: bony mimics, vascular or other calcifications, clips, wires, expected and migrated retained
surgical material

3. Limitations of intraoperative radiography
   a. Artifacts: multiple overlying clips, wires, and instruments
   b. Small size of items sought (suture needles)
   c. Role of clinical history for image interpretation

INE005-b

Open Source Software Solutions for Monitor Calibration and Quality Control

Education Exhibits
Location: IN Community, Learning Center

Participants
Nicholas Benjamin Bevins PhD (Presenter): Nothing to Disclose
Michael James Flynn PhD: Nothing to Disclose
Donald Peck PhD: Nothing to Disclose

TEACHING POINTS
1. Review the importance of monitor calibration for the presentation of medical images
2. Describe an open source software package for calibration and quality control of monitors
3. Explain how to manage monitor QC results using an enterprise database application

TABLE OF CONTENTS/OUTLINE
1. DICOM calibration of enterprise monitors (referring physician, technologists, home systems)
2. Standards and recommendations of regulatory and advisory organizations
3. pacsDisplay, an open source software package for calibration and QC of monitors
a. Development history of the software
b. Package contents and capabilities
   i. Display calibration for DICOM GSDF conformance
   ii. Quality control
4. Deployment of an enterprise solution for display management
   a. Database for storage and centralization of results
   b. Routine compliance testing, verification
5. Future development and contributions

INE006-b

Natural User Interface for Advanced 3D Medical Image Processing

Education Exhibits
Location: IN Community, Learning Center

Participants
Michael Teistler PhD (Presenter): Nothing to Disclose
Oliver Johannes Bott PhD: Nothing to Disclose
Lars Christian Ebert PhD, MSc: Nothing to Disclose
Zak Al MD: Nothing to Disclose
Richard Spencer Breiman MD: Nothing to Disclose
James A. Brunberg MD: Nothing to Disclose

TEACHING POINTS
The viewer of this exhibit can
1. Experience a novel, gesture-controlled user interface approach, particularly for advanced 3D image viewing functions like on-the-fly oblique multiplanar reformations (MPR), maximum intensity projections (MIP) or volume rendering technique (VRT)
2. Assess benefits and drawbacks of a natural, ‘deviceless’ user interface as compared to conventional input devices (mouse, keyboard, touchpad, trackball)

TABLE OF CONTENTS/OUTLINE
A. Introduction: Desktop-based gesture-controlled user interface technology (Leap Motion) and its typical use
B. Hands-On:
   B.1. Intuitively define oblique MPR images by hand movements (‘Use your hand as ultrasound probe’)
   B.2. Change 3D view (rotate, move)
   B.3. Control other commonly used (2D) functions like zoom and pan, utilizing the user interface’s multiple degrees of freedom
C. Discussion: Benefits and drawbacks of the presented natural user interface as compared to conventional user interfaces (mouse, keyboard, touchpad, trackball)

INE007-b

Virtual Retinal Display: Use of a Novel Consumer Technology for Sonographic Visualization

Education Exhibits
Location: IN Community, Learning Center

Participants
Arjun Sharma MD (Presenter): Nothing to Disclose
Grant Martin BEng: Employee, Avegant Corporation
Franklin N. Tessler MD: Consultant, Koninklijke Philips NV Equipment support, Koninklijke Philips NV

TEACHING POINTS
Ultrasound technology has advanced remarkably over the past few decades with continual improvements in acquisition capabilities, including spatial/contrast resolution, frame rate, and color Doppler sensitivity. Despite this progress, a critical component of the imaging chain - the sonographic display - has changed little, apart from the transition from CRT to LCD. In recent years, head-mounted displays have become available for a variety of consumer applications. However, applications of wearable displays in medical imaging have not received much attention. In this interactive presentation, we demonstrate a novel use for the Avegant Glyph (Avegant, Ann Arbor, MI), a new head-mounted device that employs a micro-mirror array and optics to project high resolution images directly onto the user’s retina at a high refresh rate. The Glyph may be connected directly to the scanner or to any workstation equipped to view stored static images or real-time clips, free of distracting reflections that affect conventional displays. We believe that this technology will prove beneficial in clinical or educational settings.

TABLE OF CONTENTS/OUTLINE
A. History of US displays
B. Limitations of current display methods
C. Technical background
D. Demonstration of use of Glyph head-mounted display for grayscale and color Doppler US images
E. Potential applications

**INE008-b**

**DICOM Viewer on Wearable Devices: Do It Yourself or Work with Your Geek Friend?**

**Education Exhibits**

**Location:** IN Community, Learning Center

**Participants**

- Synho Do PhD (Presenter): Research Grant, Koninklijke Philips NV
- Garry Choy MD, MS: Nothing to Disclose
- Raul Nirmal Uppot MD: Nothing to Disclose
- Sarabjeet Singh MD: Research Grant, Siemens AG Research Grant, Toshiba Corporation Research Grant, General Electric Company Research Grant, Koninklijke Philips NV
- Mannudeep K. S. Kalra MD: Nothing to Disclose
- Rajiv Gupta PhD, MD: Nothing to Disclose

**TEACHING POINTS**

1. Ever increasing data viewing (such as clinical indication, prior reports and images, lab tests, EMR, operative notes) at the time of exam interpretation can be daunting.
2. New wearable technologies can be helpful for healthcare professionals to tackle problems related to “data flooding”.
3. These technologies can simplify the multi-tasking and potential multi-click access to various data sources.
4. Clinicians and engineers need to work together to improve and develop these technologies.

**TABLE OF CONTENTS/OUTLINE**

1. Introduce new visualization technology using wearable devices (Smart glasses and watches).
2. Outline data sources for interpreting and interventional radiologists and the problems related to access.
3. Discuss opportunities for applying wearable technologies to aid radiology workflow.
4. Collaborative work (clinicians and engineers) : Step by step explanation of Smart Glass DICOM viewer development.
5. Provide specific examples from our extensive work on use of wearable devices in radiology practice.

**INE025-b**

**3D Printed Liver Models for Diagnostic and Surgical Assistance: How to Prepare Data, Print and Utilize?**

**Education Exhibits**

**Location:** IN Community, Learning Center

**Magna Cum Laude**

**Participants**

- Kensaku Mori PhD (Presenter): Nothing to Disclose
- Yoshihiko Nakamura PhD: Nothing to Disclose
- Yuichiro Hayashi PhD: Nothing to Disclose
- Masahiro Oda PhD: Nothing to Disclose
- Tsuyoshi Igami PhD, MD: Nothing to Disclose
- Tomoaki Hirose MD: Nothing to Disclose

**TEACHING POINTS**

The major teaching points of this exhibit are

1. To understand how segmentation for 3D liver model printing is performed.
2. To understand how internal structures of liver are reconstructed in 3D printed liver models.
3. To understand how 3D printed liver models are utilized for diagnostic and surgical assistance for liver surgery.

**TABLE OF CONTENTS/OUTLINE**

This exhibit consists of three parts

**Explanation of the process of 3D printed organ model creation and clinical use**

- How to segment liver regions and internal vasculatures
- How to perform post-process of segmented regions for 3D printing
- How to fabricate of liver models
- How to utilize 3D printed liver modes for communication in diagnostic process
- How to utilize 3D printed liver models as reference object during surgery

**Demonstration of 3D printed liver models and its utilization**

- Liver region segmentation software for 3D printing
- Movie display of 3D printing and post-processing process
- On-side display of 3D printed liver modes
- Movie display of real clinical use

**Summary**

- Segmentation process is very important for fabricating 3D-printed liver model
- 3D printed liver models are very intuitive for understanding liver anatomy
- 3D printed liver models assist doctors to make diagnostic and surgical decision
Development of Educational Suite for Image Interpretation Based on Real-time ROC Method

Education Exhibits
Location: IN Community, Learning Center

Participants
Yuzuho Yamaguchi (Presenter): Nothing to Disclose
Yoshinao Sato MD : Nothing to Disclose
Masaki Matsusako MD, PhD : Nothing to Disclose
Kazuhiro Hoshiya : Nothing to Disclose
Tsutomu Nishi : Nothing to Disclose
Takeshi Hara PhD : Nothing to Disclose
Daisuke Fukukawa MD : Nothing to Disclose
Xiangrong Zhou PhD : Nothing to Disclose
Chisako Muramatsu PhD : Nothing to Disclose
Hiroshi Fujita PhD : Nothing to Disclose

TEACHING POINTS
Presenting a Real-time ROC (Receiver Operating Characteristic) curve will provide good motivations for readers during interpretation training. The purpose of this exhibit is to demonstrate our developed software suites based on ROC method for PC and tablets to create your own educational packages. Teaching points: 1) To understand the basic of ROC analysis. 2) To realize your teaching file for image interpretations. 3) To review the interesting cases for chest radiograms with bone-suppression and CT scans as demonstrations.

TABLE OF CONTENTS/OUTLINE
1) Basic of ROC analysis/Statistics, case selection, gold standard, test. 2) Real-time generation of ROC curves and AUC values/Software specific idea for the calculation. 3) How to create your own teaching files/Contents, required device and basic procedure to set up. 4) How to compare the results/AUC comparison, test, and discussion. 5) Demonstration of teaching file for chest X-ray cases/New idea for understanding chest radiograms by using bone-suppression images and CT. Interesting cases for nodule detections on chest radiograms. 6) Further application to ROC study/The suites can be applied to research purpose, not only for the educational use.

INE037-b
Data Analysis Using Machine Learning Tools: An Introduction for the Non-programmer

Education Exhibits
Location: IN Community, Learning Center

Participants
Rajiv Chekuri Raju BA (Presenter): Nothing to Disclose

TEACHING POINTS
The main goal of this exhibit is to introduce machine learning principles to those with no programming experience. Freely available software packages such as WEKA now make advanced machine learning techniques accessible to the non-programmer clinician. If clinicians learn the basic principles of machine learning, they may be able to identify problems that can be solved with machine learning techniques. This can lead to more fruitful collaboration between clinicians and the machine learning experts.

After viewing this exhibit, the clinician should have a basic understanding of what machine learning is and what types of problems can be assessed with machine learning methods. The clinician should also be able to experiment with and explore machine learning using the WEKA software, as well as understand how to evaluate the effectiveness of a machine learning system.

TABLE OF CONTENTS/OUTLINE
What is Machine Learning? Why should I bother learning about machine learning if I am not a physicist or engineer? Learning about machine learning with Weka and a real mammography data set: Introduction to Weka Data visualization using Weka Machine learning experiments with Weka Evaluating performance: ten fold cross validation and area under the ROC curve Information gain evaluation: relative importance of data features

INE039-b
What Is the Most Suitable Requirements of the Comfortable Working of PACS os the Virtual Platform?

Education Exhibits
Location: IN Community, Learning Center

Participants
Naoki Mihara MD (Presenter): Nothing to Disclose
Zhi Xilong MD, PhD : Nothing to Disclose
Yuuichirou Yamamoto RT, PhD : Nothing to Disclose
Takashi Hayakawa : Nothing to Disclose
Hirohisa Iwasaki : Nothing to Disclose
Shirou Manabe : Nothing to Disclose
Toshihiro Takeda MD, PhD : Nothing to Disclose
Yasushi Matsumura MD, PhD : Nothing to Disclose

TEACHING POINTS
1. Characteristics of VDI (Virtual Desktop Infrastructure) environment 2. Estimates of various parameters to VDI at reading system 3. Discussions of the optimal service specification and network design
Outline: Next generation PACS will have to meet various needs of many departments because there are many types of viewers in a hospital and they have the important role respectively and they have each storage for it. But it is not efficient to save images with different methods simultaneously. So we think next generation PACS should have a vendor neutral archiving storage and a common platform which several viewers can work simultaneously. We have assessed some requirements of PACS on VDI (Virtual Desktop Infrastructure) environment, and we will show the points for it as belows: 1. Network traffic volume at reading images. 2. Effectiveness of parameters (bandwidth, latency, packet loss ratio). 3. Compare the functions of several viewers.

Table of contents: A. Background B. Estimate Points C. Hardware Concept D. System Configuration Concept E. Measurement of traffic volume by flow capture F. Emulate the speed of network condition G. Comparing several DICOM Viewers

The State-of-the-Art and Recent Advances in Pulmonary Image Analysis Techniques

Education Exhibits
Location: IN Community, Learning Center

Participants
Ziyue Xu PhD (Presenter): Nothing to Disclose
Ulas Bagci PhD, MSc: Nothing to Disclose
Awais Mansoor PhD: Nothing to Disclose
Brent Foster: Nothing to Disclose
Georgios Z. Papadakis MD: Nothing to Disclose
Jayaram K. Udupa PhD: Nothing to Disclose
Daniel Joseph Mollura MD: Nothing to Disclose

TEACHING POINTS
1) To present current state-of-the-art pulmonary image analysis techniques
2) To provide a general background of the challenges in pulmonary image analysis
3) To assess the accuracy and usability of multiple methods for different pulmonary applications
4) To discuss recent development in hybrid and longitudinal pulmonary image analysis techniques

Natural Language Processing Technologies in Radiology Research

Education Exhibits
Location: IN Community, Learning Center

Selected for RadioGraphics

Participants
Tianrun Cai MD (Presenter): Nothing to Disclose
Kanako Kunishima Kumamaru MD, PhD: Nothing to Disclose
Sheng Yu: Nothing to Disclose
Amir Imanzadeh MD: Nothing to Disclose
Ruth M. Dunne MBCh: Nothing to Disclose
Frank John Rybicki MD, PhD: Research Grant, Toshiba Corporation
Elizabeth George MD: Nothing to Disclose
Rani S. Sewatkar MBBS: Nothing to Disclose

TEACHING POINTS
1. Natural Language Processing (NLP) as a method for automatic data extraction has been applied to radiology research in a limited scope to date 2. The following current NLP technologies are used in radiology: pattern matching, machine learning, coupled with linguistic and statistical approaches. We will describe each with illustrative examples. 3. Potential strategies to improve the versatility and accuracy of NLP technology are reviewed with the intent on achieving a wider implementation in radiology research

The Use of the Geographical Information Systems (GIS) for Establishing Mammography Facilities

Education Exhibits
Location: IN Community, Learning Center

Participants

A. Applications of NLP to radiology reports in the biomedical imaging literature to date i. detection and classification of pulmonary embolism ii. identification of abdominal aortic aneurysm, appendicitis, pneumonia, lung nodules, and bone fracture iii. evaluation of cancer stage or tumor status iv. assessment of radiologists recommendations for additional imaging B. Algorithmic approach to current NLP technologies i. pattern matching ii. machine learning iii. linguistic approaches iv. statistical approaches C. New strategies for NLP include methods to obtain greatly needed clinical data from electronic medical records in order to supplement diagnostic radiology reports to enable more clinical outcomes focused research
TEACHING POINTS

The availability and ease of access to mammography facilities is one of the most important factors in the degree of the compliance of the target population with the current guidelines and standards. It has been shown that the distance to the mammography facility is correlated with the stage of the cancer at the diagnosis. With the use of the Geographical Information Systems (GIS), we can integrate the data on geographical attributes, access routes, and available facilities with the demographic characterization of the local population and determine the best available location for establishment of a mammography center with the best access for the current or future number of women in the screening age. It can also be integrated with the available data on the prevalence of breast cancer in different neighborhoods. The use of GIS-based approaches can improve the efficacy and cost-effectiveness of establishment of future mammography screening centers.

TABLE OF CONTENTS/OUTLINE

- Introduction of the GIS and their use in healthcare especially in the field of radiology
- Basic introduction to the available software and developing maps
- Simple analyses using GIS
- Demonstrating an analysis based on a hypothetical data for determining the best place for establishment of a mammography screening facility (both permanent and portable facilities)

INE104

Quality Improvement with Discrete Event Simulation (DES): A Primer for Radiologists

Education Exhibits
Location: IN Community, Learning Center

Magna Cum Laude
Selected for RadioGraphics

Participants
Michael Booker MD, MBA (Presenter): Nothing to Disclose
Ryan O’Connell: Nothing to Disclose
Bhushan Desai MBBS, MS: Nothing to Disclose
Vinay Anant Duddalwar MD, FRCR: Research Grant, General Electric Company

TEACHING POINTS

- To understand systems engineering and Discrete Event Simulation (DES)
- To know how DES can inform and answer common QI questions in radiology
- To learn how to introduce DES software into their own radiology practice

TABLE OF CONTENTS/OUTLINE

- Systems engineering with discrete event simulation (DES) We will describe the utility of simulation to test complex radiology workflows and how DES is particularly useful in radiology to analyze a number of variables including resource scheduling, wait times, turnaround times, and equipment expenditures. Radiology examples of DES We will introduce a large-scale simulated imaging department and analyze specific systems questions that come up frequently in radiology decision-making. These include: • Wait times and resource capacity • Extending operational hours vs. purchasing additional equipment • Dedicated equipment to sequences vs. pooling resources • Scheduling in peak-demand situations • POC testing for contrast administration Quick-start guide to DES software We will walk through the basics of setting up a classic radiology workflow in a DES software package called Simul8 (Simul8 Corp.) that was chosen for its user-friendly graphic interface. This will allow the learner to begin analyzing their own radiology workflows with minimal formal training.

INE105

Contrast Reaction! The iPad Video Quiz Show

Education Exhibits
Location: IN Community, Learning Center

Participants
Huyen D. Tran MD: Nothing to Disclose
Susan L. Summerton MD (Presenter): Nothing to Disclose
John Thomas DeBardeleben MD: Nothing to Disclose
Ryan Joseph Smith MD: Nothing to Disclose

TEACHING POINTS

Managing contrast reactions requires both didactic book-learning and practical experience. Practical experience is difficult and expensive to obtain, since high-tech sim labs are seldom conveniently available. By repeatedly using the iPad Video Quiz Show, both didactic learning and ‘hot seat’ experience is gained, leading to increased retention of material and learner confidence. By viewing this exhibit, the learner will improve in confidence when faced with a contrast reaction, and will appreciate the advantages of using the iPad Video Quiz Show to learn to manage contrast reactions.

TABLE OF CONTENTS/OUTLINE

- A contrast reaction scenario will be presented through a closed captioned reality video quiz filmed on dual iPads. Teaching points gleaned from the ACR Manual on Contrast Media (2013) include: • General approach to contrast reactions • Specific management with doses • Action checklist • Significant avoidable errors • Key learning points With the dual iPads, the student is immersed into the reaction. Presented with a blank iPad screen, the student must know what to do, or confront their ignorance; becoming motivated to learn and perform better next time. The teacher, with their own iPad screen including potentially correct and incorrect student responses, can guide the student while checkmarking that major educational guidelines are met.
Current State of Perceptive Learning in Radiology and the Potential Implications of Implementing Modern Perceptive Learning Techniques into Radiologic Education

**Participants**
Alaa Beydoun MD (Presenter): Nothing to Disclose
Jean Jeudy MD : Nothing to Disclose

**TEACHING POINTS**
To be able to differentiate between Perception and Analysis.
To understand what perceptive learning (PL) is.
To understand the history and current state of PL in radiology.
To appreciate the growth of PL research in modern cognitive neuroscience.
To consider the implications of improved PL applications in radiology education.

**TABLE OF CONTENTS/OUTLINE**
1) What is perception versus analysis? a) Definitions. b) Origins of PL. 2) PL in radiology. a) History. b) Visual tracking research. c) Search patterns. d) Brute strength experience-based approach of current PL in radiology. 3) Modern PL Research. a) Gabor Patches and Stimuli. b) Patterns and gating of learning. c) Effect on visual cortex and measurable improvements in vision. 4) Implications of PL applications in Radiology Education. a) Development of improved search patterns. b) Improved accuracy and speed of lesion detection. c) Better understanding of Perception from Radiologist perspective allows for even better teaching tools which overall leads to improved patient care.

**INE107**
Important Information at Your Fingertips: Creating and Distributing Mobile Apps within Your Department. A "How to" Guide Using Acute Contrast Reactions as an Example

**Participants**
Daniel Cornfeld MD (Presenter): Nothing to Disclose
Vladimir P. Neklesa MD : Nothing to Disclose

**TEACHING POINTS**
Explaining contrast administration policies and responding to acute contrast reactions are two of the most important responsibilities facing radiology trainees and staff. While attending to these tasks much time is spend looking up documents on-line or referring to index card sized cheat sheets. To save time and effort we created and distributed an iPhone app that places this frequently needed information at our fingertips. The app makes the following information immediately accessible: classification of allergic reactions, department specific policies regarding administering contrast in patients with prior allergic reactions, pre-medication regimens for adults and children, checklists for evaluating patients suspected of having acute contrast reactions, and treatment algorithms for different types of contrast reactions. There are two major teaching points to this exhibit. 1) Learn how department-wide apps can increase efficiency by placing important information literally in your staff's hands. 2) Provide step by step instructions for creating and disseminating iOS apps within your department.

**TABLE OF CONTENTS/OUTLINE**
A. Choosing Appropriate Content for an App B. Step by Step Guide for Building the App C. Step by Step Guide for Distribution within your Department D. Providing Updates as Policies Change

**IN108**

**Participants**
Sergey Kochkine MD (Presenter): Nothing to Disclose
Harprit Singh Bedi MD : Nothing to Disclose
Vera Mayerick MD : Nothing to Disclose
Elaine Shiang MD : Nothing to Disclose
Gene Michael Weinstein MD : Nothing to Disclose
Daniel Matheson Adams MD : Nothing to Disclose

**TEACHING POINTS**
Mind-mapping software, a computer program in which users build visual diagrams of knowledge and associations, represents a novel electronic tool with broad applications in a variety of educational curricula. As a highly interactive modality its emphasis on active learning improves recall and retention by drawing on visual associations. Its potential as a learning tool for radiologists is vast. Junior residents can pre-draw main branches and highlight gaps of knowledge, slowly filling them in through the course of their training. Senior residents can refine and consolidate their mind-maps, adding detail regularly and revisiting them for examination preparation. Interesting cases can be linked to these mind-maps throughout residency. Faculty can also take advantage of mind maps for teaching, with integration into a variety of electronic resources and access to cloud storage being some of their primary benefits. We present an introduction to this software resource, review potential uses for a variety of levels of trainees, and discuss potential for implementation in teaching as well. Finally, a step by step approach to creating radiology mind-maps will be detailed.

**TABLE OF CONTENTS/OUTLINE**
Overview of mind-mapping software. How to build a mind-map. Applications for junior residents, senior residents, and teaching.
INTEGRATION WITH EBOOKS AND IPAD APPLICATIONS.

**IN109**

**Teaching Radiology Using Instagram**

*Education Exhibits*

*Location: IN Community, Learning Center*

Certificate of Merit

**Participants**

Saad Ranginwala MD (Presenter): Nothing to Disclose
Arnold Carlson Merrow MD: Author, Amirsys, Inc Editor, Amirsys, Inc Employee, Amirsys, Inc
Alex Towbin MD: Author, Amirsys Inc Shareholder, Merge Healthcare Incorporated Consultant, Guerbet SA

**TEACHING POINTS**

The purpose of this exhibit is to demonstrate how to use Instagram to create an educational resource for teaching radiology. The purpose of this exhibit is to: 1) Provide an overview of Instagram and how it is being used for education specifically in the context of medicine and radiology 2) Provide a step-by-step primer on how to set up an Instagram account 3) Describe how to post images and structure textual data so that it can act as an effective educational resource

**TABLE OF CONTENTS/OUTLINE**

1. Instagram in education A. How is it currently being used? B. How is it used in medicine? C. How is it used in radiology? II. How to create an Instagram account A. Creating an Instagram account B. Preparing content for Instagram 1. Proper formatting 2. Posting to Instagram 3. Manual vs. Scheduled content III. How to create an effective social media educational resource A. Establishing a curriculum B. Building a user base C. Increasing effectiveness of your social media education account 1. Regularly scheduled content 2. Effective social media promotion a) Hashtags b) Theme-based content c) Effective captions

**IN110**

**The Death of Multiple Choice? Natural Language Processing as a New Testing Paradigm in Radiology**

*Education Exhibits*

*Location: IN Community, Learning Center*

Selected for RadioGraphics

**Participants**

Andrew David Tannenbaum MD (Presenter): Nothing to Disclose
Jose Cayere: Nothing to Disclose
Kitt Shaffer MD, PhD: Nothing to Disclose

**TEACHING POINTS**

1. Understand the limitations and tradeoffs of current testing methods: multiple choice vs. oral boards vs. OSCE 2. Gain a basic understanding of the fundamental concepts associated with natural language processing 3. Learn about a new system that provides an extensible natural language processing framework and how it can be applied to radiological testing. 4. Understand how a natural language processing system-based examination may provide a superior testing environment for radiologists in comparison to the current methods. 5. Understand how the new system can be used for a variety of tasks including (but not limited to) formalized testing, self-assessment and content review.

**TABLE OF CONTENTS/OUTLINE**

A. Current state of radiology testing: from oral boards to multiple choice examinations B. Disadvantages of multiple choice testing. C. Advantages of simulated reporting environment for competency evaluation D. Overview of current NLP system, from inception to current status E. Current projects implementing NLP F. Future uses of the NLP system

**IN111**

**The Radiological Diagnosis in the Light of Information Theory: A Perspective**

*Education Exhibits*

*Location: IN Community, Learning Center*

**Participants**

Rossano Girometti MD (Presenter): Nothing to Disclose
Francesco Fabris PhD: Nothing to Disclose

**TEACHING POINTS**

1. Radiologists can be easily familiar with: a) the Information Theory (IT) by C. Shannon (1916-2001), which is widely used in engine search technology, telecommunication and biology; b) the definition of “information” and main measures of information provided by IT. 2. Radiological diagnosis can be formalized as a flux of information between the disease and the reader through the imaging procedure, in accordance with the Shannon’s Binary Transmission Channel model. The flux of information is the "Mutual Information" (MI). 3. The Area Under the Curve (AUC)-ratio is an MI-based measure that can express the diagnostic performance of an imaging technique globally, using a single index that is independent from the probability of the disease.

**TABLE OF CONTENTS/OUTLINE**

1. Basic concepts of statistics and IT 2. Formalization of radiological diagnosis in terms of IT: - From the 2x2 table to MI - From MI to the AUC-ratio 3. How the AUC-ratio refines conventional measures of diagnostic accuracy: examples from radiological literature 4. Applicability and usefulness in clinical activity and/or research.
Using Social Media to Help Promote a Radiology Department

Education Exhibits
Location: IN Community, Learning Center

Participants
Saad Ranginwala MD (Presenter): Nothing to Disclose
Alex Towbin MD: Author, Amirsys Inc Shareholder, Merge Healthcare Incorporated Consultant, Guerbet SA

TEACHING POINTS
The purpose of this exhibit is to demonstrate the benefits of using social media for a radiology department. In this exhibit, we will: 1) Provide an overview of social media and describe how social media can help to promote a department 2) Describe several common social media platforms and explain how each can be used to uniquely target a different audience 3) Discuss how analytics can be used to track the impact of these services and a department’s overall online presence

TABLE OF CONTENTS/OUTLINE
I. Social media as part of a departmental strategy A. Reasons why a department should consider social media B. Potential benefits of implementing a social media strategy benefits C. Potential risks of implementing a social media strategy II. Common social media platforms and potential uses of each platform for a Radiology Department A. Twitter B. Facebook C. Instagram D. YouTube E. Departmental blog III. Tracking the impact of your social media strategy A. Online analytic tools B. Social media specific data points C. Aggregate impact trackers

INE114
CT Guided Puncture Navigated by Gyroscope Equipped Smartphone

Education Exhibits
Location: IN Community, Learning Center

Participants
Masaaki Hirata MD (Presenter): Nothing to Disclose
Hiroaki Tanaka MD: Nothing to Disclose
Naoki Fukuyama: Nothing to Disclose
Gen Koiwahara: Nothing to Disclose
Naoto Kawaguchi MD: Nothing to Disclose
Takaharu Tsuda MD, PhD: Nothing to Disclose
Teruhito Mochizuki MD: Nothing to Disclose

Background
CT-guided puncture is a well-established minimally-invasive technique applied to biopsy, drainage, percutaneous osteoplasty, etc. On this procedure, in case of nonuse of CT fluoroscope, physicians have to define the angle of puncture needle as planned on the reference images by eye measurement. This uncertain process can be the cause of inaccurate puncture with large angle error. To overcome this, we developed a smartphone application to support CT guided puncture.

Evaluation
Function of the application After definition of the appropriate puncture site and needle angle, planning puncture line is drawn on the reference image. Then the reference image is transferred to the smartphone as jpeg data. While holding smartphone at any angle, this application automatically rotate and keep the image horizontal by the function of gyroscope. All physicians have to do is just to advance the needle along the puncture line shown on the device. Puncture test In order to evaluate the accuracy of this application, experimental puncture test was carried out. Vertical, horizontal and curved plane was defined on the puncture target which was made from melamine sponge. On the scanned CT image of this target, puncture line of 30°, 50° and 70° respectively for vertical, horizontal and curved plane. As a result, the maximum angle error was only 1° (average angle error was 0.6°).

Discussion
Most of smartphones have vibrating structure gyroscope inside in order to recognize the movement of the device itself. This application makes smartphone into a handy tool which present appropriate puncture angle in real time with high accuracy. Other advantages are as follows: 1. Recognition of anatomy around the puncture site from the image on the device without eye movement. 2. High availability of devices. 3. Easy preparation. (Just put the smartphone into sterilized nylon bag.)

Conclusion
We developed an application to support CT guided puncture. This application makes smartphone into beneficial tool for accurate puncture.

INE115
Fundamentals and Applications of 3D Printing in Medicine

Education Exhibits
Location: IN Community, Learning Center

Participants
Amir Imanzadeh MD (Presenter): Nothing to Disclose
Frank John Rybicki MD, PhD: Research Grant, Toshiba Corporation
Dimitris Mitsouras PhD: Nothing to Disclose
Michael Lally Steigner MD : Speaker, Toshiba Corporation
Peter Constantine Liacouras PhD : Nothing to Disclose
Gerald Thomas Grant DMD, MS : Nothing to Disclose
Kanako Kunishima Kumamaru MD, PhD : Nothing to Disclose
Elizabeth George MD : Nothing to Disclose
Asha Sarma MD : Nothing to Disclose
Shanna Matalon MD : Nothing to Disclose
Tatiana Kell MD : Nothing to Disclose
Catherine Phillips MD : Nothing to Disclose
Rani S. Sewatkar MBBS : Nothing to Disclose
Tianrun Cai MD : Nothing to Disclose
Meaghan Mackesy MD : Nothing to Disclose
Gregory Aaron Bonci MD : Nothing to Disclose
Sachin Shyamsunder Saboo FRCP, MD : Nothing to Disclose

TEACHING POINTS
1. Introduction of 3D printing methods
2. Discuss imaging pre-requisites and post-processing techniques for obtaining printable files (STL outputs)
3. Re-meshing techniques and preparing the STL files for printing
4. Overview of current clinical applications of 3D printing
5. Discuss potential utilizations and future directive

TABLE OF CONTENTS/OUTLINE
1. Techniques of 3D printing: Description of different technologies, printers, and materials used in 3D printing
2. Imaging pre-requisites: Discuss the imaging modalities, requirements, and protocols
3. Post-processing and segmentation: Software introduction and utilization
4. STL files: Rendering and Re-meshing
5. 3D visualization vs. 3D printing
7. Future applications: Organ and soft tissue printing

INE116
Using the Leap Motion Controller and PACS Point to Allow for Hands-free Control of Standard DICOM Imaging Software

Education Exhibits
Location: IN Community, Learning Center

Participants
Peter Stoll : Nothing to Disclose
Jose Morey MD (Presenter): Nothing to Disclose

Background
Maintaining sterilization during surgical procedures is critical to maintain patient safety and to ensure optimal outcomes. When using imaging software, surgeons are forced to squander time and increase risk of infection to the patient by desterilizing and then resterilizing after operating the mouse and keyboard.

Evaluation
The Leap Motion Controller is a small device that contains three cameras that can measure hand and finger position down to the millimeter in its detection cone. The Leap Controller also can recognize several hand gestures which can be used as inputs for software designed to work in conjunction with the controller. PACS Point was designed to allow users to operate standard DICOM imaging software, and to provide full control over the cursor by moving their hand in the Leap's detection cone.

Discussion
By working with the Leap Motion Controller, PACS Point allows users all of the same controls as they would have with standard mouse and keyboard inputs, but without having to touch anything; thereby remaining sterile. PACS Point's controls currently allow for cursor movement by moving 1 finger in the x and y-plane of the Leap's detection cone while other mouse controls such as various types of clicks are controlled by simple gestures. Screen scrolling and zooming is controlled by 3 or 5 finger motion in the y-plane of the cone respectively. Additional controls are provided based on the imaging software being used in conjunction with PACS Point.

Conclusion
The ability to control imaging software in a hands-free manner will allow surgeons to save time by not having to resterilize after using a mouse or keyboard, and will likely improve on the rate of patient infections. The current state of PACS Point proves the feasibility of this type of control. Future studies will be done to measure the effect that PACS Point can have on these 2 factors. Because the Leap Motion Controller is such a new product there is room for development of PACS Point in the future. Further development will be geared towards making PACS Point compatible with additional existing imaging software as well as incorporating advances in the Leap Motion, itself, into increased usability for PACS Point.

INE117
Benefits and Challenges in Setting Up a State-of-the-Art Processing Lab for Quantitative and Qualitative Image Analysis and Clinical Integration

Education Exhibits
Location: IN Community, Learning Center

Participants
Frederick Schuster (Presenter): Nothing to Disclose
Khoschy Schawkat MD : Nothing to Disclose
Yanik Buetikofer : Nothing to Disclose
Michelle May : Nothing to Disclose
Hendrik Von Tengg-Kobligk MD : Research Grant, W. L. Gore & Associates, Inc
Daniel Ott MD : Nothing to Disclose

TEACHING POINTS
Modern image processing applications are becoming more and more complex and are demanded by clinicians in daily clinical routine. Clinical pathway for Radiology to stay up to date and provide a high standard of image analysis and interdisciplinary clinical presentation. Gain translational experience how to establish a dedicated processing core lab. This exhibit presents benefits and challenges in setting up such a clinical core lab.
TABLE OF CONTENTS/OUTLINE
Motivation for setting up an image processing lab Growing demands and possibilities Achieving a high level of quality Planning of necessary resources Facilities Hardware Personnel Financial aspects and possibilities within the Swiss health care system Establishing workflows in cooperation with our clinicians Creating awareness Meeting demands Feedback, communication Practical guidelines Workflows/SOP's Research and development Non-commercial software and hardware Implementation of new applications

INE118

Computer-aided Contouring: An Accurate and Reproducible Interactive Contouring Toolkit for Segmentation of Tumors and Organs

Education Exhibits
Location: IN Community, Learning Center

Selected for RadioGraphics

Participants
Wenli Cai PhD (Presenter): Nothing to Disclose
Yin Wu: Nothing to Disclose
Difei Lu: Nothing to Disclose
Xiuzi Ye PhD: Nothing to Disclose
Gordon J. Harris PhD: Medical Advisory Board, Fovia, Inc

TEACHING POINTS
Interactive contouring is a commonly-used tool for interactive segmentation and modification of contours of tumors and organs on medical images. The teaching points of this exhibit are: 1. Computer-aided contouring (CAC) provides an accurate, reproducible, and efficient toolkits for interactive contouring of tumors and organs. 2. CAC assisted with novel interactive hardware provides a quick tool for contour tracking and reviewing. 3. CAC reduces the inter- and intra-observers viabilities of interactive contouring.

INE121

How to Find Physiologically-based and Prognostic Biomarkers for Prediction of Survival Risk from Baseline First-pass Perfusion CT and DCE-MRI Analysis in Advanced Hepatocellular Carcinoma Treated with Antiangiogenic Agents

Education Exhibits
Location: IN Community, Learning Center

Participants
Sang Ho Lee PhD (Presenter): Nothing to Disclose
Koichi Hayano MD: Nothing to Disclose
Dushyant V. Sahani MD: Research Grant, General Electric Company
Andrew X. Zhu MD, PhD: Nothing to Disclose
Hiroyuki Yoshida PhD: Patent holder, Hologic, Inc Patent holder, MEDIAN Technologies

TEACHING POINTS
To learn the essential biophysical foundation concepts and the computational approaches of pharmacokinetic (PK) models for the liver, and describe how to find effective prognostic biomarkers for survival risk prediction from baseline first-pass perfusion CT (PCT) and DCE-MRI analysis in advanced hepatocellular carcinoma (aHCC) treated with antiangiogenic agents.

TABLE OF CONTENTS/OUTLINE
Physiologic assumptions in five popular PK models: the Tofts-Kety (TK), extended TK, two-compartment exchange, adiabatic approximation to the tissue homogeneity, and distributed parameter models. Differences in imaging protocol, input function modeling, and PK parameter computation between first-pass PCT and DCE-MRI. Differences between standard and water exchange-modified PK models in DCE-MRI. Methods for finding optimal prognostic biomarkers in terms of the prediction of landmark survival and the association with overall survival: 1) Receiver operating characteristic analysis with cross-validation, 2) Kaplan-Meier analysis with cross-validated dichotomized values, and 3) Cox proportional hazard regression analysis with a single continuous parameter. Differences in prognostic biomarkers for survival risk prediction between different antiangiogenic agents (bevacizumab and sunitinib) and among different PK models in aHCC.

INE122

Lung Lobe Volumetry as a Reliable Biomarker: Methods for Automatic Extraction of Lobes from CT Scans, and Fissure Integrity Scoring

Education Exhibits
Location: IN Community, Learning Center

Participants
Awais Mansoor PhD (Presenter): Nothing to Disclose
Ulas Bagci PhD, MSc: Nothing to Disclose
**TEACHING POINTS**

1. To highlight the clinical importance of lung lobe volume determination as an imaging biomarker.
2. To review the state of the art segmentation methods for lung lobe determination.
3. To identify challenges in lobe segmentation with the focus on evaluation of different lung diseases.
4. To discuss the future trends in lung lobe segmentation and explain how current engineering advancements in CT can play a valuable role in making the lung lobe volume information as strong biomarker in routine clinics.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction
   a. Clinical importance of lung lobe segmentation
   b. Lung lobe information as a biomarker
2. The Challenges in Segmenting Lung Lobes
   a. Lacking anatomical information when pathology exists
   b. Image quality and resolution limitations
   c. Computational efficiency
3. State-of-the-Art Lung Lobe Segmentation Methods
   a. Expert manual delineation
   b. Model-based methods
   c. Feature-based methods
   d. Neighborhood-assisted methods
   e. Hybrid methods
4. Concluding Remarks and Future Trends

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**INE123**

Multi Material 3D Printing to Create Anatomic Models for Patient Education and Pre-surgical Planning

*Education Exhibits*

*Location: IN Community, Learning Center*

**Participants**

Darryl Hwang PhD (Presenter) : Nothing to Disclose
Benjamin Nguyen : Nothing to Disclose
Samantha Mcbirney : Nothing to Disclose
Bhushan Desai MBBS, MS : Nothing to Disclose
Vinay Anant Duddalwar MD, FRCR : Research Grant, General Electric Company

**TEACHING POINTS**

Creation of Standard Tessellation Language formatted 3D object files created by segmenting medical images using Synapse 3D (FujiFilm, Stamford, CT). Understand the differences between fusion deposition, stereolithography, selective laser sintering, and powder-based printing and how to choose the appropriate technology for the application. Examination of a mixed material 3D printed model. Personalized 3D cancer models can be very useful to patients' in understanding and receiving timely, complete and accurate information in order to effectively participate in their care and decision-making.

**TABLE OF CONTENTS/OUTLINE**

1. Use of Synapse 3D (FujiFilm, Stamford, CT) to generate Standard Tessellation Language formatted 3D object files. II. Overview 3D Printing Technologies o Fusion Deposition Modeling o Stereolithography - including new research from School of Engineering. o Selective Laser Sintering o Powder-based printing III. Examples of mixed material printing. IV. Discussion of clinical applications. o Patient education - better understanding of their disease to informed treatment choice o Surgical planning o Medical student education - use in human anatomy classes

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**INE124**

Recent Topics of Image Processing for Improving Chest CT Images

*Education Exhibits*

*Location: IN Community, Learning Center*

**Participants**

Norihisa Nitta MD (Presenter) : Nothing to Disclose
Haruo Mizutani : Nothing to Disclose
Kentarou Sakata : Nothing to Disclose
Masahiro Yanagawa MD, PhD : Nothing to Disclose
Sachiko Miura MD : Nothing to Disclose
Masashi Takahashi MD : Nothing to Disclose
Akinaga Sonoda MD, PhD : Nothing to Disclose
Hideji Otani MD : Nothing to Disclose
Yukihiro Nagatan MD : Nothing to Disclose
Noritoshi Ushio RT : Nothing to Disclose
Kiyoshi Murata MD : Nothing to Disclose

**TEACHING POINTS**

1. To introduce technology which reduces radiation exposure of iterative reconstruction (IR) CT equipment, by applying a successive approximation method.
2. To evaluate the technology of reducing radiation exposure by workstation manufacturers.
3. To consider future trends of reducing radiation exposure caused by CT.

**TABLE OF CONTENTS/OUTLINE**

1. Manufacturers' applications of successive approximation methods to IR
2. iGentle volume filters by TeraRecon, Inc.
   Evaluation of physical properties of iGentle volume filters
   Visual evaluation of iGentle volume filters
3. State-of-the-art imaging reconstruction methods
   Veo by GE is a reconstruction method of successive approximation, including calculations of how X-rays spread and produce geometric reflection not only in the statistical noise model and anatomical model but also from the physical focus size and the cell size of the actual detector.
   Philips has developed a state-of-the-art reconstruction method called Iterative Model Base Reconstruction (IMR).
4. Development of other image reconstruction methods

INE125

Utilizing Contextual Knowledge for Computer Aided Detection with Object-based Image Analysis

Education Exhibits
Location: IN Community, Learning Center

Participants
- Michael Schwier (Presenter): Nothing to Disclose
- Teodora Chitiboi: Nothing to Disclose
- Andre Homeyer: Nothing to Disclose
- Horst Karl Hahn PhD: Nothing to Disclose

TEACHING POINTS
1. Understand the difficulty of getting computers to automatically identify structures in (medical) images, while it seems rather easy for humans. 2. Understand the concept of object-based image analysis (OBIA) as a new image analysis approach. Most importantly understand the limitations of pixel-based approaches, which are most common in medical image analysis, and how OBIA extends the possibilities for image analysis. 3. Emphasize the importance of medical experts’ contextual knowledge and how OBIA allows the utilization of this for developing better detection methods. 4. Insights into example solutions. Some published and evaluated. Some early experimental to demonstrate how in cooperation with clinicians first prototypes can be developed quickly.

TABLE OF CONTENTS/OUTLINE
1. Advantage of human vision - why is it so hard to teach computers to "see"? 2. Idea of object-based image analysis 3. Advantages of object-based over pixel-based image analysis 3a. Features matter - how objects exhibit a wealth of information and pixels don’t 3b. Context matters - how context matters to identify a target object 3c. How to include (contextual) knowledge provided by medical experts 4. Example solutions 4a. Detection of liver lesions (CT) 4b. Vertebrae detection (CT) 4c. Spinal cord detection (MR) 4d. (possibly more depending on space)

INE126

Virtual Mono-energetic Image Reconstruction of Dual Energy CT Dataset – Review of Clinical Applications

Education Exhibits
Location: IN Community, Learning Center

Participants
- Rahul Lohan MBBS (Presenter): Nothing to Disclose
- Hui Seong Teh MBBS: Nothing to Disclose

TEACHING POINTS
1. Review the basis of mono-energetic image (MEI) reconstruction of dual energy CT images. 2. Illustrate the clinical applications of MEIs in day to day reporting

TABLE OF CONTENTS/OUTLINE
1. Introduction 2. Mono-energetic image (MEI) reconstruction - Physical principles - How to obtain them using available commercial software solutions 3. Examples of clinical applications of low kEV MEIs - A) Better visualization of hyper-vascular liver lesions - B) Pulmonary and coronary angiography - C) Peripheries angiography 4. Examples of clinical applications of high kEV MEIs - A) In imaging following spine surgery, hip replacements and internal fixation of extremities - B) Reduction of dental artefacts in head and neck imaging - C) Other miscellaneous applications 5. Conclusion

INE127

A New Approach for Semantic DICOM Interoperability

Education Exhibits
Location: IN Community, Learning Center

Participants
- Arpad Bischof MD (Presenter): Employee, IMAGE Information Systems
- Joerg Barkhausen MD: Nothing to Disclose

TEACHING POINTS
DICOM interoperability
How to solve interoperability issues

TABLE OF CONTENTS/OUTLINE
The goal of this project was to normalize DICOM data to allow completely vendor independent hanging protocols. We collected 1.67 Million datasets from over 800 imaging centers in multiple countries. We analyzed the collected data and created a summary of the real world listing the variability of vendors and manufacturers in coding information in DICOM. We used artificial intelligence and peer review by radiologists and radiographers to interpret all data. We performed a comprehensive literature research about terminologies in medical imaging and developed a complex rule set to convert data into a vendor neutral archive format. We chose the newest publications of the DICOM committee or the IHE as the target formats. The system was able to convert 91.8% of data into a vendor neutral format. This approach will help manage DICOM data from multiple vendors and sources in a single network more efficiently, e.g. for global hanging protocol management. The system cannot create
Implementing of a National RIS / PACS in Ireland

Education Exhibits
Location: IN Community, Learning Center

Participants
- Yvonne Goff BSC, MSc (Presenter): Nothing to Disclose
- Neil O’Hare: Nothing to Disclose
- Keith Morrissey: Nothing to Disclose
- Julie Bellew: Nothing to Disclose
- Breda Matthews: Nothing to Disclose
- Kate McKenna: Nothing to Disclose
- Lisa Morrín: Nothing to Disclose
- Damien Duffy: Nothing to Disclose
- Sharon Flatley: Nothing to Disclose
- Peter Smith: Nothing to Disclose

METHODS

Pre NIMIS implementation there were 52 hospitals existed in the Health Service of which only 15 had PACS. Except for some teleradiology systems for image transmission to the neurosurgical and spinal national centres, none of the existing PACS could communicate with each other. Today NIMIS is achieving 6,000,000 Images and reports, with 35,000 studies added weekly, using a central archive, a major achievement in the relatively short time period. The first site went live over 3 years ago, with 31 sites currently live on the system and one a month being added. While NIMIS is inherently a Radiology system, the original design and implementation has extended the boundaries of the solution into other imaging type services such as Cardiology, Vascular, Arthroscopy, Obstetrics, and Respiratory functions. The critical components of this enormous task to achieve fully national integrated RIS/PACS using a single archive will be discussed. In addition, the current issues with sharing of images and clinical reports across different hospitals without a national identifier, and the ability of NIMIS to adapt to the current healthcare reconfiguration will also be presented. NIMIS was introduced into fully operational departments in which work flow had to continue with minimal impact. Impediments to user acceptance will be discussed along with difficulties experienced transitioning to a paperless environment. The review will present the very many benefits accruing from the move to a single national system around patient care, service delivery, metrics and end-user support. The cost and process efficiencies of a single system support mechanism that have resulted will be presented along with the inherent risks and resultant mitigation strategies.

PURPOSE

In 2007 the Health Service Executive (HSE) in Ireland initiated the National Integrated Medical Imaging (NIMIS) Project. The initial aim of this project was to install a RIS / PACS solution into all publically funded hospitals in Ireland that currently did not have such systems (34 in total). This review sets out the current position with regard to the implementation of NIMIS throughout the Republic of Ireland, the impact this has had on improving patient care, and the lessons learned during the process.

RESULTS

The review gives insight to how NIMIS fits into the changing methods of service delivery to address increasing demand pressures on diagnostic imaging services, including insourcing and outsourcing radiology services and the capability of resource utilization monitoring. Increasingly, patients are moving between jurisdictions with service level agreements being discussed and agreed on the efficient provision of treatment for specialised areas. Inherent in the system specification and design is the use of the IHE XDS standard. The current NIMIS architecture is XDS enabled, allowing for cross border sharing of data.

CONCLUSION

The implementation of NIMIS is a very significant milestone in the development of a national electronic health record, as a national image archive for the Health System. The project has set new standards in aspects relating to large system procurement and implementation. The system, while very successful, has highlighted other gaps in the IT infrastructure in Ireland such as the current lack of implemented national Order Comms, Results acknowledgement, or Critical Findings solutions.

Incorporating Non Radiology Imaging Services within a National RIS/PACS Solution

Education Exhibits
Location: IN Community, Learning Center

Participants
- Keith Morrissey (Presenter): Nothing to Disclose
- Yvonne Goff BSC, MSc: Nothing to Disclose
- Julie Bellew: Nothing to Disclose
- Breda Matthews: Nothing to Disclose
- Kate McKenna: Nothing to Disclose
- Lisa Morrín: Nothing to Disclose
- Damien Duffy: Nothing to Disclose
- Sharon Flatley: Nothing to Disclose
- Peter Smith: Nothing to Disclose

METHODS

NIMIS Implementation Team adopted a "Big Tent" approach with prospective sites where the system was offered to image producing areas if they agreed to adopt the basic NIMIS workflow and supply the necessary resources to facilitate successful implementation. The original design and implementation of the system has extended the boundaries of the solution into other imaging type services such as Cardiology, Vascular US, Obstetrics US, Arthroscopy, and Respiratory Function Laboratories.

PURPOSE

In 2007 the Health Service Executive (HSE) in Ireland initiated the National Integrated Medical Imaging (NIMIS) Project. The initial aim of this project was to install a RIS / PACS solution into all publically funded hospitals that currently did not have such systems (34 in total). While NIMIS at its inception was inherently a Radiology system it was not designed to be exclusively so.
NIMIS as the acronym suggests was envisaged to be more of a holistic "Medical Imaging" archive rather than limited to a Radiology PACS/RIS. There was a desire to include the capture and storage of Resting ECG data within the system and to this effect an ECG module was procured to integrate with the core PACS/RIS. The system was designed to be XDS compliant and architecturally is XDS enabled.

RESULTS

This review will focus on the particular requirements, benefits and challenges that were presented in the implementation of the NIMIS system in these non-radiology image producing areas. The process workflows in many of these areas were not as developed and standardised as within radiology depts. There was a significant learning curve involved for the national implementation team and vendor to gain the detailed understanding of the varied work processes followed in these areas necessary to support the system implementation in these areas. The particular benefits that have accrued to these non-radiology areas becoming part of the system will be presented in particular the resultant improvements in patient care delivery. There were also particular benefits delivered to the various stakeholders who utilise the services offered by these Depts. through their adoption of the NIMIS system. There were very specific lessons learned and functionality limitations encountered.

CONCLUSION

The project has delivered on a significant element of the original specification, namely the development of a generic image archive using the radiology solution as the catalyst for such. This has been proven in the utilisation of the archive to store many non-radiology image examinations. At the same time, these areas have had to adopt to a rigorous and structured workflows with interesting consequences a step taken by Radiology many years ago. The NIMIS solution, in just the same as for radiology exams, affords the opportunity to share such exams at a national level where clinically required.

INE131

Best Practices in Critical Test Results Management Systems

Education Exhibits

Location: IN Community, Learning Center

Selected for RadioGraphics

Participants

Paras Khandheria MD (Presenter): Nothing to Disclose
Brian David Gale MD : Board Member, SaferMD, LLC
Paul G. Nagy PhD : Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to: (1) understand what constitutes a critical test results management system (CTRM) (2) identify important features a ‘best in class’ CTRM system should provide (3) understand how to effectively deploy CTRM in the learner’s institution

TABLE OF CONTENTS/OUTLINE

1. Define what constitutes a critical finding in collaboration with clinical services.
   - stratify by acuity
   - define appropriate modes of communication
   - define escalation tree(s) based on clinical setting if no initial response is found
2. Optimize communication process between radiologist and clinician.
   - automate contacting of the referring provider
   - maintain accurate personnel white pages
   - automate tracking of results through the lifecycle of a critical result with timestamping
   - provide extensible application programming interface (API) to allow custom dashboarding
   - offer clinician a convenient way to contact the interpreting radiologist if there are questions
3. Addend reports automatically with documentation of findings communication and readback receipt.
4. Implement fail-safe measure(s) to track abandoned important incidental findings.

INE180

National Library of Medicine (NLM) Literature Searches Demonstration

Education Exhibits

Location: NA

TEACHING POINTS

NLM Literature Searching Consultation Area offers demonstrations of the free resources of the National Library of Medicine (NLM) (http://nlm.nih.gov/) and the Neuroimaging Informatics Tools and Resources Clearinghouse (NITRC) (http://www.nitrc.org/). Search PubMed/MEDLINE, the premier citation database, on individual workstations with one-on-one assistance from health sciences librarians. Improve your searching skills and discover tools to keep up with the latest publications. Tour related free NLM databases including those focusing on images and drugs. View demonstrations of the NIH-funded free NITRC website including the Image Repository (NITRC-IR) and the collaboration environment NITRC-R, a Resources Repository. This site collects, points to, and enables the comparing of neuroimaging tools and software and offers user provided ratings and reviews. In addition to tutorial brochures, materials for the in-person classes on PubMed and on online databases taught by NLM librarians will be available; as well as assistance in several languages.

INE181

IHE/RSNA Image Sharing Demonstration

Education Exhibits

Location: NA
TEACHING POINTS

This demonstration will showcase developments in standards-based interoperability that enhance the quality, efficiency and safety of care in radiology. The demonstration will show enhanced radiology reporting and image sharing based on IHE profiles and the RSNA Image Share network, a pilot project funded by the National Institute of Biomedical Imaging and Bioengineering (NIBIB).

Location: South Building - Hall A, Booth 1336
Demonstration Hours: 10:00 AM - 2:00 PM daily, Sunday through Thursday

**INE182**

**Computer Assisted Radiology and Surgery (CARS)**

*Education Exhibits*

Location: NA

**INE183**

**The Society for Imaging Informatics in Medicine (SIIM)**

*Education Exhibits*

Location: NA

**MIE001-b**

**Oncogenic Osteomalacia, What Does It Look Like? From SPECT to Plain Films with Pathologic Correlation**

*Education Exhibits*

Location: NA

Participants

- Jesus Alejandro Gabutti MD (Presenter): Nothing to Disclose
- Ailan Hitandhui Barrientos-Priego MD: Nothing to Disclose
- Joaquin Nunez Gomez MD: Nothing to Disclose
- Daniela Canaviri MD: Nothing to Disclose
- Fritz Hofmann MD: Nothing to Disclose
- Jorge Vazquez-Lamadrid MD: Nothing to Disclose
- Fernando Cano MD: Nothing to Disclose

TEACHING POINTS

To explain the pathophysiology of oncogenic osteomalacia. To explain the importance of molecular imaging, with special emphasis in SPECT-CT for the correct diagnosis. To show and explain the main imaging findings in MRI, US, CT and plain films of mesenchymal tumor, systemic manifestations, complications and consequences of a delay diagnosis. To emphasize the importance of the radiologist in the approach of a patient of suspected oncogenic osteomalacia.

**TABLE OF CONTENTS/OUTLINE**

Introduction: epidemiology and pathogenesis. Clinical and laboratory findings. Imaging work-up, indications and algorithm. SPECT and SPECT-CT findings, radiotracers and technique. Other molecular imaging methods. Review of cases with radiologic-pathologic correlation: MRI and ultrasound appearance of the mesenchymal tumor. CT and plain films of the systemic manifestations and complications. Summary of the teaching points and conclusion.

**MIE002-b**

**Simultaneous Positron Emission Tomography/Magnetic Resonance Imaging (PET/MRI): Clinical Advances and Implications in Neuroimaging of Epilepsy**

*Education Exhibits*

Location: NA

Participants

- Emmanuel C. Obuse MD (Presenter): Nothing to Disclose
- Shetal N. Shah MD: Nothing to Disclose
- Bandar Osaid Safar MD: Nothing to Disclose
- Unni K. Udayasankar MD, FRCR: Nothing to Disclose
- Guiyun Wu MD: Nothing to Disclose
- Stephen Edward Jones MD, PhD: Nothing to Disclose

TEACHING POINTS

1. Emphasize the clinical significance of simultaneous PET/MRI in the improving the detection of epilepsy foci. 2. Illustrate with simultaneous fused-FDG-PET/MRI findings of epileptic foci.

**TABLE OF CONTENTS/OUTLINE**

1. Briefly review the role of MRI in epilepsy a. Discuss current MRI imaging findings and limitations in the evaluation of epilepsy
1. Briefly review the role of MRI in epilepsy. Discuss current MRI imaging findings and limitations in the evaluation of epilepsy foci. Limited to focal cortical dysplasia, mesial temporal sclerosis, polymicrogyria and heterotopia. 2. Describe current technical advances in PET/MRI and its use in neuroimaging. 3. Discuss the clinical utility of fused-FDG-PET/MRI for evaluation of epilepsy foci and advantages over structural MRI. Fused-PET/MRI is a modality that offers superior diagnostic advantages. Patients with medically refractory epilepsy may be candidates for surgery. This cohort of patients may have a positive surgical outcome with the identification of epileptic foci on MRI. However, some patients show indeterminate or no evidence of structural abnormality on MRI. In these subset of patients, fused-FDG-PET/MRI is increasing being used as a tool to enhance pre-surgical identification of epileptic foci. Learn the clinical utility of fused-FDG-PET/MRI and its advantages - such as new regions of hypometabolic epileptic foci not seen on MRI and ability to delineate anatomic boundaries of hypometabolism not identified on PET.

**Utility of 18F-FDG PET/CT and 11C-Acetate PET/CT in Restaging of Prostate Cancer: A Review of the Literature**

**Education Exhibits**

**Location:** NA

**Participants**

- Erika Morongo Bastida MD (Presenter): Nothing to Disclose
- Juan Pablo Chavez Torres MD : Nothing to Disclose
- Ailan Hitandhui Barrientos-Priego MD : Nothing to Disclose
- Jose Rafael Garcia Ortiz MD : Nothing to Disclose
- Maria Mayela Leon Sanchez : Nothing to Disclose
- Irma Soldevilla-Gallardo : Nothing to Disclose

**TEACHING POINTS**

1. To review differences in the metabolic pathway and biodistribution of each radiopharmaceutical.
2. To know the use that has been given in the literature to 18F FDG PET/CT and 11C-Acetate PET/CT in the restaging of prostate cancer.
3. To identify specific conditions in each patient for the best selection of the radiopharmaceutical that provides more information in the restaging of prostate cancer.

**TABLE OF CONTENTS/OUTLINE**

- Overview of prostate cancer
- Properties of 18F-FDG and 11C-Acetate
- Indicators of prostate cancer recurrence
- Review of the utility of 18F FDG PET/CT and 11C-Acetate in the restaging of prostate cancer
- Choice of Radiopharmaceutical
- Example images

**New Insights in Molecular Imaging of Venous Thromboembolism**

**Education Exhibits**

**Location:** NA

**Participants**

- Sina Houshmand MD : Nothing to Disclose
- Ali Salavati MD, MPH (Presenter): Nothing to Disclose
- Soren Hess : Nothing to Disclose
- Thomas J. Werner : Nothing to Disclose
- Abass Alavi MD : Nothing to Disclose

**TEACHING POINTS**

To review different molecular imaging techniques for diagnosis and assessment of venous thromboembolism (VTE). To review applications of clinical routine molecular imaging techniques for diagnosis of VTE and tumor thrombosis.

**TABLE OF CONTENTS/OUTLINE**

- Venous thromboembolism (VTE) is a blood clotting disorder mostly presenting as deep vein thrombosis (DVT) and pulmonary embolism (PE) which affects up to 600,000 individuals in United States each year. Clinical symptoms of VTE are nonspecific and sometimes misleading. Additionally, side effects of available treatment plans for VTE are significant. Therefore, medical imaging plays a crucial role in proper diagnosis and avoidance from over/under diagnosis, which exposes the patient to risk. Molecular imaging techniques with different tracers have been studied for diagnosis of VTE and have shown promise in aiding the conventional structural imaging of VTE. In this exhibit we will briefly review following topics: 1. Molecular imaging methods for diagnosis of DVT: SPECT / scintigraphy a. Ventilation-perfusion scan b. Anti D-Dimer c. GP IIb/IIIa Cyclic RGD Peptide d. Antifibrin antibodies ii. PET/CT a. FDG b. EP-2104R iii. Near Infrared fluorescence imaging

**The Emerging Role of 18F-FDG and Sodium 18F Fluoride PET/CT in the Assessment of Atherosclerotic Plaques: An Update [ MI Scavenger Hunt! ]**

**Education Exhibits**

**Location:** NA

**Participants**

- Ali Salavati MD, MPH (Presenter): Nothing to Disclose
- Sina Houshmand MD : Nothing to Disclose
- Thomas J. Werner : Nothing to Disclose
- Benjapa Khiewvan : Nothing to Disclose
- Saeid Gholami MD : Nothing to Disclose
- Abass Alavi MD : Nothing to Disclose
TEACHING POINTS
To review the advances in molecular imaging of atherosclerosis and vessel wall inflammation using FDG-PET/CT and sodium 18F Fluoride PET/CT. To review the impact of different methodological factors on vessel wall imaging and quantification of 18F-FDG and sodium 18F Fluoride PET/CT scans.

TABLE OF CONTENTS/OUTLINE
18F-FDG PET/CT is a noninvasive, accurate and reproducible imaging modality that can identify and quantify inflammatory processes and prognosticate the risk for acute cardiovascular disease. Imaging vascular calcification by sodium 18F fluoride PET/CT can possibly improve cardiovascular risk stratification by detecting calcification in vascular wall and also differentiate active from indolent calcification. In this review, we will discuss advances and improvements in application of FDG-PET/CT and sodium 18F Fluoride PET/CT in atherosclerotic plaque inflammation and effects of methodological factors on accurate quantification of vessel wall inflammation. 1) FDG-PET/CT 2) Sodium 18F Fluoride 3) Methodological factors i. Delayed time point ii. Pre-scan variables iii. FDG Uptake parameters a. Qualitative b. Semi-quantitative c. Quantitative

MIE102
Clinical Utility of PET-MRI in Abdominopelvic Imaging

Education Exhibits
Location: NA

Participants
- Maryam Gul (Presenter): Nothing to Disclose
- Ammar Ahmed Chaudhry MD : Nothing to Disclose
- Kevin S. Baker MD : Nothing to Disclose
- Abbas Ahmed Chaudhry BS : Nothing to Disclose
- Mubashir Sheikh : Nothing to Disclose
- Marlene Leslie Zawin MD : Nothing to Disclose

TEACHING POINTS
1- Review physical principles and techniques of PET-MRI (positron emission tomography-magnetic resonance imaging).
2- Discuss clinical utility of using functional information obtained from a PET scan and structural information obtained from MR imaging.

TABLE OF CONTENTS/OUTLINE
Outline: 1. Physical principles and techniques of PET-MRI: review image acquisition and postprocessing 2. Utility of PET-MRI in oncology: role in initial tumor diagnosis, treatment planning and post-treatment follow-up 3. Role of PET-MRI in evaluation of infectious and inflammatory conditions (such as IgG4-related disease, etc) 4. Pearls and Pitfalls: Common pitfalls and controversies regarding PET-MRI in abdominopelvic radiology. 5. Future of PET-MRI: Discuss current challenges facing PET-MRI in radiology. Conclusion: PET-MRI is an emerging hybrid imaging modality offering detailed functional and structural imaging with promising clinical applications especially in the field of oncology, infectious and inflammatory conditions. Familiarity with the technical and clinical aspects of PET-MRI along with knowledge of common pearls and pitfalls of PET-MRI will aid in better integration and relevant usage of this modality in clinical practice.

MIE103
Improved Detection Sensitivity of Merkel Cell Carcinoma Liver Metastasis by SPECT-CT Octreoscan and FDG PET-CT

Education Exhibits
Location: NA

Participants
- Jinchun Yan MD, PhD (Presenter): Nothing to Disclose
- Upendra Parvathaneni MBBS, FRANZC : Nothing to Disclose

TEACHING POINTS
1. SPECT-CT has increased contrast resolution than planar imaging and therefore often bears higher detection sensitivity. 2. Octreoscan is a useful imaging modality for detecting neuroendocrine tumors that express somatostatin receptors.

TABLE OF CONTENTS/OUTLINE
Merkel cell carcinoma (MCC) is a cutaneous malignancy of neuroendocrine origin with a high propensity for distant metastases. The prognosis is significantly worse for patients with metastatic spread; 5 year overall survival is 80% for stage I versus 20% for stage IV disease. 111In-pentetreotide imaging (Octreoscan) is a useful imaging modality for detecting neuroendocrine tumors that express somatostatin receptors. It helps in the management of MCC by identifying clinically occult metastases for staging and during surveillance. It also determines whether treatment with Octreotide is indicated. However, planar 111 In-pentetreotide images do not always detect liver metastases due to high background liver uptake. SPECT-CT can offer better contrast resolution compared to planar imaging. FDG PET-CT images correlate well with the SPECT-CT.

MIE105
Potential Value of 18F-FDG PET/CT in Diagnosis and Therapy Evaluation of Relapsing Polychondritis (RP): A Rare Autoimmune Disease

Education Exhibits
Location: NA

Participants
- Susann-Cathrin Schuele (Presenter): Research Grant, Siemens AG
- Christian la Fougere : Nothing to Disclose
- Theodoros Xenidis : Nothing to Disclose
TEACHING POINTS

- To present the typical RP manifestations in FDG-PET/CT
- To underline the value of FDG-PET/CT for initial diagnosis, especially if laboratory and clinically results are inconsistent
- To illustrate PET/CT as an adequate tool for therapy monitoring for vitality assessment of RP
- To describe the value of FDG-PET/CT for detection of RP-associated diseases

TABLE OF CONTENTS/OUTLINE

- PET/CT for primary staging (case example 1)
  - 18F-PET/CT was not only suspicious for RP, but also exactly defined the extent of acute inflammation (auricular cartilage, tracheal-bronchial system) in a patient with fever, night sweat and swelling of the right ear, clinically suspect for vasculitis or a malignant tumour.
- PET/CT for therapy monitoring (case example 2)
  - PET/CT excluded in one case a relapse despite clinical symptoms, whereas in another case diagnosed a relapse despite normal laboratory findings.
- PET/CT for detection/exclusion of RP-associated diseases (case example 3)
  - PET/CT excluded vasculitis in one patient and malignant tumors in two patients with night sweat. PET/CT excluded vital RP before replacement of descending aorta in a patient with known RP and elevated CRP.

MIE109

A Review of Bench to Bedside Molecular Functional Imaging in Translational Cancer Medicine: To Image or to Imagine? [ MI Scavenger Hunt! ]

Education Exhibits
Location: NA

Participants
- Abhishek Mahajan, MD (Presenter): Nothing to Disclose
- Sandip Basu, MBBS, MD: Nothing to Disclose
- Meenakshi Haresh Thakur, MD: Nothing to Disclose

TEACHING POINTS

- Molecular functional imaging has given a newer insight to the medical imaging and has diversified the role of imaging in the field of the translational cancer medicine and has an indispensable role to play in screening, early diagnosis, staging, predicting prognosis, therapy delivery, therapy monitoring and follow-up.
- Overall there has been a significant development in the field of molecular imaging and its utilisation in the perspective of the biomedical research which has led to better understanding of the signalling pathways in the tumorigenesis and novel drug discoveries.
- The future of molecular functional imaging in the coming era is its exploitation into understanding the gene expression profiling in-vivo and optimising the patient specific therapies using gene expression profiling.
- Quantitative molecular functional imaging, in conjunction with quantitative structural imaging, will be the future of ‘personalized radiology,’ ‘personalized oncology,’ ‘personalized medicine,’ and of oncologic research in the 21st century and beyond.

TABLE OF CONTENTS/OUTLINE

- Cancer And Molecular Functional Imaging (MFI)
- MFI Of Gene Expression, Receptors And Signalling Pathways
- MFI of Multidrug-Resistance In Cancer
- MFI Of Extracellular Matrix And Its Key Components
- MFI Of Neoangiogenesis, Hypoxia And Metabolism
- MFI And Small Animal Imaging

MIE110

DWI vs 18-FDG PET/CT: Which Technique for Which Clinical Scenario? [ MI Scavenger Hunt! ]

Education Exhibits
Location: NA

Participants
- Antonio Luna, MD (Presenter): Nothing to Disclose
- Joan C. Vilanova, MD, PhD: Nothing to Disclose
- Sandra Baleato Gonzalez, MD: Nothing to Disclose
- Roberto Garcia Figueiras, MD: Nothing to Disclose
- Mariano Volpacchio, MD: Nothing to Disclose
- Christine O. Menias, MD: Nothing to Disclose

TEACHING POINTS

- Highlight the complementary role of these techniques in the detection and staging of different body tumors
- Review which of these techniques is more adequate for common clinical scenarios in oncology

TABLE OF CONTENTS/OUTLINE

1. Introduction
2. Staging
   - WB-DWI vs PET-CT
   - N-staging
   - M-staging: liver, brain, lung and bone metastases
   - Performance in staging of NSCLC, breast cancer, prostate cancer, malignant melanoma, colorectal cancer, lymphoma, multiple myeloma and others
3. Therapy monitoring
4. Prediction of treatment response
5. Posttreatment surveillance
6. Conclusions

**MIE111**

**Multiparametric Imaging in Oncology: Deconstructing Tumor Microenvironment [ MI Scavenger Hunt! ]**

*Education Exhibits*

*Location: NA*

**Participants**

- Roberto Garcia Figueiras MD (Presenter): Nothing to Disclose
- Anwar Roshanali Padhani MD: Advisory Board, Acuitas Medical Ltd Advisory Board, Siemens AG Speakers Bureau, Siemens AG Researcher, Siemens AG Speakers Bureau, Johnson & Johnson
- Ambros Johannes Beer MD: Nothing to Disclose
- Sandra Baleato Gonzalez MD: Nothing to Disclose
- Antonio Luna MD: Nothing to Disclose
- Joan C. Vilanova MD, PhD: Nothing to Disclose
- Laura Oleaga: Nothing to Disclose
- Maria Cruz Ajeitos Casais MD: Nothing to Disclose
- Anxo Martinez De Alegria MD: Nothing to Disclose

**TEACHING POINTS**

Cancers are complex, evolving, multiscale systems characterized by profound spatial and temporal heterogeneity in their phenotype. Actually, there is an opportunity to perform multiparametric imaging (MPI) at a variety of organ sites and with many clinical roles. The aim of this exhibit is:

- To emphasize that functional and molecular imaging (FMI) imaging techniques may yield an added information of biological tumor phenotype and of the effects of therapies.
- To learn about the biological correlates of MPI based on different FMI techniques: dynamic contrast-enhanced ultrasound, perfusion CT, dynamic contrast-enhanced MRI, dynamic susceptibility MRI, diffusion-weighted MRI, MR spectroscopy imaging, BOLD-MRI, PET, or SPECT.
- To evaluate the value of MPI approach in clinical oncology, including tumor diagnosis, prognosis, response to therapy, or relapse and drug development.

**TABLE OF CONTENTS/OUTLINE**

1. Why do we need MPI in oncology? 2. Tumor hallmarks in imaging and tumor microenvironment. 3. MPI in oncology: Basic principles. 4. MPI in clinical practice: a) The established role of MPI imaging in tumors (prostate, breast and brain tumors), b) New approaches to tumoral phenotype based in MPI. c) MPI in tumor evaluation: when discrepancies are biological meaningful. d) MPI for monitoring tumor response evaluation.

**MIE114**

**Superparamagnetic Iron Oxide Nanoparticles in Biomedicine: Applications and Developments in Diagnostics and Therapy**

*Education Exhibits*

*Location: NA*

**Participants**

- Harald Ittrich MD (Presenter): Nothing to Disclose
- Nina Raabe MD: Nothing to Disclose
- Kersten Peldschus MD: Nothing to Disclose
- Michael Gerhard Kaul: Nothing to Disclose
- Gerhard B. Adam MD: Nothing to Disclose

**TEACHING POINTS**

1. SPIO can be used for diagnostic MRI and therapy and may qualify for MPI. 2. Monodisperse SPIO improve physicochemistry and pharmacodynamics. 3. SPIO in targeted probes enable in vitro diagnostic imaging (μNMR).

**TABLE OF CONTENTS/OUTLINE**

SPIO can be used to image anatomical, cellular and molecular changes. Clinical applications range from MRA to the imaging of tumors, lymph nodes, CNS, atherosclerotic plaque and thrombosis. New experimental approaches describe undirected SPIO trapping in inflammation and tumors and directed accumulation of SPIO ligands in/on tumor and apoptotic cells, infarction, inflammation and degeneration in cardiovascular and neurological diseases, in atherosclerosis or thrombosis. Stem cell labeling allows imaging of cell therapies or transplant rejections. SPIO coupling to ligands, radio- and/or chemotherapeutics, embedding in carrier systems or activatable smart sensor probes enable molecular tumor therapies or the imaging of metabolic and enzymatic processes. Monodisperse SPIO may improve SPIO-based MRI in the future and as targeted probes in diagnostic magnetic resonance. Chip-based μNMR may improve in vitro analysis methods for biomarkers, pathogens and tumor cells. Magnetic particle imaging (MPI) offers new applications for SPIO in cardiovascular, oncological, cellular and molecular diagnostics and therapy.

**MKE001-b**

**Lipoma Arborescens in Swollen Joints: Histopathological and Multimodalitary Radiological Approach**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Betul Kizildag MD: Nothing to Disclose
- Emine Dagslan: Nothing to Disclose
- Zeliha Coqun: Nothing to Disclose
- Siddika Halicioğlu MD: Nothing to Disclose
- Imran Fenjanchi MD: Nothing to Disclose
TEACHING POINTS

- Lipoma arborescens is a nonneoplastic uncommon synovial entity occurring in the lining of joints, bursae, and tendons causing recurrent painless joint swelling and effusion in a wide age range. • Diffuse replacement of subsynovial mature fatty cells associated with villous proliferation of synovium forming typical frond-like appearance is the major histopathologic finding in which MRI is the most effective method in radiologic aspect. • Lipoma arborescens should be included in the differential diagnosis of recurrent joint swelling and effusion among other synovial pathologies such as pigmented villonodular synovitis, synovial lipoma, rheumatoid arthritis, synovial hemangioma, synovial chondromatosis. • Lipoma arborescens is a benign entity of which radiologists and pathologists should increase their familiarity about it and MRI is the problem solving tool before biopsy, arthroscopy or synovectomy.

TABLE OF CONTENTS/OUTLINE

- Histopathological definition and incidence of lipoma arborescens • Multimodal imaging and histopathological findings of various cases • Differential diagnosis of lipoma arborescence among other synovial diseases

MKE002-b

A Pictorial Review of Bone Stress Injuries in Olympic Athletes

Education Exhibits

Location: MK Community, Learning Center

Participants

Monika Rowe MD, PhD (Presenter): Nothing to Disclose
Adam W. Mitchell FRCR : Nothing to Disclose
Sarah S. R. Bethapudi MRCP, FRCR : Nothing to Disclose
Philip James O’Connor MBBS, FRCP : Nothing to Disclose
Justin Charles Lee MBBS, FRCP : Nothing to Disclose
Jeremiah Christopher Healy MBCHIR, FRCP : Nothing to Disclose
Richard Beuttel MBBS : Nothing to Disclose
Lars Engebretsen MD, PhD : Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To analyse the demographics and review the spectrum and distribution of bone stress injuries witnessed in Olympic Athletes: a) In different sporting categories. b) Based on anatomical body parts. 3. To review site-specific imaging findings of bone stress injuries in Olympic Athletes (including features on conventional radiography, CT, MRI). 4. To review commonly used MRI grading systems for site-specific stress injuries and discuss the correlation of MRI findings with time to return to sports activities.

TABLE OF CONTENTS/OUTLINE

1. Review of the definition and pathogenesis of bone stress injuries (bone stress response versus bone stress fracture). 2. Review of the presentation, demographics and distribution of bone stress injuries witnessed in a group of 40 Olympic Athletes: a) Analysis of bone stress injuries in different sporting categories. b) Analysis of bone stress injuries based on anatomical body parts. 3. Review of various site-specific injury patterns on imaging, including conventional radiography, CT and MRI (with sample cases including injuries to the spine, pelvis, femur, tibia, fibula, ankle, foot etc.). 4. Review of commonly used site-specific MRI grading systems (f.ex. for pars interarticularis, tibial injuries) and their correlation with time to return to sports activities. 5. Summary.

MKE003-b

Let’s Talk about Our Differences – Gender Variations in Musculoskeletal Radiology

Education Exhibits

Location: MK Community, Learning Center

Participants

Vetana Seit MD (Presenter): Nothing to Disclose
Corey K. Ho MD : Nothing to Disclose
Kevin R. Math MD : Nothing to Disclose
Douglas S. Katz MD : Nothing to Disclose

TEACHING POINTS

Numerous anatomical differences between males and females are evident on musculoskeletal imaging examinations. These morphological differences have important implications in both forensic medicine and in understanding the predisposition of males vs females to specific musculoskeletal injuries. The differences are primarily seen in the pelvis and in the upper and lower extremities, ranging from angular differences of the long bones to different patterns of calcification at the costochondral junctions. The purpose of this exhibit is therefore to demonstrate and review the differences in both normal and abnormal musculoskeletal imaging findings in males vs females

TABLE OF CONTENTS/OUTLINE


MKE004-b

Bone Marrow Edema-like Lesions on MRI: An Analytical Approach for Differential Diagnosis

Education Exhibits

Location: MK Community, Learning Center
Participants

Ustun Aydingoz MD (Presenter): Nothing to Disclose
Fatma Bilge Ergen MD: Nothing to Disclose
Zeynep Ozdemir MD: Nothing to Disclose
Kemal Kosemehmetoglu: Nothing to Disclose

TEACHING POINTS
At the end of viewing this exhibit the learner should be able to:

1. Explain why magnetic resonance imaging (MRI) is the single most effective radiological tool to detect bone marrow edema-like lesions (BMEL).
2. List several constituents of BMEL on MR images.
3. Ask several questions that would help to narrow down the differential diagnostic considerations with regard to BMEL on MRI.
4. Describe several characteristic patterns of BMEL on MRI that can help in making specific diagnoses.
5. Name several conditions where the temporal course of BMEL on MRI would be suggestive.

TABLE OF CONTENTS/OUTLINE
What is suggested by bone marrow edema-like lesions (BMEL) on magnetic resonance imaging (MRI)? Concepts of resolution in radiology and how they relate to bone marrow imaging MRI in showing BMEL: strengths and challenges How to approach bone marrow edema-like signal alterations on MRI?: asking relevant questions Temporal change in BMEL on MRI: diagnostic possibilities Take home messages

MKE006-b

The Rib in Medical Imaging- From A to BX

Education Exhibits
Location: MK Community, Learning Center

Participants

Nicholson Stephen Chadwick MD (Presenter): Nothing to Disclose
Curtis W. Hayes MD: Research Consultant, BioClinica, Inc Research Consultant, Pfizer Inc

TEACHING POINTS
Twenty percent of intradepartmental referrals to a tertiary medical center musculoskeletal radiology section involved osseous lesions of the rib. We aim to increase confidence, regardless of sub-specialty training, in the diagnostic workup of rib lesions. This exhibit offers: A multimodality review of benign and malignant entities that involve the rib An algorithm that utilizes characteristic imaging features to aid in diagnostic workup, with particular attention paid to benign mimics of malignancy Examples of rib biopsies with procedural tips and technique

TABLE OF CONTENTS/OUTLINE
Review of normal radiographic appearance of the rib and associated structures Entities presented include: Normal variants/Congenital: fused, bifid, extranumerary rib, rib notching Trauma: fractures (pathologic, healing, and stress), post-surgical presentations Neoplastic: primary malignancy (multiple myeloma, Ewing's sarcoma, lymphoma, chondrosarcoma) and metastatic (plastic vs lytic) Benign: enchondromas, bone island, fibrous lesions (non-ossifying fibroma and fibrous dysplasia), aneurysmal bone cyst Metabolic/Systemic: hyperparathyroidism, osteomalacia, osteoporosis, Paget's, sickle cell disease, eosinophilic granuloma Management algorithm Rib biopsy technique and points to consider

MKE007-b

Diagnosing Shoulder Arthritis: Beyond DJD and HADD

Education Exhibits
Location: MK Community, Learning Center
Certificate of Merit

Participants

Eric Hartman MD (Presenter): Nothing to Disclose
Kirkland W. Davis MD: Nothing to Disclose
Jarrod D. Dale MD: Nothing to Disclose
Kevin McKown MD: Nothing to Disclose
Michael John Tuite MD: Nothing to Disclose
Humberto Gerardo Rosas MD: Nothing to Disclose
Jack Anthony Porrino MD: Nothing to Disclose

TEACHING POINTS
By viewing this exhibit the learner should be able to:

1. Recognize and describe the distinct imaging features of various types of shoulder arthritis.
2. Understand the clinical workup and management of various types of shoulder arthritis.

TABLE OF CONTENTS/OUTLINE
Review of each type of shoulder arthritis to include: Typical imaging features Distinguishing imaging characteristics Expected findings in other joints Clinical presentation, including Hand® and relevant lab abnormalities Basics of management Emphasis will be given to: Osteoarthritis Rheumatoid arthritis Pyrophosphate arthropathy Hydroxyapatite deposition disease Neuropathic arthropathy Milwaukee shoulder Juvenile idiopathic arthritis Septic arthritis Minor emphasis on: Post-traumatic Hyperparathyroidism Scleroderma

MKE008-b

Lurking Beneath the Surface: A Look at Strange but Common Musculoskeletal Fibrous Lesions
Participants

Thillai Sekar MD (Presenter): Nothing to Disclose
Cornelia B. C. Wenokor MD: Nothing to Disclose
Valerie Fitzhugh MD: Nothing to Disclose

TEACHING POINTS

Benign fibrous musculoskeletal lesions are surprisingly common, but not well understood or recognized. Their often complex clinical courses lend them an additional layer of mystery. This exhibit will: Introduce the viewer to the common benign musculoskeletal fibrous lesions as a group. What are they? Review the lesions one-by-one, including typical presenting histories and clinical courses. The focus will be on imaging characteristic (X-ray, ultrasound, CT, and MRI), centered on MRI, which is the typical end-point modality in the imaging evaluation of these lesions. Radiologic and microscopy images are sourced from our academic center. Summarize key imaging similarities and differences for these lesions. Provide the viewer with a list of take-home points so they will have familiarity when such lesions appear on their work queue.

TABLE OF CONTENTS/OUTLINE

1. Introduction to benign fibrous musculoskeletal lesions: what are they? 2. Lesion review, including clinical context and imaging examples, with an emphasis on MRI: Extra-abdominal fibromatosis Palmar fibromatosis Plantar fibromatosis Nodular fasciitis Fibromatosis of the tendon sheath Elastofibroma Desmoplastic fibroma 3. Key imaging similarities and differences. 4. Take-home points: what should I remember about these lesions?

MKE009-b

Various Manifestations of Giant Cell Tumor According to Clinical Courses and Anatomical Locations: What the Radiologists Should Know?

Participants

Jung Eun Lee (Presenter): Nothing to Disclose
Ji Seon Park MD, PhD: Nothing to Disclose
Kyung Nam Ryu MD, PhD: Nothing to Disclose
Sohee Yoon MD: Nothing to Disclose
So Young Park: Nothing to Disclose
Wook Jin: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1) To review of typical radiological and clinical features of GCT of bone 2) To provide atypical manifestations of GCT according to clinical aggressiveness 3) To provide atypical manifestations of GCT according to the anatomical location

TABLE OF CONTENTS/OUTLINE

1) Introduction & purpose

2) Typical radiological features and common clinical courses of GCT
   - Sample cases (x-ray, CT, MRI)
   - Differential diagnoses such as chondroblastoma, aneurysmal bone cyst, osteosarcoma (telangiectatic, giant cell-rich, fibroblastic types), clear cell chondrosarcoma, desmoplastic fibroma, and fibrous dysplasia

3) Atypical manifestations of GCT according to clinical aggressiveness
   - Recurrence / metastasis / direct invasion / malignant transformation / pregnancy-related condition

4) Atypical manifestations of GCT according to the anatomical location and their differential diagnosis
   - GCT of spine
     Differential diagnosis from chordoma, lymphoma, or metastasis
   - GCT of short tubular bone
     Differential diagnosis from giant cell reparative granuloma or enchondroma
   - GCT with intraarticular extension
     - Pigmented villonodular synovitis / bursitis

5) Conclusion

MKE011-b

A Hard Look at Soft Tissue Tumors: A Systematic Approach to Imaging Diagnosis

Participants

Esther Bilinsky MD, MS (Presenter): Nothing to Disclose
Cornelia B. C. Wenokor MD: Nothing to Disclose

TEACHING POINTS

The imaging of soft tissue tumors is notoriously perplexing, largely owing to the significant overlap in imaging characteristics. We present a unique structured approach to the imaging evaluation of soft tissue tumors to aid in converting the often generic imaging appearance of soft tissue tumors into an appropriate differential diagnosis. Teaching points include: 1. An approach in
which emphasis is placed on categorizing tumors by MR features (ie: vascular, lipomatous, cartilaginous...) to create a structured approach in identifying lesions and devising reasonable differential considerations. The viewer is given new perspective on how these tumors may be evaluated and categorized. 2. Supplemental CT and Xrays will be provided when they can be useful for further categorization. Patient age, clinical history, location and number of lesions are integrated into the systematic approach we demonstrate to aid in arriving at the diagnosis and accurate differential considerations.

TABLE OF CONTENTS/OVERRIDE

MKE012-b
What Is That Tumor? Review of Imaging Findings of Talus Bone Tumors

Education Exhibits
Location: MK Community, Learning Center

Participants
Ji Young Jeon (Presenter): Nothing to Disclose
Hye Won Chung MD: Nothing to Disclose
Joon Seon Song: Nothing to Disclose
Sang Hoon Lee: Nothing to Disclose
Min Hee Lee MD: Nothing to Disclose
Myung Jin Shin MD: Nothing to Disclose

TEACHING POINTS
1. Bone tumors involving talus are rare and a comprehensive review integrating the imaging findings of talus tumors has not been published yet. 2. By showing various talus bone tumors, characteristic imaging features of them could be suggested.

TEACHING POINTS
Our exhibition will be composed of 4 parts: 1. Displaying 19 bone tumors of the talus collected for 11 years in our institution: detailed pathologic diagnoses in Table 1. 2. Showing other talus tumors on previously reported literatures: osteoid osteoma, osteoblastoma, intraosseous lipoma, epithelioid angiosarcoma 3. Presenting representative imaging features of talus bone tumors (1) Giant cell tumor, chondroblastoma, chondromyxoid fibroma share similar MR morphology and unlike long bones, age of the patients and tumor locations are not helpful factors for differential diagnosis among them. (2) Circumscribed tumor margin regardless of size does not necessarily mean benignancy. 4. Presenting radiographic features that might suggest clues in differentiating malignancy from benignancy (1) Benign mass is likely to have noticeable cystic area or cystic/hemorrhagic degeneration. (2) Malignant mass tends to show nearby multiplicity, extratalar soft tissue extension, or considerable increase in size on follow-up.

MKE014-b
FDG-PET/CT, CT and MR Imaging of Tenosynovial Giant Cells Tumors

Education Exhibits
Location: MK Community, Learning Center

Participants
Laurent Derde MD (Presenter): Nothing to Disclose
Samy Ammari: Nothing to Disclose
Roland Chisin MD: Nothing to Disclose
Quentin Gillebert: Nothing to Disclose
Laurence Vilcot: Nothing to Disclose
Martin Schlumberger: Nothing to Disclose
Clarisse Dromain MD: Nothing to Disclose
Frederic Courbon: Nothing to Disclose

TEACHING POINTS
- Diagnosis of the local extent of the disease (surgery): MRI and/or FDG-PET/CT - Malignant transformations - Response to targeted therapies: FDG-PET/CT

TABLE OF CONTENTS/OVERRIDE
Introduction: Tenosynovial giant cells tumors [T-GCT] are benign but locally aggressive tumours with a high recurrence rate. The main challenges are the diagnosis of the local extent of the disease, of malignant transformations and to monitor the response to targeted therapies. Teaching Points: The definitive diagnostic is based on biopsy-obtained histopathology. The main imaging features are the presence of a soft tissue mass, or hypertrophy in the synovium or bursa or tendon sheath (MRI, CT-scan or 18F-FDG-PET/CT); hemosiderin deposition (MRI); increased FDG-uptake (PET); extrinsic erosion of bone with well-defined sclerotic margins on CT-scan. MRI is the current reference-standard for the pre-operative with a pattern highly specific of hemosiderin deposition in the macrophages (low T2-signal intensity and blooming artefact with gradient-echo sequences). The differential diagnoses include synovial haemangioma and haemophilic arthropathy. Targeted therapies are responsible for a late symptomatic improvement. MRI and RECIST fail to predict the response to treatment. As a contrary, FDG-PET/CT and PERCIST are good predictor of the response.

MKE016-b
US Findings of Musculoskeletal Complications in Diabetes: Based on Patient’s Symptoms

Education Exhibits
Location: MK Community, Learning Center

Participants
Kyungham Ryu MD, PhD (Presenter): Nothing to Disclose
Minho Park MD: Nothing to Disclose
Sung Eun Ahn: Nothing to Disclose
Jieon Park MD, PhD: Nothing to Disclose
The purpose of this exhibit is: 1. To review the various MSK lesions which can be occurred in diabetic patients and be diagnosed by ultrasonography. 2. To categorize the diabetes-related MSK diseases according to patient's symptoms. 3. To illustrate and describe the US findings of the above MSK lesions.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction and purpose
2. Review of diabetes-related MSK complications - Infectious diseases (Cellulitis, pyogenic tenosynovitis, necrotizing fasciitis, septic arthritis) - Vascular disorders (Medial arteriolosclerosis, stiff arterial flow on Doppler US) - Diabetic neuropathy (Peripheral neuritis, diabetic foot Muscle infarction, muscle ischemia) - Numbness, coldness, or discomfort of hand or foot
3. Categorization of diabetes-related MSK diseases according to patient's symptoms - Cellulitis, pyogenic tenosynovitis, pyomyositis, necrotizing fasciitis, septic arthritis - Muscle infarction, muscle ischemia - Numbness, coldness, or discomfort of hand or foot - Limitation of motion or pain of joints or periarticular regions

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**MKE017-b**

**A Pictorial Review of Wrist Injuries in the Elite Golfer**

**Education Exhibits**

Location: MK Community, Learning Center

**Participants**

- Amit Kumar Bharath MBChB, FRCR (Presenter)
- Philip Robinson MBChB
- Rob Campbell MBChB
- Doug Campbell
- Roger Hawkes
- Philip O'Connor MBBS, FRCR

**TEACHING POINTS**

- This education exhibit will review the aetiology of common injuries encountered by the examining sports physician/radiologist in the elite golfer. The exhibit will include a discussion regarding the biomechanics of the golf swing and how this relates to the different osseous and soft tissue pathologies seen in the leading and trailing wrists of elite golfers.
- The imaging findings will be reviewed with a particular emphasis on ultrasound and MR. Static and dynamic ultrasound techniques will be discussed. The images are taken from elite professional golfers who sustained injuries on the European PGA tour. The wrist injuries will be classified anatomically; with radial sided, ulnar sided and dorsal wrist injuries.

**TABLE OF CONTENTS/OUTLINE**

- Introduction
- The Golf Swing biomechanics of the golf swing
- Injuries in the Professional Golfer epidemiology of wrist injuries in elite golfers
- Ulnar Sided Injuries (clinical and imaging review) ECU pathology Triangular Fibrocartilage Complex (TFCC) Injury Hamate Fracture Hypothenar Hammer Syndrome Radial Sided injuries De Quervain's Tendonitis Dorsal Injuries Dorsal rim impaction syndrome Carpal bossing Ganglia Summary

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**MKE020-b**

**Femorotibial Cartilage Lesions: Diagnostic, Classification and Treatment**

**Education Exhibits**

Location: MK Community, Learning Center

**Participants**

- Julian Francisco Forero MD
- Jorge O. Suarez MD (Presenter)
- Jaime Martinez MD
- Jorge Enrique Fuentes MD
- Sara Garcia
- Juan Guillermo Trujillo MD

**TEACHING POINTS**

- Describe classification of subchondral, chondral and osteochondral lesions, included the proposed by Bohndorf and Vellet.
- Discuss the importance of radiological assessment to guide appropriate treatment and describe the options as conservative, arthroscopic or open surgical procedures.

**TABLE OF CONTENTS/OUTLINE**

- Introduction
- MR assessment
- Pathogenesis of femorotibial cartilage lesions
- Description and classification of chondral lesions
- Treatment modalities
- Conclusions

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**MKE021-b**

**Total Ankle Arthroplasty: A Radiologic Overview**

**Education Exhibits**
Certificate of Merit

Participants
Ka Young Chun (Presenter): Nothing to Disclose
Yun Sun Choi MD, PhD: Nothing to Disclose
Minchul Kim MD: Nothing to Disclose
Hollis G. Potter MD: Research support, General Electric Company
Jin Su Kim: Nothing to Disclose
Ki Won Yang: Nothing to Disclose
Yoon Young Jung: Nothing to Disclose

TEACHING POINTS
1. To review the imaging features of total ankle arthroplasty (TAA) in the treatment of end-stage ankle arthrosis
2. To provide optimized CT and MRI protocols
3. To familiarize the participant with multimodal imaging of complicated TAA

TABLE OF CONTENTS/OUTLINE
1. Review the clinical and imaging features of TAA
2. Identify complications and failures of TAA prostheses with a minimum of a 1-year follow-up
3. Optimized CT and MRI protocols
4. Review classifications of complications: high-grade versus medium-grade
5. Description of radiologic findings (radiograph, CT, MRI, 3 phase bone scan)
   - periprosthetic osteolysis, aseptic loosening, infection, tendon tear, fracture
6. Summary

MKE022-b
Business at Hand: Arm Transplant Imaging

Participants
Fritz Hofmann MD (Presenter): Nothing to Disclose
Martin Iglesias MD: Nothing to Disclose
Veronica Espinosa: Nothing to Disclose
Juan Eugenio Cosme MD: Nothing to Disclose
Jesus Antonio Higueru-Calleja: Nothing to Disclose
Jorge Vazquez-Lamadrid MD: Nothing to Disclose
Christian Escalona-Huerta MD: Nothing to Disclose
Enrique Miguel Cruz MD: Nothing to Disclose
Jose David Dosal Banuelos MD: Nothing to Disclose

TEACHING POINTS
1. To have a better understanding and familiarized with arm transplant procedure, follow up and outcome.
2. Be aware of the importance of the diagnostic imaging modalities and current technologies for proper patient selection, as well as its utility prior, during and after intervention.
3. To address patient self image and transplant overall integration

TABLE OF CONTENTS/OUTLINE
A. Anatomy characteristics at the level of amputation as well as functioning units. B. Diagnostic Imaging methods for patient selection and prior to procedure (Rx, US, CT, MR) C. Review of the indications and contraindications of this procedure D. Diagnostic Imaging assessment in the follow-up of transplant integration and/or complications; as well as an illustrative description of a Case-based imaging findings E. Long term expectations Arm transplant imaging educational exhibit will focus on imaging characteristics for the assessment prior, during and after procedure; it is expected to help in the understanding of the reconstructive requirements and mechanisms for this composite tissue allotransplant. Patient’s body self image, as well as functionality should be assessed in a long term follow up

MKE024-b
Meniscal Allograft Transplantation: What the Radiologist Needs to Know

Participants
Hye-Larn Lee (Presenter): Nothing to Disclose
Min Hee Lee MD: Nothing to Disclose
Seong-II Bin: Nothing to Disclose
Sang Hoon Lee: Nothing to Disclose
Sun-Young Park MD: Nothing to Disclose
Hye Won Chung MD: Nothing to Disclose
Myung Jin Shin MD: Nothing to Disclose

TEACHING POINTS
1. Review the definition of meniscal allograft transplantation (MAT) and understand the surgical technique and indications.
2. Describe the normal appearance of postoperative MAT on plain radiograph and MR imaging immediately and at follow-up.
3. Recognize specific abnormal post-operative complications at immediate and serial follow-up MR imaging
4. Provide factors that may influence clinical outcomes of MAT
TABLE OF CONTENTS/OUTLINE

1. Discuss indications and patients eligibility for MAT. 2. Understand surgical technique of MAT with schematic illustration. 3. Review radiographic and MRI features of normal appearances of postoperative MAT: Bone plugs in tibia, normal knee alignment, signal intensity and partial extrusion of transplanted meniscus, focal synovitis. 4. Overview of post-operative complications of MAT at follow-up MRI: meniscal tear and progressive extrusion, progressive articular cartilage loss, post operative hematoma or fibrosis. 5. Review radiologic and clinical factors that may influence the prognosis of MAT.

MKE025-b

Partial Thickness Tears of the Anterior Cruciate Ligament (ACL): Mechanism, Biomechanics and Imaging Appearances

Education Exhibits
Location: MK Community, Learning Center

Participants
Allanah Barker MBChB, MRCS (Presenter): Nothing to Disclose
Andoni Paul Toms FRCR, PhD: Nothing to Disclose

TEACHING POINTS
The purpose of the exhibit is to: • Illustrate the spectrum of appearances of partial thickness ACL tears using pictorial examples. The ACL is a common site of injury both in the general population and in elite athletes. Use of 3T MRI imaging with its superior spatial resolution enables improved recognition of partial ACL tears. • Review the mechanisms of injury that may result in this type of tear. Tears of the different ACL bundles arise from separate and specific mechanisms of injury. • Emphasise key findings affecting patient management: Early recognition of such tears can be difficult, but familiarity with the imaging features allows accurate image interpretation.

MKE026-b

Happy Feet- A Simple Guide for the Radiological Review of Common Corrective Forefoot Surgeries

Education Exhibits
Location: MK Community, Learning Center

Participants
Elaine S. Gould MD: Nothing to Disclose
Hiten Bhaskar Patel MD: Nothing to Disclose
Kevin S. Baker MD (Presenter): Nothing to Disclose
Bernard Martin MD: Nothing to Disclose

TEACHING POINTS
After viewing this exhibit the learner should be able to: Recognize common imaging abnormalities of the forefoot and toes in adults Understand basic principles and radiological measurements important in determination of bony and soft tissue deformity Discuss common corrective surgical options based on the deformity(or deformities). Recognize imaging appearance of various commonly utilized surgical procedures.

MKE028-b

X-linked Spondyloepiphyseal Dysplasia Tarda: Clinical and Radiological Findings in Mutation Confirmed Ten Patients

Education Exhibits
Location: MK Community, Learning Center

Participants
Sun-Min Jeong (Presenter): Nothing to Disclose
Ok Hwa Kim MD, PhD: Nothing to Disclose
Tae-Joon Cho MD: Nothing to Disclose
Yumie Rhee: Nothing to Disclose
Gye-Yeon Lim MD: Nothing to Disclose
Hae Ryong Song MD, PhD: Nothing to Disclose
Dong Kyu Jin: Nothing to Disclose

TEACHING POINTS
XL-SEDT affects male only. Vertebral endplates bony elevation (hump) is characteristically observed at lumbar area. Premature degenerative osteoarthritis of the hip joints TRAPPC2 gene mutation is responsible.
Introduction: X-linked spondyloepiphyseal dysplasia tarda (XL-SEDT) is a rare skeletal dysplasia, manifested with short stature and progressive back and/or hip joint pain. Unawareness of this disease may be a significant factor for delayed diagnosis.

Materials and method: Ten patients (age range: 7-50 years) who had been undiagnosed/misdiagnosed were reassessed by an experienced radiologist in skeletal dysplasia. DNA sequencing of the TRAPPC2 gene was performed. Results: All patients were male and showed marked short stature (height in adult; 137-152 cm, < 3 p). Spine showed rectangular platyspondyly with hump-like elevations on the upper and lower endplates, predominantly the lumbar spine, rarely the thoracic spine, and not shown on the cervical spine. Pelvis showed relatively long ischiium and pubic bones, resulted in vertically oblong shape of obturator foramina. Premature degenerative osteoarthritis of the hip joint was evident after age 30 years. Conclusion: Awareness of skeletal manifestations of XL-SEDT and recommendation of molecular confirmation can enhance the proper genetic counseling and clinical management.

MKE029-b
Magnetic Resonance Imaging of Sacrum Pathology

Education Exhibits
Location: MK Community, Learning Center

Participants
- Jorge O. Suarez MD (Presenter): Nothing to Disclose
- Jaime Martinez MD: Nothing to Disclose
- Juan Andres Mora MD: Nothing to Disclose
- German Enrique Galvis MD: Nothing to Disclose
- Carolina Tramontini: Speaker, Merck KGaA Speaker, Novartis AG

TEACHING POINTS
Review magnetic resonance imaging of common sacrum pathology including congenital lesions, inflammatory bone diseases, trauma, infection, benign and malignant neoplasms and post-operative changes. Discuss the utility of MRI particularly in lesions that may be easily missed on other imaging modalities. To explain useful classifications in congenital and inflammatory diseases of the sacrum. Describe the most common sacral bone neoplasms, considering benign lesions as giant cell tumor, aneurysmal bone cyst, osteoid osteoma and malignant lesions as metastases, chordoma, myeloma and sacroiliac joint invasion by other tumours. Recognize differential diagnosis of sacral canal neoplasms that develop from lower lumbo sacral nerve roots as ependymomas, meningiomas, schwannomas, and neurofibromas.

TABLE OF CONTENTS/OUTLINE
Introduction MRI protocols Anatomy of the sacrum Congenital sacral lesions Inflammatory bone diseases Traumatic lesions Infectious lesions Benign bone tumors Malignant bone tumors Sacral canal neoplasms Post-operative Conclusions

MKE100
Calcification: Get Rid of This Rock in Your Shoe!

Education Exhibits
Location: MK Community, Learning Center

Participants
- Marianne Lepage-Saucier MD (Presenter): Nothing to Disclose
- Veronique Freire MD: Nothing to Disclose
- Thomas Moser MD: Research Consultant, Horizon Sciences & Technologies Inc

TEACHING POINTS
1. Calcium hydroxyapatite crystal deposition disease can be treated by ultrasound-guided aspiration and cortisone injection. 2. Calcifications may be seen in arthritis: chondrocalcinosis in calcium pyrophosphate dihydrate deposition disease and calcinosis in connective tissue diseases. 3. Calcifications can be differentiated from ossifications by the absence of cortical and trabecular organizations. 4. Tumoral or tumor-like calcifications are divided in focal or diffuse soft tissue calcifications and osseous calcifications.

TABLE OF CONTENTS/OUTLINE
The main objectives of this educational exhibit are: 1. To review the classification and investigation of multiple forms of calcifications in the soft tissues and bones 2. To discuss the treatment options of calcific tendinopathy Table of Contents/Outline: 1. Calcific tendinopathy a. Typical and atypical clinical presentations b. Imaging diagnosis including pitfalls c. Treatment options 2. Calcifications in arthritis a. Calcium pyrophosphate dihydrate deposition disease b. Connective tissue diseases 3. Tumoral and tumor-like soft tissue and bone calcifications a. Differentiation between calcifications and ossifications b. Soft tissue calcifications i. Focal ii. Diffuse c. Osseous calcifications

MKE101
How to Differentiate Psoriatic Arthritis from Other Inflammatory Arthritis Using Magnetic Resonance and Computed Tomography Imaging: The Use of Dynamic Contrast-Enhanced MRI Conventional and Dual-Energy CT

Education Exhibits
Location: MK Community, Learning Center

Participants
- Augusto Guimaraes Altoe (Presenter): Nothing to Disclose
- Clarissa Canella MD: Nothing to Disclose
- Silvana Machado Mendonca: Nothing to Disclose
- Pedro Henrique Rodrigues Martins MD: Nothing to Disclose
- Bruno Baptista Hassel Mendes MD: Nothing to Disclose
- Flavia Martins Costa MD: Nothing to Disclose

TEACHING POINTS
Psoriatic arthritis frequently occurs in hand and wrist joints, mostly as monoarthritis or oligoarthritis, presenting a large spectrum of clinical and imaging findings. - MRI allows the visualization of bone marrow, soft tissue, articular and enthesal...
lesions, identifying subclinical arthritis and providing useful information regarding active inflammation. New techniques such Dynamic Contrast-Enhanced MRI Conventional and Dual-energy CT can be used in the differentiation of others peripheral arthropathies.

TABLE OF CONTENTS/OUTLINE

MR and CT imaging findings of psoriatic arthritis of peripheral articulations will be illustrate and discussed: Synovitis Enthesitis Tendinitis Dactylitis and soft tissue oedema Bone erosions and bone oedema Destructive and proliferative bony changes, subluxation, and ankylosis MR and CT imaging findings of other types of peripheral inflammatory arthritis that can simulate psoriatic arthritis will also be illustrated. Potential applications Dynamic Contrast-Enhanced MRI Conventional and Dual-energy CT for differential diagnosis of psoriatic arthritis and other inflammatory arthritis will be discussed.

MKE102

Imaging Evaluation of the Hip Prosthesis: Advances and New Concepts

Education Exhibits
Location: MK Community, Learning Center

Participants
Joao Paulo Oliveira Araujo MD (Presenter): Nothing to Disclose
Fernando Mesquita Lima: Nothing to Disclose
Bruno Henrique Magalhaes Pizzolito: Nothing to Disclose
Hamilton Guidorizzi MD: Nothing to Disclose
Julio Brandao Guimaraes: Nothing to Disclose
Andre Yui Aihara Longo MD: Nothing to Disclose

TEACHING POINTS

Introduction: Total hip replacement is an option for patients with hip diseases that cause chronic discomfort and significant functional impairment as observed in advanced osteoarthritis. Most patients have a good prognosis with improvement in symptoms and physical function, however there is a risk of complications and these should be recognized. Methods: There were selected cases of monitoring patients to evaluate total hip replacement, by different imaging methods, especially by plain radiography.

TABLE OF CONTENTS/OUTLINE

Discussion: The normal appearance, with emphasis on specific anatomical landmarks and measures and possible complications were analyzed, as well as the materials of the prosthesis used. The initial evaluation of the prosthesis and its monitoring to detect subtle flaws were discussed. Conclusion: It is important that radiologists learn to recognize the good positioning of the prosthesis as well as the possible complications that can occur. Periodic monitoring with imaging is necessary to identify early evidences of prostheses failure, which can occur even in the absence of clinical symptoms.

MKE103

Imaging of Rapidly Destructive Arthropathies

Education Exhibits
Location: MK Community, Learning Center

Participants
Kimia Khalatbari Kani MD (Presenter): Nothing to Disclose
Hyojeong Mulcahy MD: Nothing to Disclose
Felix Sze-Kway Chew MD: Nothing to Disclose

TEACHING POINTS

1. Recognize rapidly destructive joint disease in a variety of clinical scenarios and formulate a differential diagnosis; 2. Describe the typical clinical and imaging features of idiopathic rapidly destructive arthropathies in the shoulder and hip joints; 3. Discuss the various theories described in the literature regarding etiology.

TABLE OF CONTENTS/OUTLINE

1. Definition of rapidly destructive arthropathy 2. Imaging, clinical presentation, evolution, and differentiating features a. septic arthritis b. neuroarthropathy c. crystal induced arthropathy d. post-traumatic synovitis e. ochronosis f. drug induced arthropathy g. amyloid arthropathy h. Sapho syndrome i. idiopathic rapidly destructive arthropathy 3. Proposed pathogenetic theories

MKE104

Magnetic Resonance Imaging in Psoriatic Arthropathy

Education Exhibits
Location: MK Community, Learning Center

Participants
Jose Antonio Narvaez MD (Presenter): Nothing to Disclose
Javier Narvaez MD: Nothing to Disclose
Javier Hernandez Ganan: Nothing to Disclose
Daniel Rodriguez Bejarano: Nothing to Disclose
Joan Miquel Nolla-Sole MD: Nothing to Disclose

TEACHING POINTS

MR imaging can detect inflammatory changes in peripheral and axial joints and entheses in PsA before the classic destructive and proliferative changes are detected on radiographs, improving the possibilities for early diagnosis and objective monitoring of the disease process. Identification of certain MR features can help to suggest a specific diagnosis of PsA in peripheral forms of the disease. Patterns of inflammation on MR imaging suggest that the different entheses are the primary target of inflammation in most of clinical forms of PsA.

TABLE OF CONTENTS/OUTLINE
Our purpose is to describe the spectrum of MR imaging findings in axial and peripheral joints and entheses in patients with Psoriatic Arthritis (PsA), emphasizing the ability of this technique to detect the inflammatory changes. Table of contents:

- Clinical key points of PsA
- Technical MR imaging considerations
- MR features:
  - Inflammatory changes: Enthesitis: major entheses, joint entheses
  - Bone edema: subchondral, periarticular, diaphyseal
  - Synovitis/tenosynovitis: Widespread, extracapsular soft-tissue edema
  - Destructive/proliferative changes
- MR imaging in the differential diagnosis of PsA
- Current role of MR imaging in PsA

**MKE106**

**Oh, My Aching Back! A Review of Spinal Arthropathies**

*Education Exhibits*

*Location: MK Community, Learning Center*

*Selected for RadioGraphics*

**Participants**

- Kimberly Ruth Gardner MD (Presenter): Nothing to Disclose
- Elana Beth Smith MD: Nothing to Disclose
- Adam C. Zoga MD: Nothing to Disclose

**TEACHING POINTS**

1. Review the differences between syndesmophytes and osteophytes
2. Demonstrate the spectrum of imaging features of spinal arthropathies and imaging features that can be used to differentiate these entities from one another
3. Understand the pathophysiology and clinical course of each type of spinal arthropathy

**TABLE OF CONTENTS/OUTLINE**

Pertinent anatomy of the spine will be reviewed. The pathophysiology and clinical course of each type of arthropathy will be discussed with imaging findings demonstrated on radiographs and cross-sectional imaging. The disease entities to be discussed will include the following:

I. Degenerative:
   - a. Spondylosis Deformans
   - b. Modic Changes
   - c. Degenerative Disk Disease
   - d. Diffuse Idiopathic Skeletal Hyperostosis
   - e. Ossification of the Posterior Longitudinal Ligament
II. Erosive:
   - a. Rheumatoid Arthritis
   - b. Psoriatic Arthritis
   - c. Ankylosing Spondylitis
III. Crystal Deposition Disease:
   - a. CPPD Arthropathy
   - b. Gout
IV. Pediatric:
   - a. Juvenile Idiopathic Arthritis
   - b. Scheuermann Disease

**MKE107**

**Search under the Cartilage: A Gamut of Subchondral Lesions**

*Education Exhibits*

*Location: MK Community, Learning Center*

*Participants*

- Shiri Farhana MBBS (Presenter): Nothing to Disclose
- Masataka Uetani MD: Nothing to Disclose
- Rafael Mursalin MBBS: Nothing to Disclose
- Tetsuji Yamaguchi MD: Nothing to Disclose

**TEACHING POINTS**

1. The abnormalities in articular cartilage and subchondral bone are closely related to each other and should be regarded as a single unit in various disorders.
2. Subchondral bone marrow edema is a nonspecific finding, but it can be a major prognostic factor of articular damage.
3. Characteristic imaging findings and differential diagnosis in various subchondral lesions are presented.

**TABLE OF CONTENTS/OUTLINE**

1. Anatomy of subchondral bone
   - a. Subchondral trabecular bone structure on high resolution CT and MRI (Fig.1)
   - b. Normal and variations of subchondral bone structure on MRI
2. Physiological relationship of cartilage and subchondral bone
3. Pathological conditions of subchondral bone (Fig 2-5):
   - a. Subchondral fracture
   - b. Subchondral insufficiency fracture
   - c. Transient bone marrow edema syndrome
   - d. Osteonecrosis
   - e. Osteochondritis dissecans
   - f. Various articular diseases (e.g. rheumatoid arthritis, osteoarthritis)
   - g. Tumors or tumor-like lesions (e.g. giant cell tumor, chondroblastoma)

**MKE110**

**Anatomic Correlation of Forearm Nerve Ultrasound Anatomy at Sites of Entrapment in the Forearm**

*Education Exhibits*

*Location: MK Community, Learning Center*

*Participants*

- Kevin McGill MD, MPH (Presenter): Nothing to Disclose
- Bisher Tarabishy MD: Nothing to Disclose

**TEACHING POINTS**

1) Peripheral nerve compression syndromes are a common ailment
2) The most common causes of peripheral neuropathy involve the median, ulnar, and radial nerves
3) Ultrasound is useful in diagnosing peripheral neuropathy
4) Ultrasound can also
TABLE OF CONTENTS/OUTLINE
1) Gross anatomy of the median, ulnar, and radial nerves in the forearm 2) Ultrasound anatomy of the median, ulnar, and radial nerves in the forearm 3) Correlation of ultrasound anatomy with subsequent cadaver dissection 4) Evaluation of sites of peripheral nerve entrapment in the forearm

MKE113
Flick of the Wrist and You Are Done: Systematic Approach to the Radiographic Interpretation of the Wrist to Avoid Common Diagnostic Errors

Education Exhibits
Location: MK Community, Learning Center

Participants
Matthew R. Minor MD (Presenter): Nothing to Disclose
Liem Thanh Mansfield MD : Nothing to Disclose
Bradley John Carra MD : Nothing to Disclose

TEACHING POINTS
Systematic checklist approach to the evaluation of wrist radiographs ensures detection of common and uncommon diagnoses.
Evaluation of the carpal arcs helps to detect subtle cases of carpal dislocations.
Understanding the concept of carpal arcs of injuries enables the radiologist to detect the combination of injuries that is common in wrist trauma.

TABLE OF CONTENTS/OUTLINE

MKE115
Imaging of Chronic Wrist Pain

Education Exhibits
Location: MK Community, Learning Center

Participants
Feng Poh MBBS, FRCR (Presenter): Nothing to Disclose
Mon Ben Chow MD : Nothing to Disclose

TEACHING POINTS
1. To acquaint the reader with the selection of the appropriate imaging modality (including radiography, MRI, CT and ultrasound) in the evaluation of patients with chronic wrist pain based on the clinical scenario. 2. To discuss the etiologies in chronic wrist pain and their imaging features. 3. To describe a differential-based imaging approach in wrist pain and swelling with the use of case examples. 4. Brief discussion of the expanding role of advanced wrist imaging in inflammatory arthritides.

TABLE OF CONTENTS/OUTLINE

MKE116
Injuries of Dorsal Soft Tissues and Extensor Hood at the Metacarpophalangeal Joint in Closed Traumatism: Ultrasound and MR Imaging Evaluation with a Multilayer Approach

Education Exhibits
Location: MK Community, Learning Center

Participants
sonia hammoud (Presenter): Nothing to Disclose
Raphael Campagna MD : Nothing to Disclose
Julien Rousseau : Nothing to Disclose
Eric Georges Pessis MD : Nothing to Disclose
Henri Guerini MD : Nothing to Disclose
Jean-Luc Drape MD, PhD : Nothing to Disclose

TEACHING POINTS
Ultrasound and MRI are able to assess the anatomy of dorsal soft tissues and extensor hood at the metacarpophalangeal joint.
A theoretical superficial to deep multilayer approach is used to recognize each structure - US and/or MRI must be performed after a closed traumatism with normal XRay images - Dynamic evaluation with ultrasound can depict instabilities - Early depiction of injuries can change the treatment

**TABLE OF CONTENTS/OUTLINE**

1. Introduction / normal appearance with a multilayer approach 2. Static and dynamic imaging of dorsal soft tissues injuries at the metacarpophalangeal joint with a multilayer approach: i) Dorsal metacarpophalangeal bursitis ii) Tears of sagittal bands iii) Tears of intertendinous fibrous splits (of the V and II) iv) Tears of intertendinous connections (juncturae tendinum of the second, third and fourth intermetacarpal space) v) Capsular lesions 3. Conclusion

**MKE117**

**Injuries of Hand and Wrist Tendons on MR Imaging**

*Education Exhibits*

*Location: MK Community, Learning Center*

Certificate of Merit

**Participants**

- Pushpender Gupta MBBS (Presenter): Nothing to Disclose
- Bahram Kiani MD: Nothing to Disclose
- Leon Lenchik MD: Nothing to Disclose
- Scott David Wuertzer MD, MS: Nothing to Disclose

**TEACHING POINTS**

1. Injuries to the tendons of the hand and wrist may result from acute or chronic repetitive trauma. 2. MR imaging allows comprehensive evaluation of the tendons. 3. Familiarity with MR anatomy and appearance of various tendon injuries is essential for accurate diagnosis.

**TABLE OF CONTENTS/OUTLINE**


**MKE118**

**Instability of the Elbow: Spectrum of Imaging Findings**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Joao Paulo Oliveira Araujo MD (Presenter): Nothing to Disclose
- Fernando Mesquita Lima: Nothing to Disclose
- Douglas Leal: Nothing to Disclose
- Hamilton Guiderizzi MD: Nothing to Disclose
- Julio Brandao Guimaraes: Nothing to Disclose
- Andre Yui Alhara MD: Nothing to Disclose
- Carlos Henrique Longo MD: Nothing to Disclose

**TEACHING POINTS**

Objective.: The purpose of this presentation is to understand the biomechanics of the elbow joint and review the spectrum of imaging findings in instability. Technical overview The work will focus on evaluation of the elbow by magnetic resonance imaging.

**TABLE OF CONTENTS/OUTLINE**

Discussion: The instability of the elbow has been recognized as a spectrum ranging from a small lesion to frank dislocation. Between these two extremes, the more subtle instability is posterolateral rotatory instability of elbow, which can cause functional impairment, but can be detected accurately only by radiographic study. Lesions of fibrous capsule and ligaments of the elbow usually progress in rotational direction from lateral to medial. Consequently, the dislocation occurs in the final stage of instability of the elbow with the coronoid process being located behind of the humerus. We will demonstrate the key imaging features of elbow instability, particularly when evaluated by MRI. Conclusion: The knowledge of the various imaging findings of elbow instability may allow precise recognition of soft tissue injuries and bone structures, thereby assisting in patient treatment and surgical planning.

**MKE120**

**Radiological Imaging of Congenital Hand Anomalies - 6yr Single Centre Experience and What the Hand Surgeons Want to Know**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Emma Gerety MBCh, PhD (Presenter): Nothing to Disclose
- Ian Grant: Nothing to Disclose
- Melanie Ann Hopper MBCh, FRCR: Nothing to Disclose

**TEACHING POINTS**

By viewing this exhibit, the learner will:

1. Appreciate the importance of congenital hand anomalies which, although rare, present a unique physical and emotional
challenge for children and their parents.
2. Gain a basic understanding of the normal development of the upper limb and what goes wrong to cause hand anomalies.
3. Understand which congenital hand anomalies are most commonly imaged.
4. Appreciate the classification systems and important imaging issues for the more common congenital hand anomalies.

**TABLE OF CONTENTS/OUTLINE**

Introduction to congenital hand anomalies - normal development of the upper limb - genetic pathways involved in limb development - results of disruption of upper limb development Common congenital hand anomalies imaged at our centre and useful classification systems - thumb duplication - syndactyly - thumb hypoplasia and longitudinal arrest - transverse arrest - epiphyseal abnormality Syndromes including congenital hand anomalies Timing of imaging of congenital hand anomalies

**MKE121**

**Soft Tissue Tumours and Tumour-like Lesions of the Hand and Wrist: A Pictorial Review**

**Education Exhibits**

**Location:** MK Community, Learning Center

**Participants**

Lee Lian Chew MBBS (Presenter): Nothing to Disclose
Rupak Dutta FRCR: Nothing to Disclose
Ankit Anil Tandon FRCR: Nothing to Disclose
Krishna Mohan Gummalla DMRD: Nothing to Disclose
Matthew George FRCR, MMed: Nothing to Disclose

**TEACHING POINTS**

The aim of this educational exhibit is: 1. To describe MR appearance of common soft tissue tumours and tumour-like lesions of the hand and wrist. 2. To identify features on MR imaging to help differentiate benign from malignant lesions. 3. To formulate differential diagnosis based on anatomical location and MR appearance.

**TABLE OF CONTENTS/OUTLINE**

1. Background
2. Approach to masses based on anatomic location
3. Review of imaging findings - ganglion - epidermal cyst - giant cell tumor of the tendon sheath (GCTTS) - Fibromatosis - Dupuytren's contracture - lipoma - fibrolipomatous hamartoma - benign peripheral nerve sheath tumours (PNST) - haemangioma/vascular malformation - aneurysm - glomus tumour - desmoplastic fibroma - malignant masses (e.g. bone metastasis, fibrosarcoma) - pseudomasses (synovial pathology e.g. tenosynovitis) - soft tissue infections - traumatic (haematoma) - Accessory muscles
4. Conclusion

**MKE122**

**The Luckless Lunate: Pre- and Postoperative Imaging of Kienbock Disease**

**Education Exhibits**

**Location:** MK Community, Learning Center

**Participants**

Erika Nealey MD (Presenter): Nothing to Disclose
Jonelle Marie Petscavage-Thomas MD, MPH: Consultant, Medical Metrics, Inc
Felix Sze-Kway Chew MD: Nothing to Disclose
Alice S. Ha MD: Nothing to Disclose

**TEACHING POINTS**

Kienbock disease, or avascular necrosis of the lunate, is a progressive disease ultimately resulting in collapse, fragmentation, and end-stage arthrosis of the lunate. Symptoms include chronic pain, decreased wrist range of motion, and decreased grip strength. A recent systematic review of various surgical treatments of Kienbock disease showed none with a superior outcome; as such, different treatments remain in current clinical use. This educational exhibit is designed to describe the pre- and post-operative imaging appearances of Kienbock disease, beginning with anatomic antecedents, pathophysiology, stages of disease progression correlated with surgical treatments, normal and abnormal postoperative appearances, and appropriate use of imaging.

**TABLE OF CONTENTS/OUTLINE**

1.) Anatomic antecedents
2.) Pathophysiology
3.) Osteonecrosis (Stage 1) - Treatment - casting
4.) Sclerosis (Stage 2) - Treatment in setting of ulnar negative variance -- Pedicled bone graft -- Radial osteotomy -- Capitate shortening
5.) Collapse and Fragmentation (Stage 3) - Treatment -- Intercarpal arthrodesis -- Lunate excision -- Proximal row carpectomy
6.) End-Stage Arthrosis (Stage 4) - Treatment -- Proximal row carpectomy -- Carpal arthrodesis

**MKE123**

**The TFCC - An Illustrated Review of Its Anatomy and Injury Patterns Based on the Palmer Classification**

**Education Exhibits**

**Location:** MK Community, Learning Center

**Participants**

Matthew Raymond Skalski DC (Presenter): Nothing to Disclose
Dakshesh Bhulabhai Patel MD: Nothing to Disclose
George Robert Matcuk MD: Nothing to Disclose
Aaron Schein MD: Nothing to Disclose
DEBORAH M. FORRESTER MD: Nothing to Disclose
Hector Riverameo BS: Nothing to Disclose

TEACHING POINTS
The purpose of this presentation is to provide the viewer with: 1. A comprehensive review of the complex anatomy of the TFCC
2. An understanding of potential pitfalls in the accurate diagnosis of TFCC tears. A review of the pattern of TFCC tears as
described by the Palmer classification using original illustrations and example cases.

TABLE OF CONTENTS/OUTLINE
Anatomy of the TFCC - Gross and sectional illustrations of anatomy, including ligamentous attachments Tear mimics -Normal
recesses - Ligamentum subcruentum - Hyaline cartilage interface - Normal variations - Patient positioning Palmer Classification
Class 1 - traumatic - Type A - Type B - Type C - Type D Class 2 - degenerative (ulnocarpal abutment syndrome) - Type A - Type B
- Type C - Type D - Type E

MKE124
What's Goin' on in the Guyon's Canal?

Education Exhibits
Location: MK Community, Learning Center

Participants
Naveen Vasireddy MBBS, FRCR (Presenter): Nothing to Disclose
Syahmain Suut MBChB, FRCP: Nothing to Disclose
Mohammad Waseem: Nothing to Disclose
Jochen Fischer: Nothing to Disclose
Suresh Babu Amilineni Venkat MBBS, MD: Nothing to Disclose
Kelvin Choi MBChB: Nothing to Disclose
Rashpal Bassi: Nothing to Disclose

TEACHING POINTS
Introduction: The Guyon's canal is a 4cm long fibroosseous tunnel which extends from palmar carpal ligament along the proximal
pisiform bone edge to the aponeurotic arch of the hypothenar muscles. The tunnel of Guyon is clinically significant because of
its contents, the ulnar artery, ulnar nerve, accompanying veins and fat. Lesions arising from these structures within the canal
and pathology along the margins of the canal can lead to compression of the ulnar nerve. The second most common site for
ulnar nerve entrapment after elbow, however, diagnosis of ulnar nerve compression in the Guyon's canal is often delayed
Teaching points: Our pictorial review aims to raise awareness of ulnar nerve compression in Guyon's canal. Our case-mix includes
pathology from fat, nerve and vascular origins ensuring that the reader is exposed to the whole gamut. Our cases include an
interesting collection of intrinsic and extrinsic pathologies involving Guyon's canal.

TABLE OF CONTENTS/OUTLINE
The cases are: Neurofibroma, Haemangioepithelioma, Lipoma, Ganglion cyst, Hook of hamate fracture. A brief discussion of these
cases including clinical presentation, diagnostic pathway, review of current literature and characteristic imaging findings of
Guyon's canal pathology as well as normal anatomy are included.

MKE125
Assessment Chronic Recurrent Multifocal Osteomyelitis (CRMO) Using Conventional MRI and
dWI: Usual and Unusual Presentations

Education Exhibits
Location: MK Community, Learning Center

Participants
Flavia Martins Costa MD (Presenter): Nothing to Disclose
Clarissa Canella MD: Nothing to Disclose
Augusto Guimaraes Alcose: Nothing to Disclose
Silvana Machado Mendonca: Nothing to Disclose
Pedro Henrique Rodrigues Martins MD: Nothing to Disclose
Jerece Lins Aymore: Nothing to Disclose

TEACHING POINTS
The purpose is to describe conventional (MR) imaging appearance of usual and unusual forms of CRMO and assess the role of
DWI and whole-body DWI in the diagnosis of disease, assessment in differential diagnosis, following treatment and correlation with
clinical findings and laboratory data. Chronic recurrent multifocal osteomyelitis (CRMO) is a non-infectious inflammatory bone
disease of unknown origin and can be a challenging diagnosis. Conventional MRI, together with DWI and WB-DWI MRI may
contribute to the diagnosis and facilitate the follow-up of children with CRMO. This non-invasive, non-irradiating procedure will
also allow depicting more precisely the natural history of bone and extra-osseous lesions in CRMO, can improve the diagnostic
accuracy and assessment follow up treatment management.

TABLE OF CONTENTS/OUTLINE
1-To illustrate with conventional MRI, and correlate with DWI and WB-DWI images the usual and unusual forms of CRMO; 2-To
illustrate the differential diagnosis (osteomyelitis, ewing sarcoma, leukemia, lymphoma, rhabdomyosarcoma, metastasis) with
DWI and conventional images; 3-To correlate with radiologic and histopathologic findings; 4-The usefulness of these sequences
in follow-up treatment management.

MKE126
Bug vs. Host Disease: Musculoskeletal Infections and Mimickers in Vulnerable Patient
Populations

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit
Participants
Christopher E. Kim MD (Presenter): Nothing to Disclose
Tetyana A. Gorbachova MD: Nothing to Disclose
Charles B. Mulhern MD: Nothing to Disclose

TEACHING POINTS
• To present a multimodality review of the spectrum of musculoskeletal infections unique to patients with diabetes, end-stage renal disease, and otherwise immunocompromised states as well as post-arthroplasty patients. • To highlight key imaging features distinguishing population-specific manifestations of musculoskeletal infection as well as non-infectious mimickers. • To provide insight into these population-specific considerations while reinforcing the basic radiographic principles of musculoskeletal infection.

TABLE OF CONTENTS/OUTLINE

MKE127
Differentiating Benign versus Pathological Vertebral Compression Fractures in the Osteoporotic Spines: Causes and Concerns

Education Exhibits
Location: MK Community, Learning Center

Participants
Rupak Dutta FRCR (Presenter): Nothing to Disclose
Vasu Keshav Sharma MBBS, FRCR: Nothing to Disclose
Krishna Mohan Gummalia DMRD: Nothing to Disclose
Matthew George FRCR, MMed: Nothing to Disclose

TEACHING POINTS
Objectives: 1. Identifying benign from pathological fractures based on morphology. 2. DWI has high sensitivity with high PPV. 3. Signal intensity ratio (SIR) of STIR with in/opposed phase.

TABLE OF CONTENTS/OUTLINE
Ascertaining the cause of vertebral collapse in patients with no known malignancy is of paramount importance since it is a predictor of prognosis and outcome. Osteoporotic compression may be indistinguishable from malignant collapse. Vertebral fractures may be detected on radiographs, CT or nucleotide studies but so often is unable to distinguish between benign versus malignant collapse. A retrospective of the MRI spines with acute vertebral collapse from 2008 to 2013. MR features of malignant vertebral collapse includes multiple vertebral involvement, signal intensity, Gad enhancement, posterior cortex margins, paraspinal soft tissues, posterior element, DWI/ADC, Chemical shift (dual echo). MRI has a sensitivity of 100 % and specificity of 64 %. DWI has 92% sensitivity, 90% specificity and 85% accuracy in differentiating benign from malignant. PPV and NPV values of approx 78 and 90 % respectively. Close follow up/ PET scan and also bone biopsy had to be resorted to in the remaining patients with indeterminate causes.

MKE129
Side Effects of Drugs on Musculoskeletal System

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit

Participants
Julia Calatayud MD (Presenter): Nothing to Disclose
Maria Andreu Ruiz De Gopegui MD: Nothing to Disclose
Diana Exposito MD: Nothing to Disclose
Diego Pereira Boo: Nothing to Disclose
Beatriz Alvarez De Sierra Garcia MD: Nothing to Disclose
Javier Sanchez Hernandez: Nothing to Disclose

TEACHING POINTS
To provide an overview of the more frequent drug-induced musculoskeletal disorders. To illustrate the radiological findings of these effects by radiological techniques: Conventional radiology, computed tomography (CT) and Magnetic Resonance (MR).

TABLE OF CONTENTS/OUTLINE
Some drugs can have adverse effects on musculoskeletal system. Nowadays, the increasing use of a wide variety of drugs with side effects requires a thorough understanding by radiologist and the right approach in evaluating imaging techniques to detect these alterations. We reviewed the pathologic findings induced musculoskeletal drugs in our hospital in the last year. We reviewed the clinical and demographic data and have characterized these findings agree with bone, muscle and tendon manifestations mainly. Abnormalities such as insufficiency fractures induced by bisphosphonates, tendinopathy and myopathy induced by statins or quinolones, osteoporosis and avascular osteonecrosis caused by corticosteroids will be presented, evaluating the radiological findings with appropriate methods of image (RX, CT and RM). The adverse effects on musculoskeletal system are common and often undiagnosed. Familiarity with these commonly encountered side effects leads to a more accurate and precise diagnosis and is essential for proper clinical management.
The Use of Whole-body MR Imaging in Rheumatic Diseases

Education Exhibits
Location: Mk Community, Learning Center

Participants
Augusto Guimaraes Altoe (Presenter): Nothing to Disclose
Clariisa Canella MD : Nothing to Disclose
Silvana Machado Mendonca : Nothing to Disclose
Flavia Martins Costa MD : Nothing to Disclose
Pedro Henrique Rodrigues Martins MD : Nothing to Disclose
Evandro Miguelote : Nothing to Disclose

TEACHING POINTS
The purpose of this article is: - To demonstrate the usefulness of whole-body MR imaging in patients with autoimmune and inflammatory systemic disorders, as chronic recurrent multifocal osteomyelitis (CRMO), inflammatory miophaties, spondyloarthritis, helping the diagnosis, specially in multifocal and non symptomatic disease. - To describe imaging protocols, interpretation of imaging findings and initial experience with whole-body MR imaging in the evaluation of some rheumatic diseases. Also, the correlation with disease activity and some differential diagnosis will be discussed.

TABLE OF CONTENTS/OUTLINE
A. To illustate the usefulness whole-body MR imaging in patients with autoimmune and inflammatory systemic disorders B. To correlate whole-body MR imaging and clinical findings, predicting disease activity.

MKE131
Unusual Forms of Presentation of Tuberculous Vertebral Osteomyelitis

Education Exhibits
Location: Mk Community, Learning Center

Participants
Pilar Marquez-Sanchez (Presenter): Nothing to Disclose
Torcuato Garcia de la Oliva MD : Nothing to Disclose
Juan de Dios Colmenero-Castillo MD, PhD : Nothing to Disclose
Juan Diego Ruiz-Mesa : Nothing to Disclose

TEACHING POINTS
The aim of this exhibit are: -To show unusual form of presentation of tuberculous vertebral osteomyelitis (TVO) as seen with CT and MRI. -To know the manifestations of this disorder to avoid underdiagnosis, leading to the possible development of complications.

TABLE OF CONTENTS/OUTLINE
- To remember the normal presentation of TVO. -In some patients, the form of presentation of TVO is often atypical. We want to show several examples of TVO with unusual locations and manifestations. • TVO infection confined to one vertebral body. • Multiple spinal lesions. • The cervical spine is often involved. • Lytic and sclerotic changes. • Involvement of the posterior elements of the vertebrae. • Exceptionally large abscess formation with calcification in the wall and fistulization. • Lack of involvement of the intervertebral disc.

MKE133
Association of a Thickened Suprapatellar Plica with Quadricipital Fat Pad Edema on Magnetic Resonance Imaging of the Knee

Education Exhibits
Location: Mk Community, Learning Center

Participants
Daniel Zimmermann Stefani MD : Nothing to Disclose
Luciano Lerch Hoffmann MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. To describe the anatomy of the fat pads and plicae of the knee 2. To review current concepts about the pathophysiology of the quadricipital fat pad edema and plicae diseases 3. To demonstrate MRI findings of quadricipital fat pad edema and plicae diseases 4. To discuss the association of a thickened suprapattelar plica and quadricipital fat pad edema and the clinical significance of these findings

TABLE OF CONTENTS/OUTLINE
Anatomy of the fat pads and plicae of the knee Current concepts about quadricipital fat pad edema and plicae diseases Review of the MRI findings of: - Quadricipital fat pad edema - Plicae diseases, focusing on the suprapatellar plica Relationship of a thickened suprapatellar plicae and quadricipital fat pad edema

MKE134
Clinical Utility of CT in the Identification of Normal and Abnormal Anatomy of the Knee: Spectrum of Knee Pathology Identifiable on Dual Energy CT Scans

Education Exhibits
Location: Mk Community, Learning Center

Certificate of Merit
Participants
Shamir Rai BSC (Presenter): Nothing to Disclose
Patrick McLaughlin FFR(RCSI): Nothing to Disclose
Savvas Nicolau MD: Nothing to Disclose

TEACHING POINTS
1) Discuss scope, clinical presentation and rationale for screening of knee pathology, with a focus on dual energy CT, and illustrate with imaging examples with MRI correlation
2) Review the utility of imaging in management and diagnosis of knee pathology
3) Review novel imaging techniques for maximizing the identification of normal anatomy and pathology of the knee using CT

TABLE OF CONTENTS/OUTLINE
- Review the pathophysiology, epidemiology and clinical presentation of knee injuries
- Review the normal anatomy and important landmarks of the knee and supporting structures on CT and MRI
- Review the utility and limitations of imaging modalities used for the assessment of knee anatomy and pathology
- Demonstrate the spectrum knee injuries using imaging examples, including bone marrow edema, urate deposition, meniscal pathology, ligamentous pathology, and bony/cartilaginous pathology
- Discuss an imaging-based management algorithm for identification of knee pathology
- Discuss new imaging techniques and technology applicable for maximizing the identification of normal anatomy and pathology of the knee on CT
**Participants**
Georges Hayek (Presenter): Nothing to Disclose
Guillaume Mercy: Nothing to Disclose
Audrey Massein: Nothing to Disclose
Jerome Renoux MD: Nothing to Disclose
Delphine Zeitoun MD: Nothing to Disclose
Aziza Absi-Yaic MD: Nothing to Disclose
Jean-Louis Brasseur: Nothing to Disclose
Philippe A. Grenier MD: Nothing to Disclose

**TEACHING POINTS**
1- To know the anatomy of the infrapatellar fat pad of Hoffa.
2- To know the different aspects on imaging of the normal infrapatellar fat pad of Hoffa.
3- To know the main diseases that can affect the infrapatellar fat pad of Hoffa and their main imaging features.

**TABLE OF CONTENTS/OUTLINE**
1 - Normal anatomy of the infrapatellar fat pad of Hoffa.
2 - Normal imaging aspects of the infrapatellar fat pad of Hoffa.
   a- Radiography
   b- Ultrasonography
   c- CT-scan
   d- MRI
3 - Main diseases:
   a- Mass syndrome
   i. Ganglion cyst
   ii. Meniscal cyst
   iii. Nodular synovitis
   iv. Metastasis
   v. Primary tumor
   vi. Fibrotic lesions
   vii. Postarthroscopy or postsurgery fibrosis
   viii. Cyclops lesions
   ix. Hemangioma
2 - Infiltration
   a- Femoropatellar friction syndrome
   b- Infrapatellar plicae
   c- Hoffa disease
   d- Infiltration near a fracture
   e- Septic, inflammatory or microcrystalline arthritis
   f- Tendinopathy or enthesopathy of the patellar ligament

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**Kinesiology of Knee Fat Pads - Normal Fat Pads Movements as Observed during Dynamic Ultrasound Examination**

**Education Exhibits**

**Participants**
Waqar Aslam Bhatti MBCh (Presenter): Nothing to Disclose
Gulraiz Sarfaraz Ahmad MBChB: Nothing to Disclose
Shahrukh Raees Ahmad: Nothing to Disclose
Jawad Naqvi BSC, MBBS: Nothing to Disclose
Reda Braham Chaouch MD: Nothing to Disclose
Muhammad Mubashar MBBS, FRCR: Nothing to Disclose

**TEACHING POINTS**
To review the anatomy, function, and normal dynamics of the knee fat pads during extension and flexion of the knee. To discuss the factors which disturb the normal dynamics and lead to the differing “fat pad impingement syndromes”.

**TABLE OF CONTENTS/OUTLINE**
A. Anatomy and function of the knee fat pads.
B. Technique and tips or the assessment of fat pads.
C. Normal dynamics of the superior and lower portions of the Hoffa’s fat and complex interplay between the Quadriceps and the pre-femoral fat pad.
D. Factors contributing to abnormal dynamics and the Fat pad impingement syndrome.
E. Percutaneous management

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**Magnetic Resonance Imaging of Anterior Cruciate Ligament Reconstruction**

**Education Exhibits**

**Participants**
Giuseppe Peritore MD (Presenter): Nothing to Disclose
Raffaello Sutera MD, PhD: Nothing to Disclose
Domenico Messana: Nothing to Disclose
Angelo Ivone MD: Nothing to Disclose
Massimo Midiri MD: Nothing to Disclose

**TEACHING POINTS**
To review the MRI imaging appearances of intact anterior cruciate ligament (ACL) graft and describe the assessment of impingement and postoperative complications.

**TABLE OF CONTENTS/OUTLINE**
Traditional ACL reconstruction is performed with autograft; disadvantages of this technique are donor site morbidity and a long rehabilitation period. Allograft tendons are reported to have excellent clinical results, but these grafts bring the risk of infection. The most common indications for evaluating ACL reconstructions with MR imaging include: 1) Failure of ACL reconstruction to stabilize the knee; 2) postoperative re-injury to the knee; 3) postoperative stiffness especially extension loss (flexion contracture); 4) preparation for revision of a failed ACL reconstruction. MRI is a non-invasive method for assessment of these problems. Because it allows direct visualization of the graft, as well as the fixation devices, tibial and femoral tunnels or bioabsorbable cross pins. MRI shows if the bone tunnels are proper positioned. At long-term follow-up MRI can detect intrasubstance ACL graft signal changes that represent a pathologic finding indicative of possible graft impingement, degeneration or partial tearing.
Meniscal Flap Tears and Flipped Fragments: Clues to Diagnosis, Where to Find Them, and Pitfalls in Diagnosis

**Education Exhibits**
Location: MK Community, Learning Center

**Participants**
- Anthony Dennis Mohabir MD (Presenter): Nothing to Disclose
- Helise Robyn CooperSmith MD: Nothing to Disclose
- Daniel M. Walz MD: Nothing to Disclose
- John S. O'Donnell MD: Nothing to Disclose
- Jarett Burak MD: Nothing to Disclose
- Michael Brown MD: Nothing to Disclose

**TEACHING POINTS**
1. Medial and lateral meniscal tears with flaps and flipped fragments are quite common and should be recognized by the radiologist.
2. Meniscal flaps and flipped fragments are usually found in one or more of several common locations. These locations should be part of the radiologist's search pattern when a meniscal tear is recognized.
3. There are several anatomic structures adjacent to the medial and lateral menisci that can be mistaken for displaced meniscal tissue.
4. There are important clinical implications to identifying meniscal flap tears.

**TABLE OF CONTENTS/OUTLINE**
- Meniscal Anatomy Overview and Overview of Potential Locations for Displaced Meniscal Tissue
- Clinical Cues to Displaced Meniscal Injury
- Imaging Clues to Displaced Meniscal Injury
- Displaced Meniscal Injury Examples (Flap Tears/Flipped Meniscal Tissue, Bucket Handle Tears, and Free Fragments in Common and Uncommon locations)
- Pitfalls in Diagnosing Displaced Meniscal Tissue
- Clinical Implications and Treatment Issues

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MKE143

MRI Evaluation of Anatomic Variations of Menisci and Perimeniscal Ligaments Anatomy and Potential Related Pitfalls

**Education Exhibits**
Location: MK Community, Learning Center

**Participants**
- Marcelo Novelino Simao MD, PhD (Presenter): Nothing to Disclose
- Marcello Henrique Nogueira-Barbosa MD, PhD: Nothing to Disclose

**TEACHING POINTS**
- Improve knowledge of meniscal anatomical variants and normal anatomy of perimeniscal ligaments; Contribute to accurate interpretation of menisci tears and avoid potential pitfalls;

**TABLE OF CONTENTS/OUTLINE**

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MKE144

Peri-patellar Fat Impingement: Anatomy, Imaging and Significance

**Education Exhibits**
Location: MK Community, Learning Center

**Participants**
- Luis Enrique Diaz MD (Presenter): Nothing to Disclose
- William F. Arndt MD: Nothing to Disclose
- Ajay R. Goud MD: Nothing to Disclose
- Frank W. Roemer MD: Chief Medical Officer, Boston Imaging Core Lab LLC Research Director, Boston Imaging Core Lab LLC Shareholder, Boston Imaging Core Lab LLC
- Ali Guermazi MD, PhD: President, Boston Imaging Core Lab, LLC Research Consultant, Merck KgaA Research Consultant, Sanofi-Aventis Group Research Consultant, TissueGene, Inc

**TEACHING POINTS**
1. Review of anterior knee fat pads imaging anatomy
2. Description, imaging diagnosis, differential diagnosis and therapeutic relevance of fat pad impingement syndromes

**TABLE OF CONTENTS/OUTLINE**
- 1. Imaging anatomy of peripatellar fat pads and associated structures
- 2. Description of knee fat pad impingement syndromes and their clinical implications • Suprapatellar fat impingement • Prefemoral fat impingement • Infrapatellar fat impingement
- 3. Imaging review of fat impingement syndromes of the anterior knee
- 4. Discussion of differential diagnosis
- 5. Therapeutic implications
The Infrapatellar Fat Pad of Hoffa: A Comprehensive Pictorial Review of Intrinsic and Extrinsic Pathology

Education Exhibits
Location: MK Community, Learning Center

Participants
Patrick Kobes DO (Presenter): Nothing to Disclose
Anthony Dennis Mohabir MD : Nothing to Disclose
Michael Brown MD : Nothing to Disclose
Daniel M. Walz MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the anatomy on MR imaging of the infrapatellar fat pad of Hoffa, as well as the adjacent structures. 2. To provide a pictorial review of the intrinsic and extrinsic pathology of Hoffa's fat pad.

TABLE OF CONTENTS/OUTLINE
1. Anatomy of Hoffa's fat pad and adjacent structures

The Spectrum of Tibial Plateau Fractures

Education Exhibits
Location: MK Community, Learning Center

Participants
Ricki Upendra Shah MD (Presenter): Nothing to Disclose
Mital Kishor Patel MD : Nothing to Disclose
Andrew Lee Chiang MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. Review the classification systems of Tibial plateau fractures, including the Schatzker and AO classification system 2. Discuss the mechanisms of Tibial plateau injuries. 3. Describe the imaging findings and utility of CT and MRI with an emphasis on general management principles particularly focusing on operative vs non-operative management.

TABLE OF CONTENTS/OUTLINE
1. Anatomy and Classification systems
2. Mechanisms of Injury
3. Imaging findings on radiography, CT and MRI
4. Management principles
5. Sample Cases illustrating points 1-4

Ultrasonography of the Patellar Tendon: The First-line Imaging

Education Exhibits
Location: MK Community, Learning Center

Participants
Guillaume Mercy (Presenter): Nothing to Disclose
Jean-Louis Brasseur : Nothing to Disclose
Audrey Massein : Nothing to Disclose
Philippe A. Grenier MD : Nothing to Disclose

TEACHING POINTS
The patellar tendon is the anatomical and functional extension of the quadricipital tendon. Ultrasound (US) is the first-line imaging of the patellar tendon. Advantages of US compared with MRI include better spatial resolution which helps characterize a lesion, dynamic study, easier detection of vascularity by Doppler. Direct expansions of the quadricipital tendon on the tibia explain why the retraction of a disrupted patellar tendon can be missing. The location of a microtraumatic injury depends on the weakest point of the patellar tendon, which varies according to the age. In young athletes proximal tendinosis (jumper's knee) is the most frequent condition. US can help make the difference with physiological changes of the tendon and provides crucial data if surgery is considered.

TABLE OF CONTENTS/OUTLINE
Ultrasound and MRI Evaluation of the Extensor Mechanism

Education Exhibits
Location: MK Community, Learning Center

Participants
Kara Gaetke Udager MD (Presenter): Nothing to Disclose
Corrie Mariene Yablon MD: Nothing to Disclose
Deepa R. Pai MD: Nothing to Disclose
Qian Dong MD: Nothing to Disclose
Gandikota Girish MBBS, FRCR: Nothing to Disclose
Jon A. Jacobson MD: Consultant, BioClinica, Inc; Royalties, Reed Elsevier; Equipment support, Terumo Corporation; Equipment support, Arthrex, Inc

TEACHING POINTS
After review of this exhibit, the viewer will be able to: 1. List common causes of pathology of the extensor mechanism 2. Explain the normal anatomy of the extensor mechanism including common anatomical variants 3. Describe the ultrasound and MRI appearance of pathology of the extensor mechanism 4. Discuss the factors determining the utility of ultrasound vs. MRI in evaluating the extensor mechanism

TABLE OF CONTENTS/OUTLINE
We aim to describe and illustrate the spectrum of imaging findings in the extensor mechanism on both ultrasound and MRI, including: - Quadriceps and patellar tendon tears, complete and partial - Quadriceps tendinosis - Patellar tendinosis, including jumper’s knee and related entities of Osgood-Schlatter and Sinding-Larsen-Johansson syndromes - Patellar instability including sequela of acute and chronic dislocation - Patellar fracture - Patellofemoral osteoarthrosis - Patellar tracking abnormalities with fat pad abnormality - Bursal pathology - Normal variants and imaging pitfalls including dorsal defect of the patella, bipartite patella, and magic angle artifact

MKE153
Achilles Tendon: MR Imaging Review of Anatomy and Pathology

Education Exhibits
Location: MK Community, Learning Center

Participants
Pushpender Gupta MBBS (Presenter): Nothing to Disclose
Leon Lenchik MD: Nothing to Disclose
Scott David Wuetzer MD, MS: Nothing to Disclose

TEACHING POINTS
1. There is a relationship between Achilles tendon anatomy and pathology. 2. MR imaging allows for accurate diagnosis of a wide range of Achilles tendon pathology.

TABLE OF CONTENTS/OUTLINE
Perspective: The Achilles tendon is the largest and strongest tendon in the body; however, it is the most commonly injured tendon, accounting for approximately 20% of all large tendon injuries. Review of pertinent anatomy: The Achilles tendon typically develops pathology in three different zones: the musculotendinous junction zone, the midsubstance zone approximately 4 cm proximal to the calcaneus, and the insertional zone at the calcaneus. This anatomy will be reviewed. Etiology and risk factors: Although the etiology for Achilles tendon pathology is often idiopathic, the most common pathologies are related to overuse and/or repetitive micro-trauma. Risk factors include systemic disorders including diabetes, hyperlipidemia, and hypertension. Examples: The MR imaging characteristics for common and uncommon pathology in the Achilles tendon will be discussed through case examples. Specifically, examples of insertional and non-insertional tendinosis, Haglund’s syndrome, paratenonitis, paratendinitis, tendon tears, tendon avulsions, and an Achilles tendon xanthoma will be shown. Management: A brief discussion of current management recommendations.

MKE155
Ankle Impingement Syndromes: An Illustrative Review

Education Exhibits
Location: MK Community, Learning Center

Participants
Ronnie Chen MD (Presenter): Nothing to Disclose
Daria Motamedi MD: Nothing to Disclose
Kira Chow MD: Nothing to Disclose
Shahla Modarresi MD: Nothing to Disclose

TEACHING POINTS
This exhibit will:
1. Review the definition and classification of the various impingement syndromes about the ankle joint.
2. Review the pertinent ligamentous anatomy of the ankle joint.
3. Provide an overview of the clinical presentations, common causes, and imaging manifestations of impingement at and about the ankle joint.

Main teaching points:
1. The ankle impingement syndromes are caused by entrapment of an anatomic structure of the ankle joint by pathologic soft tissue or bony conditions leading to chronic pain and restricted mobility.
2. MRI is best used to assess the soft tissue etiologies of impingement and radiography can be used to evaluate for osseous abnormalities.

TABLE OF CONTENTS/OUTLINE
Ankle Impingement Syndromes - Definition and Classification

Clinical Presentation, Pathophysiology, and Imaging Findings

- Anteromedial Impingement
- Anterolateral Impingement
- Posterior Impingement
- Posteromedial Impingement
- Posterolateral Impingement
- Syndesmotic Impingement

MKE156

Ankle Trauma: What Radiology Residents Need to Know

Education Exhibits

Location: MK Community, Learning Center

Certificate of Merit

Participants

Pavani Adapa MD (Presenter): Nothing to Disclose
Melissa Nicole Manzer MD: Nothing to Disclose
Thomas Michael Cullen MD: Nothing to Disclose
Arash Kamali MD: Nothing to Disclose

TEACHING POINTS

Review the anatomy and biomechanics of the ankle joint and understand ligament and osseous injuries including osteochondral, Weber, triplane, pilon, lateral process talus and juvenile Tillaux.

TABLE OF CONTENTS/OUTLINE

Illustrate the anatomy and biomechanics of the osseous, myotendinous and ligamentous structures of the ankle joint, including the tibiotalar and distal tibio-fibular joints and the ankle mortise. Describe and demonstrate the classification of common injuries involving the ankle joint, including Weber classification of distal tibia and fibula injuries, osteochondral injury of the talus, pilon, triplane, lateral process talus and juvenile Tillaux, using radiographs, 2D and 3D MDCT and MRI. Discuss a practical approach to describing the findings, recognizing the pitfalls in imaging of ankle trauma and understand what not to miss when reporting findings to the clinicians.

MKE157

At the Forefront of Forefoot

Education Exhibits

Location: MK Community, Learning Center

Participants

Aarti Luhar MD (Presenter): Nothing to Disclose
Leanne Louise Seeger MD: Scientific Advisory Board, Amgen Inc
Benjamin David Levine MD: Nothing to Disclose
Benjamin Eric Plotkin MD: Nothing to Disclose
Kambiz Motamedi MD: Nothing to Disclose

TEACHING POINTS

Forefoot disorders are commonly encountered on radiographs of the foot. Understanding the natural history of each disorder is vital to directing management. Familiarity with their pre- and post-operative appearances is important to making accurate imaging diagnosis. The purpose of this exhibit is: 1) To give a brief overview of the natural history, complications and management of four common bony disorders of the forefoot. 2) To provide a primer emphasizing the pre- and post-operative appearances of each disorder, with an emphasis on plain radiographic findings.

TABLE OF CONTENTS/OUTLINE

We will present the natural history of a) Hallux valgus deformity, b) Hallux sesamoid disorders, c) Hammertoe deformity, d) Long 2nd or 3rd metatarsal deformity. The discussion for each entity will be presented as follows: 1) Definition 2) Etiology 3) Presentation 4) Complications 5) Treatment a. Conservative therapy b. Indications for surgical management 6) Pre-operative appearance 7) Post-operative appearance

MKE158

Best Foot Forward! Ultrasound of the Foot and Ankle with MRI Correlation

Education Exhibits

Location: MK Community, Learning Center

Participants

Ami Gokli MD (Presenter): Nothing to Disclose
Steven Peti MD: Nothing to Disclose
Michael Coords MD: Nothing to Disclose
Ryan Logan Webb MD: Nothing to Disclose
Cheryl Hsuan Lin MD: Nothing to Disclose
TEACHING POINTS
The purpose of this exhibit is: 1. To provide a focused review of normal foot anatomy on ultrasound. 2. To present a variety of ultrasound cases on common foot and ankle pathology. 3. To illustrate excellent sonographic correlation with the contemporaneous MRI on the same patients. 4. To be aware of some pitfalls and inherent limitations of ultrasound on certain pathology and know when to pursue other imaging modalities.

TABLE OF CONTENTS/OUTLINE

MKE160
Calcaneal Cleavage Planes: Trabecular Lattice of the Calcaneus in Relation to Fracture Patterns

Education Exhibits
Location: MK Community, Learning Center

Participants
Daniel August Young MD (Presenter): Nothing to Disclose
Edward Smitaman MD: Nothing to Disclose

TEACHING POINTS
The major teaching points of the exhibit are: The calcaneus is made up of six trabecular patterns which form a lattice structure to support axial loading. The Neutral Zone of the calcaneus is an inherent weak point due to sparse trabeculation. Calcaneal fractures run along the planes of the trabecula, causing cleavage in predictable patterns that correlate to the Sander’s Classification scheme. Insufficiency fractures can deviate from the normal cleavage plains due to weakening of the trabecular patterns via microfractures.

TABLE OF CONTENTS/OUTLINE
Calcaneal Anatomy Calcaneal Trabecula Orientation Neutral Zone Anatomy Mechanism of Injury Sander’s Classification in Relation to Trabecular Patterns Insufficiency Fractures

MKE161
Carpal and Tarsal Coalitions: Typical and Atypical Locations with Diagnostic Pitfalls

Education Exhibits
Location: MK Community, Learning Center

Participants
Sung Moon Kim MD (Presenter): Nothing to Disclose
Monica Kalume Brigido MD: Nothing to Disclose
Jon A. Jacobson MD: Consultant, BioClinica, Inc Royalties, Reed Elsevier Equipment support, Terumo Corporation Equipment support, Arthrex, Inc
David Paul Fessell MD: Nothing to Disclose
Corrie Marlene Yablon MD: Nothing to Disclose

TEACHING POINTS
1. To know the typical locations of carpal and tarsal coalitions.
2. To see the atypical locations of carpal and tarsal coalitions.
3. To understand the pitfalls and advantages of radiography, CT, and MRI.

TABLE OF CONTENTS/OUTLINE
1. Typical locations of carpal coalitions: lunotriquetral coalition and capitohamate coalition. 2. Atypical locations of carpal coalitions: pisohamate coalition and scaphotrapezial coalition. 3. Typical locations of tarsal coalitions: talocalcaneal coalition and calcaneonavicular coalition. 4. Atypical locations of tarsal coalitions: talonavicular coalition, cubonavicular coalition, the first naviculocuneiform coalition, and lateral cuneiform-the thrid metatarsal coalition. 5. Imaging modalities including radiography, CT, and MRI to detect the types of coalition such as osseous, fibrous, and cartilaginous in nature.

MKE162
Clinical and Radiological Management of the Acquired Adult Flatfoot

Education Exhibits
Location: MK Community, Learning Center

Participants
Rosa Dominguez-Oronoz MD (Presenter): Nothing to Disclose
Maria Pardo-Antunez: Nothing to Disclose
Xavier Marín-Casabiel MD: Nothing to Disclose
Sarai Roche: Nothing to Disclose
Victor Sanchez Pineda MD: Nothing to Disclose
Rosa Busquets: Nothing to Disclose

TEACHING POINTS
Review the anatomical structures which have an important role in the stabilization of the foot plantar arch and the physical examination. Review the pathogenesis that causes flat foot on adults and the new classification (RAM). Recognize MRI findings associated with clinical AAFF.

**TABLE OF CONTENTS/OUTLINE**

The adult acquired flatfoot (AAFF) is a relatively multifactorial common disorder characterized by findings as plantar flexion of the talus, medial arch collapse, valgus hindfoot and forefoot abduction. Although posterior tibial tendon (PTT) dysfunction is the most common cause of this entity we must consider that other structures can also bring it on (Spring and talocalcaneal interosseous ligaments). Therefore, the deformity may affect different zones around the foot and ankle (rearfoot, ankle, and midfoot) in various ways and degrees in different patients. We exhibit the new classification of AAFF: RAM, wherein each level of deformity is assessed and graded independently of each other, both clinically and radiographically. MRI is an important tool in the evaluation of AAFF, providing valuable information to correctly classify and understand its pathogenesis. Furthermore, detection of the injured anatomical structures is essential for selecting an appropriate surgical treatment.

**MKE163**

**Comprehensive Imaging Review of Metatarsalgia and Related Painful Conditions of the Forefoot**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Anthony Dennis Mohabir MD : Nothing to Disclose
- Adam Noah Rucker MD : Nothing to Disclose
- Michael Brown MD : Nothing to Disclose
- Jarett Burak MD : Nothing to Disclose
- Daniel M. Walz MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

The Purpose of this Exhibit is:

1. To explain the clinical presentations of metatarsal and metatarsal phalangeal (MTP) joint pathology and the proper indications for various methods of imaging
2. To review normal anatomy of the metatarsals and MTP joints with a focus on magnetic resonance imaging.
3. To learn the imaging features of various pathologic conditions of the metatarsals and forefoot.

**TABLE OF CONTENTS/OUTLINE**

1. Normal Imaging Anatomy
   a. First and Lesser Metatarsals
   b. MTP Joints
2. Clinical Presentation
3. Imaging Techniques and Indications
4. Case Examples
   a. Stress Fracture
   b. Flexor and Extensor Tendon Pathology
   c. Plantar Plate Tears
   d. MTP Joint Instability
   e. Interdigital Neuroma
   f. Intermetatarsal Bursitis
   g. Hallux Valgus Deformity
   h. Degenerative and Inflammatory Arthrosis
   i. Systemic Disorders
4. Summary

**MKE165**

**Dynamic Evaluation with High-resolution Ultrasound of Ankle Retinacula: A Detailed Didactic Approach**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Alessandro Muda MD : Nothing to Disclose
- Enzo Silvestri MD (Presenter): Nothing to Disclose
- Riccardo Sartoris MD : Nothing to Disclose
- Alice Arcidiacono : Nothing to Disclose
- Silvia Perugin Bernardi MChir : Nothing to Disclose
- Michela Pascale MD : Nothing to Disclose

**TEACHING POINTS**

The aim of our educational exhibit is to illustrate the normal anatomy and HR-US appearance of ankle retinacula, to produce detailed anatomical schemes with didactic purpose and to describe a systematic technique for HR-US evaluation of these structures.

Dynamic evaluation adds several important information about biomechanics of such superficial structures.

Knowledge of the normal anatomy and imaging appearance of these structures is essential for the depiction of their injuries.

**TABLE OF CONTENTS/OUTLINE**

The retinacula of the ankle are thickening structures of the crural fascia with a specific role in maintaining the tendon structures strictly closer to the underlying bone. Standard US protocol includes the evaluation of the extensor retinaculum, the peroneal retinaculum and the flexor retinaculum. For each retinaculum we will provide a dedicated 22 MHz HR-US scan, a detailed anatomic scheme and a practical guide on 'how to do' the HR-US scan.

**MKE166**

**Dynamic High Resolution Ultrasonography (d-HRUS) of the Leg Muscles: A Detailed Didactic Approach**

*Education Exhibits*

*Location: MK Community, Learning Center*
**MKE167**

**Entrainment: Soft Tissue Injuries Accompanying Pilon Fractures of the Tibia**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Xue Susan Bai MD (Presenter): Nothing to Disclose
- Sana Parsian MD: Nothing to Disclose
- Jonelle Marie Petscavage-Thomas MD, MPH: Consultant, Medical Metrics, Inc
- Felix Sze-Kway Chew MD: Nothing to Disclose
- Alice S. Ha MD: Nothing to Disclose

**TEACHING POINTS**

- Review the radiologic morphology of Pilon fractures and the role of cross-sectional imaging
- Discuss current surgical approaches for Pilon fractures
- Illustrate common concomitant soft tissue injuries
- Demonstrate postoperative complications and their imaging appearances

**TABLE OF CONTENTS/OUTLINE**

1) Review radiographic and cross-sectional anatomy related to Pilon fractures; 2) Outline surgical procedures to treat Pilon fractures with radiographic correlates; 3) Illustrate common concomitant soft tissue injuries including tendon impingement and nerve entrapment; 4) Demonstrate common postoperative complications and their imaging features including nonunion, infection, malunion, and osteoarthritis.

**MKE168**

**Fascia Cruri Tears- A ‘New’ Injury- Clinical Presentation, Imaging and Treatment**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Sophia Tincey MBBS (Presenter): Nothing to Disclose
- Nicola Lindsay Robertson MBChB, MRCS: Nothing to Disclose
- Hardi Madani FRCR: Nothing to Disclose
- Aniket N. Tavare MA, MBBCh: Nothing to Disclose
- Brian Joseph Holloway MBBCh: Nothing to Disclose
- Otto Chan MD: Nothing to Disclose
- Nick Webborn MBBS, MSc: Nothing to Disclose

**TEACHING POINTS**

- Appreciate the normal radiological anatomy of the fascia cruris
- Describe the pathophysiology of fascia cruri tears
- Classical clinical presentation and differences with Achilles tendinopathy
- Symptomatology Imaging characteristics on US and MRI of fascia cruri tears
- Initial rehabilitation protocol
- Describe novel approach using prolotherapy and rehabilitation boot
- Emphasize the importance of a conditioning program

**TABLE OF CONTENTS/OUTLINE**

- The fascia cruris is a layer of deep fibrous connective tissue and is continuous above with the fascia lata and below with the fascia on the dorsum of the foot and the plantar aponeurosis at the sole. Injuries to this structure are not well understood but are not uncommon and we discuss the clinical presentation along with abnormal imaging findings with pathological correlation. Multi-modality illustrated examples outlining various types of tears. Evaluation of the limited treatment options available for these patients. Discussion of novel image guided interventions and their potential role in the management of tears.
Foot for Thought: Metatarsalgia Imaging and Intervention

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit

Participants
Heba Almutairi MD (Presenter): Nothing to Disclose
Almamoon I. Justaniyah MD, MA : Nothing to Disclose
Robert James French MD : Nothing to Disclose
Dmitry Elentuck MD : Nothing to Disclose

TEACHING POINTS
After reviewing this exhibit, the participant will:
- Be familiar with the clinical presentations and differential diagnosis of extra-osseous causes of metatarsalgia as well as with the imaging modalities available to make the correct diagnosis.
- Be able to recognize the findings of various painful forefoot pathologies on ultrasound and MRI.
- Be up to date with the current role of the radiologist in treating some of these conditions under ultrasound guidance.

TABLE OF CONTENTS/OUTLINE
1. Introduction.

High Definition US-MRI Fusion Imaging of the Ankle: A Detailed Didactic Approach

Education Exhibits
Location: MK Community, Learning Center

Participants
Riccardo Sartoris MD (Presenter): Nothing to Disclose
Silvia Perugin Bernardi MChir : Nothing to Disclose
Alice Arcidiacono : Nothing to Disclose
Angelo Corazza MD : Nothing to Disclose
Alessandro Muda MD : Nothing to Disclose
Enzo Silvestri MD : Nothing to Disclose
Giulio Ferrero : Nothing to Disclose

TEACHING POINTS
Normal US anatomy of the ankle is complex and not immediate to comprehend it.
The accurate knowledge of this anatomy is essential for the understanding of district diseases.
Fusion imaging between US and MRI could represent a new frontier in musculoskeletal US teaching. The aim of our paper is to present some features of this new technique applied to the study of the ankle.

TABLE OF CONTENTS/OUTLINE
We have selected a volunteer and previously obtained a volumetric MR scan of the ankle. With an US equipment provided with a GPS-enhanced fusion system we have combined these techniques and obtained an extremely reliable tool for the teaching of correct US scan planes of this insidious anatomical region. The ankle can be subdivided in four compartments: each of those includes structures that are extremely important for ankle function. For each structure we will provide a dedicated HR-US image with MRI fusion imaging detailed anatomic scheme practical guide on ‘how to do’ the HR-US scan With US-MR fusion imaging we have analyzed ankle compartments highlighting critical areas. A thorough knowledge of the anatomy is crucial to enable the musculoskeletal radiologist to make an accurate and useful diagnosis of ankle distraction. It seems that Fusion Imaging may improve and accelerate the comprehension of anatomy

Illustration and MRI Atlas of the Ankle: 3D-MR Imaging at 3-Tesla of the Ligaments, Tendons, and Cartilage of the Ankle and Hindfoot, Accompanied by Detailed Original Medical Illustration of the Deltoid Ligamentous Complex

Education Exhibits
Location: MK Community, Learning Center

Participants
Solomon Abay BS (Presenter): Nothing to Disclose
Michael Silver BS, MA : Nothing to Disclose
Kenneth Chung-Yi Wang MD, PhD : Co-founder, DexNote, LLC
Filippo Del Grande MD, MBA : Nothing to Disclose
John A. Carrino MD, MPH : Consultant, BioClinica, Inc Consultant, Pfizer Inc Advisory Board, General Electric Company

TEACHING POINTS
The purpose of this exhibit is to:
1. Demonstrate the MR appearance of important ligamentous, tendinous, and cartilaginous structures on isotropic 3D images at 3-Tesla. This includes structures such as the ligaments of the sinus tarsi, as well as the components of the deltoid ligamentous complex.
2. Review the normal course and bony attachment sites of ligaments and tendons of the ankle.
3. Provide a strategy for identifying and evaluating these structures using isotropic 3D MR imaging.

TABLE OF CONTENTS/OUTLINE
Description of isotropic 3-Tesla 3D MR imaging protocol at the ankle and hindfoot. Review of anatomy and MR imaging findings
for each of the following: Components of the deltoid ligamentous complex Spring ligament Ligaments of the tibiofibular syndesmosis Anterior talofibular ligament Calcaneofibular ligament Posterior talofibular ligament Sinus tarsi ligaments Articular cartilage Tendons, nerves, vessels and retinacula Original illustrations of the deltoid ligamentous complex and its five component ligaments will also be presented with MR image correlation.

MKE172

Imaging of Muscle Injuries: The Prognosis Impact of Connective Tissue Involvement

Education Exhibits
Location: MK Community, Learning Center

Cum Laude

Participants
Audrey Massein (Presenter): Nothing to Disclose
Jerome Renoux MD : Nothing to Disclose
Guillaume Mercy : Nothing to Disclose
Loris Maya : Nothing to Disclose
Salim Benabadji MD : Nothing to Disclose
Mathilde Wagner : Nothing to Disclose
Eric Rolland : Nothing to Disclose
Jean-Louis Brasseur : Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is 1. To explain importance of intramuscular conjonctive structures 2. To illustrate the spectrum of lesions of connective tissue, with correlation between ultrasonography and MRI 3. To discuss the role of imaging to evaluate sole connective tissue lesions and their impact on return to play time in high-level soccer players 4. To discuss interest of imaging in the follow-up

TABLE OF CONTENTS/OUTLINE

1. Clinical features 2. Different locations on imaging: - epimysium - intramuscular conjonctive wall - intramuscular tendon extension - between two perimuscular conjonctive walls 3. Different severities on imaging: - blurred and limited thickening of an intramuscular conjonctive wall - diffuse thickening of an intra or perimuscular conjonctive component - rupture of a connective structure with muscle injury which is symmetrical around 4. Prognosis 5. Imaging in the follow-up

MKE173

Imaging Review of the Accessory Ossicles of the Foot

Education Exhibits
Location: MK Community, Learning Center

Participants
Josephina Anna Vossen MD, PhD : Nothing to Disclose
Jennifer Golia Pernicka MD : Nothing to Disclose
Laura Miller MD : Nothing to Disclose
Greg B. Marrinan MD : Nothing to Disclose
Martin Torriani MD (Presenter): Nothing to Disclose

TEACHING POINTS

1. To review to spectrum of accessory ossicle and sesamoid bones in the foot.
2. To recognize pathology associated with accessory ossicle and sesamoid bones in the foot.
3. To suggest appropriate imaging modalities and discuss imaging pitfalls.

TABLE OF CONTENTS/OUTLINE

Anatomic variant accessory ossicles of the foot will be reviewed by radiograph, CT, and high resolution MR imaging, with sample cases including: os peroneum, os subfibulare, os subtibiale, os tibiale externum (accessory navicular), os trigonum, os calcaneus secundarius, and os intermetatarsale. Furthermore, potential pathology and pitfalls will be discussed.

MKE174

Insertional Achilles Tendinopathy – New Imaging and Treatment Strategies

Education Exhibits
Location: MK Community, Learning Center

Participants
Aniket N. Tavare MA, MBBCh : Nothing to Disclose
Sophia Tincey MBBS : Nothing to Disclose
Hardi Madani FRCP (Presenter): Nothing to Disclose
Nicola Lindsay Robertson MBChB, MRCS : Nothing to Disclose
John King MD : Nothing to Disclose
Otto Chan MD : Nothing to Disclose
Brian Joseph Holloway MBBCh : Nothing to Disclose

TEACHING POINTS

1. Review of the anatomy and function of Achilles tendon, the largest and strongest tendon in the body; in particular the insertional component. 2. Discussion of the aetiologies of insertional Achilles tendinopathy (IAT), a common cause of chronic pain and reduced function in both athletes and sedentary individuals 3. Outline of the diagnosis and assessment of IAT using ultrasound and MRI 4. Review of the differences in rehabilitation programmes between Achilles tendinopathy and IAT 5. Review of the established and innovative image-guided therapies for IAT available when conservative management is unsuccessful.
TABLE OF CONTENTS/OUTLINE

MKE175
Keep That Spring in Your Step: Review of Plantar Fascia Anatomy and Pathology

Education Exhibits
Location: Mk Community, Learning Center

Participants
Christin MB Foster MD (Presenter): Nothing to Disclose
Bryon Thomson DO: Nothing to Disclose
Jinoh Sandberg DO: Nothing to Disclose

TEACHING POINTS
Heel pain is a common complaint in the primary care, orthopedic and podiatry clinics. It can lead to lost work time, decreased participation in sporting activities and long-term morbidity. In this exhibit, the learner will (1) review normal anatomy of the calcaneus, plantar fascia and associated structures and (2) learn to recognize common pathologic processes contributing to heel pain using a multi-modality approach.

TABLE OF CONTENTS/OUTLINE
Illustrate normal anatomy of the calcaneus, plantar fascia and associated hindfoot soft tissues -Diagrams -Radiographs -Ultrasound -MRI Multimodality review of pathologic imaging findings - Plantar fasciitis - Achilles tendinosis/bursitis - Heel pad fat necrosis/rheumatoid nodules - Plantar fibromatosis - Nerve impingement - Stress fracture - Others Sample cases Summary

MKE176
MR Imaging of Intraarticular Ankle Impingement Lesions: A Pictorial Review

Education Exhibits
Location: Mk Community, Learning Center
Certificate of Merit

Participants
Monica Tafur MD (Presenter): Nothing to Disclose
Brady Kirk Huang MD: Nothing to Disclose
Eric Y. Chang MD: Nothing to Disclose

TEACHING POINTS
The purpose is to review the findings of the intraarticular ankle impingement lesions using an imaging-based approach. Illustrations will be used to explain the anatomic basis, pathophysiology and main features of each impingement lesion. The role of diagnostic imaging in the management of these entities and the differential diagnoses will be discussed. 1. Imaging findings may relate to a range of soft tissue or bony pathologies that can predispose to painful limitation of joint motion or impingement. Diagnosis of ankle impingement remains clinical, however is aided by radiological findings. 2. Knowledge of the pathophysiology and the anatomy of the regions involved in each syndrome is important to understand the imaging findings. 3. Post-traumatic synovitis, intraarticular fibrous scar tissue, capsular scarring and bone abnormalities are frequently associated with this pathology. 4. Knowledge of the imaging findings and the differential diagnoses for the various ankle impingement syndromes is essential to avoid misdiagnosis that may delay the patient's treatment.

TABLE OF CONTENTS/OUTLINE
1. Definition and general features 2. Anatomy, demographics, pathophysiology, clinical findings, imaging findings, differential diagnoses and management of each ankle impingement syndrome (anterior, posterior, anterolateral, anteromedial and posteromedial)

MKE178
Painless Plantar Fasciitis Ultrasound Guided Injections Using Posterior Tibial Nerve Block-Why and How

Education Exhibits
Location: Mk Community, Learning Center

Participants
Mark Leung Hsin Tie MBBCh (Presenter): Nothing to Disclose

TEACHING POINTS
1. Learn the anatomy of the plantar fascia. 2. Learn the pathophysiology of plantar fascial disease. 3. Learn the technique of US guided plantar fascial injections. 4. Learn the anatomy of tibial nerve at the ankle and how to anaesthetise it for plantar fascial injections.

TABLE OF CONTENTS/OUTLINE
A: Anatomy of the plantar fascia and tibial nerve at the ankle B. Pathophysiology C. Diagnostic Imaging and US anatomy D. Contraindications E. Technique of anaesthesia injection F. Technique for plantar fascial injection G. Aftercare and complications
MKE179

Pathologies Mimicking Achilles Tendinopathy

Education Exhibits
Location: MK Community, Learning Center

Participants
Aniket N. Tavare MA, MBBCh (Presenter): Nothing to Disclose
Nicola Lindsay Robertson MBBCh, MRCS: Nothing to Disclose
Sophia Tincey MBBS: Nothing to Disclose
Hardi Madani FRCR: Nothing to Disclose
Nicola Maffulli: Nothing to Disclose
Otto Chan MD: Nothing to Disclose
Tom Crisp MD: Nothing to Disclose
Brian Joseph Holloway MBBCh: Nothing to Disclose

TEACHING POINTS
Achilles tendinopathy is a common cause of chronic posterior heel and calf pain in both athletes and non-exercising individuals. We will review: 1. The anatomy and biomechanical function of the posterior calf 2. The wide differential diagnosis encompassing other disorders of the Achilles tendon complex and a variety of non-Achilles conditions affecting the surrounding bones, joints, muscles and nerves. 3. The imaging findings of each of these disorders on plain radiography, ultrasound (US) and MRI and will highlight discriminatory features.

TABLE OF CONTENTS/OUTLINE

MKE180

Plantar Heel Pain: A Comprehensive Multimodality Review and Update of Common and Uncommon Imaging Findings and Treatment Options

Education Exhibits
Location: MK Community, Learning Center

Participants
Amanda Weiss MD: Nothing to Disclose
Anthony Dennis Mohabir MD (Presenter): Nothing to Disclose
Daniel M. Waltz MD: Nothing to Disclose
John S. O'Donnell MD: Nothing to Disclose
Michael Brown MD: Nothing to Disclose

TEACHING POINTS
1. Plantar heel pain is one of the most common indications for ankle/foot imaging studies. 2. Knowledge of the anatomy along the plantar aspect of the hindfoot is essential to guide imaging studies and make accurate diagnoses. 3. Some causes of heel pain that can be identified on imaging studies include calcaneal stress fractures, plantar fasciitis, plantar fascial tears, plantar fibromas, Baxter's neuropathy, painful os peroneum syndrome, short and long plantar ligament degeneration/partial tears, and lateral plantar vein thrombosis. 4. Treatment options for the varying causes of plantar heel pain include conservative measures, image guided procedures, and surgery.

TABLE OF CONTENTS/OUTLINE

MKE182

Radiographic Measurements and Angles of the Ankle and Foot: What Every Radiologist Should Know

Education Exhibits
Location: MK Community, Learning Center

Participants
Juliana Oggioni Gaiotti MD (Presenter): Nothing to Disclose
Felipe Damasio de Castro MD: Nothing to Disclose
Luana Belusso MD: Nothing to Disclose
Fabiano Nassar Cardoso MD: Nothing to Disclose
Carolina Luisa Martins de Jesus: Nothing to Disclose
Maira Costa Nunes Andrade Leite MD: Nothing to Disclose
Carlos Henrique Longo MD: Nothing to Disclose
Andre Yui Aihara MD: Nothing to Disclose
Hamilton Guidorizzi MD: Nothing to Disclose
Eduardo Jose Mariotoni Bronzatto: Nothing to Disclose

TEACHING POINTS
Importance of the radiographic analysis of the foot and ankle. Changes in bone alignment and angles of the foot, and pathologies arising from them. A practical step-by-step guide to measure radiographic foot angles.

TABLE OF CONTENTS/OUTLINE
Over the past 15 years, too much emphasis has been given to more "advanced" imaging, such as CT-scan and MRI exams, while conventional radiography has been neglected. However, radiographic measurements of the foot and ankle in the weight-bearing position can provide plenty of information regarding the biomechanics and pathogenesis of common foot disorders, which cannot be granted by other imaging techniques. Besides, a solid and comprehensive knowledge of the anatomy and biomechanics of the foot is essential to properly understand and analyze a multitude of complex radiographic findings, which may be intimidating to the less experienced. Certain lines and angles plotted on weight-bearing radiographs are useful in revealing subtle deformities and malalignment of the foot, such as hallux valgus, flat foot, cavus foot, etc. With that in mind, the purpose of this article is to highlight the importance of these measurements in daily practice, and to establish a step-by-step guide to obtain them accurately.

MKE183
Sonographic Evaluation of Chronic Pain after Lateral Ankle Sprain: It Is not Only Lateral Ligament Complex Lesion

Education Exhibits
Location: MK Community, Learning Center

Participants
Sara Sanchez Bernal MD (Presenter): Nothing to Disclose
Elena Gallardo MD, PHD : Nothing to Disclose
Eduardo Torres Díez : Nothing to Disclose
Rosa María A. Landeras MD : Nothing to Disclose
Angelica Lamagrande Obregon : Nothing to Disclose
Gerardo Lopez Rasis MD : Nothing to Disclose

TEACHING POINTS
1.- To illustrate the normal sonoanatomy of the structures that can be injured in a lateral ankle sprain. 2.- To propose a systematic scanning technique for the evaluation of such structures. 3.-To describe the most important bone and soft-tissue lesions associated to a lateral ankle sprain.

TABLE OF CONTENTS/OUTLINE

MKE185
The Road to Pes Planovalgus

Education Exhibits
Location: MK Community, Learning Center

Participants
Adam Daniel Singer MD (Presenter): Nothing to Disclose
Paul David Clifford MD : Nothing to Disclose
Abhijit Datir MD : Nothing to Disclose
Joshua Zeidenberg BA, MD : Nothing to Disclose
Ty Kanyn Subhawong MD : Nothing to Disclose
Jean Jose MS, DO : Nothing to Disclose

TEACHING POINTS
1. Common and present in children and adults 2. Several important structures support the plantar arch 3. Failure of the arch may result in other deformities such as hindfoot valgus and subfibular impingement 4. Available treatment strategies range from conservative to surgical 5. Radiologist plays a key role in diagnosis

TABLE OF CONTENTS/OUTLINE
Anatomy and mechanism of support Involved supporting structures: static and dynamic stabilizers Epidemiology Adults (primary focus) Children Clinical manifestations Types Rigid versus flexible Associated systemic processes Degenerative Tarsal coalition The role of imaging Radiographs, CT, US and MRI Pes planus associations Hindfoot valgus Subfibular impingement Medial cuneiform injury Forefoot abduction Achilles tendinopathy Management Conservative Surgical approaches Indications and contraindications for surgery

MKE186
Topographic Relationship and Compression Syndromes of the Plantar Nerves: MR and US with Anatomical Correlation

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit
Selected for Radiographics

Participants
Michel De Maeseneer MD (Presenter): Nothing to Disclose
Stefaan Marcelis MD : Nothing to Disclose
Johan De Mey : Research Grant, General Electric Company
TEACHING POINTS
1. Describe topographic relationships of the plantar nerves relative to tendons and muscles along the plantar aspect of the foot.
3. Discuss compression areas and syndromes related to this anatomy.

TABLE OF CONTENTS/OUTLINE
Branches of the posterior tibial nerve: -Medial calcaneal nerve. -Inferior calcaneal nerve. -Medial and lateral plantar nerves.

MKE188
Ultrasonography of the Deltoid Ligament of the Ankle

Education Exhibits
Location: MK Community, Learning Center

Participants
Guillaume Mercy (Presenter): Nothing to Disclose
Audrey Massein : Nothing to Disclose
Jean-Louis Brasseur : Nothing to Disclose
Philippe A. Grenier MD : Nothing to Disclose

TEACHING POINTS
The deltoid ligament (also called medial collateral ligament) is a complex, crucial stabilizing structure of the hindfoot and midfoot. It can be basically divided into a superficial layer and a deep layer. The ligament can also be theoretically divided into three functional parts: anterior, middle and posterior. Both anatomy and function explain pathological findings after a sprain: - Injury of the deep layer often occurs as it is pinched between medial malleolus and talus during a varus sprain. - Injury of one of the three functional parts results from ligament stretching during a valgus sprain and depends on the degree of flexion of the ankle during the trauma. Ultrasonographic study of each part of the ligament in a tensioned position is necessary to avoid missing any injury after a sprain. The normal incidental absence of the anterior part of the ligament and the normal stacked appearance of the deep layer are the most common pitfalls. Ultrasonography is helpful to identify a healing complication including impingement and instability.

TABLE OF CONTENTS/OUTLINE
Anatomy Biomechanics Ultrasonography: achievement, normal aspects and pitfalls Ultrasonographic pathological aspects: - sprain - delayed complications including impingement and instability Advantages of ultrasonography versus other modalities including MRI

MKE189
Ultrasound Findings in Injury and Healing of the Most Common Muscle Injuries of the Lower Limb. An Imaging Review

Education Exhibits
Location: MK Community, Learning Center

Participants
Alejandro Garcia de la Oliva MD (Presenter): Nothing to Disclose
Luis S. Cueto MD, PhD : Nothing to Disclose
Begona Fernandez MD : Nothing to Disclose
Francisco Javier Fernandez : Nothing to Disclose
yolanda marin lapeira : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is:
1. To review the echographic characteristic imaging features in acute tear
2. To review the echographic findings in muscle scar
3. To describe the list of potential problems after muscle tear
4. To explain some keys to do a muscle ultrasound successfully
5. To discuss the role of Ultrasound and MRI in the diagnosis of muscle tear: strengths and weaknesses

TABLE OF CONTENTS/OUTLINE
Pathophysiology of muscle injury Equipment, software and method Review the imaging findings in: Acute muscle injury Fibrous scar Potential problems Same cases and mimics Discuss ultrasound Versus MRI Summary

MKE190
"Walking on Pins and Needles": Arthrodesis of the Foot and Ankle and Its Complications

Education Exhibits
Location: MK Community, Learning Center
Participants
Hussan Mohammed MD (Presenter): Nothing to Disclose
Daksheh Bhalabhai Patel MD: Nothing to Disclose
George Robert Matcuk MD: Nothing to Disclose
Timothy Charlton MD: Nothing to Disclose
Aaron Schein MD: Nothing to Disclose
Deborah M. Forrester MD: Nothing to Disclose
Eric Allan White MD: Nothing to Disclose

TEACHING POINTS
Foot and ankle arthrodesis, also known as fusion surgery, is the mainstay surgical approach to relieve disabling foot and ankle pain/deforality. An understanding of how to interpret postoperative arthrodesis films is critical in musculoskeletal radiology practice. The purpose of this exhibit is to describe the clinical issues surrounding foot and ankle arthrodesis, to review the expected postoperative appearance, and to illustrate the imaging findings of arthrodesis complications in a case-based format.

TABLE OF CONTENTS/OUTLINE
- Description of the clinical issues surrounding foot and ankle arthrodesis, including indications and contraindications, types of surgical approaches, and outcomes.
- Review of the relevant anatomy and the normal radiographic findings after arthrodesis, such as what to expect in the early postoperative period and when to expect bridging of bony trabeculae across the joint.
- Pictorial essay and description of the various complications that may occur using illustrative cases from our institution. This includes nonunion, malalignment, loosening of fixation screws/plates, hardware fracture, hardware migration, infection, and development of arthritis at joints adjacent to those fused.
- Protocolling pearls and pitfalls will be highlighted throughout the exhibit, including techniques to minimize metal artifacts on CT and MRI.

MKE192
Bone Densitometry: A Resident’s Guide to Common Pitfalls and How to Avoid Them

Education Exhibits
Location: MK Community, Learning Center
Certificate of Merit

Participants
Stephane Desouches DO (Presenter): Nothing to Disclose
Wasfia Alikhan: Nothing to Disclose
Jessica Lea Sanchez MD: Nothing to Disclose
Margaret Aarons Stull MD: Nothing to Disclose

TEACHING POINTS
Dual-energy x-ray absorptiometry (DXA) is the most commonly employed imaging modality for evaluating bone mineral density. Precise measurements are necessary to accurately diagnose osteopenia and osteoporosis in asymptomatic people, to predict individual risk of fragility fractures, and to guide treatment by the referring physician. Standardized measurements must be consistent and reproducible in order to ensure legitimate comparison of serial studies. The purpose of this exhibit is to illustrate technically correct DXA scans along with common imaging pitfalls and how to avoid them.

TABLE OF CONTENTS/OUTLINE
Examples of commonly encountered pitfalls in the interpretation of DXA scans are illustrated in a case-based format. Suggestions on how to avoid and overcome these problems are provided. Cases will include: - Patient positioning - Degenerative disease and scoliosis - Paget’s disease and bony metastases - Adjacent or superimposed gastrointestinal contrast - Post-surgical and post-traumatic changes - Soft tissue calcifications - Metallic implants and external metal

MKE193
Bones on Drugs: Imaging of Drug-Related Changes in Bone

Education Exhibits
Location: MK Community, Learning Center
Cum Laude

Participants
Tyson Steven Chadaz MD: Nothing to Disclose
Brett S. Talbot MD (Presenter): Nothing to Disclose
Johnny Uzoma Valmon Monu MD: Nothing to Disclose

TEACHING POINTS
The purpose of this educational exhibit is to: 1. Reiterate awareness of unsuspected and unexpected effect of drugs on patients’ bones. 2. Demonstrate a series of challenging musculoskeletal cases with common and uncommon medication-related changes. 3. Review the pertinent literature on adverse medication effects on bone.

TABLE OF CONTENTS/OUTLINE
Specific cases include: Osteonecrosis of the jaw associated with zoledronic acid Bisphosphonate associated femur fractures Osteosclerosis associated with numerous agents. Bone marrow changes associated with granulocyte-colony stimulating factor Demineralization associated with numerous agents including: -Glucocorticoids -Inhaled corticosteroids -Heparin -Selective serotonin reuptake inhibitors/tricyclic antidepressants -Chemotherapeutic agents -Aromatase inhibitors -Thiazolidinediones -Antiepileptic drugs -Cyclosporine -GnRH agonists/antagonists -Loop diuretics

MKE194
Effectiveness of Digital Tomosynthesis in the Detection of Radiographically Occult Bisphosphonate-Related Fragility Fractures of the Femur

Education Exhibits
Location: MK Community, Learning Center

Participants
Andrew Michael Petraszko MD (Presenter): Nothing to Disclose
Daniel Scott Siegal MD: Nothing to Disclose
Dhanwada Sudhaker Rao MD: Nothing to Disclose

TEACHING POINTS
1. Review the risk factors and underlying biochemical mechanisms that contribute to the development of bisphosphonate fragility fractures (BPFF).
2. Review the imaging appearance of BPFF and diagnostic features of BPFF on radiographs and tomosynthesis.
3. Demonstrate the increased sensitivity of tomosynthesis for detection of discrete fracture lines, and its ability to increase diagnostic confidence when radiographs are equivocal.
4. Review the clinical management of BPFF, and the significance of imaging in the diagnostic algorithm.

TABLE OF CONTENTS/OUTLINE
Risk Factors for Developing Bisphosphonate-Related Fragility Fractures (BPFF) Radiographic Technique Radiographic Appearance of BPFF Tomographic Technique Findings of BPFF on Radiographs and Tomosynthesis -Several Cases of BPFF on Radiographs and Tomosynthesis showing Increased Accuracy of Tomosynthesis -Pretreatment/Posttreatment showing fracture healing on tomosynthesis -Mimics of BPFF Data Demonstrating Increased Accuracy of Tomosynthesis vs Radiographs Clinical Implications of Tomosynthesis in BPFF

MKE195
MRI of Metabolic Bone Changes

Education Exhibits
Location: MK Community, Learning Center

Participants
Pedro Henrique Ramos Quintino Silva (Presenter): Nothing to Disclose
Hugo Pereira Costa MD: Nothing to Disclose
Felipe Boschini Franco MD: Nothing to Disclose
Alexandre Castillo Valim: Nothing to Disclose
Marcelo Bordalo-Rodrigues MD: Nothing to Disclose
Giovanni Guido Cerri PhD: Nothing to Disclose

TEACHING POINTS
1. Review the literature on metabolic bone disease (MBD) and its differential diagnosis on imaging findings.
2. Compare the imaging of different diseases with emphasis on magnetic resonance imaging (MRI).
3. Illustrate the differences, challenges / pitfalls and similar features among them, for a better diagnosis.

TABLE OF CONTENTS/OUTLINE
MBD is very important in musculoskeletal diagnostic image, due to many differential diagnoses and their importance as bone diseases or as manifestation of systemic pathologies. However, the majority of studies are based on RX, and there is lack of studies focuses on MRI features. Therefore, we will consolidate the imaging findings of MRI, comparing the differential diagnosis of BMD: Paget's disease, renal tubular acidosis, primary biliary cirrhosis, osteomalacia, osteoporosis, inflammatory bowel disease/ celiac disease, phosphaturic mesenchymal tumor, secondary hyperparathyroidism, osteogenesis imperfecta, osteopetrosis, Dent’s disease.

MKE196
Musculoskeletal Manifestations of Sickle Cell Disease

Education Exhibits
Location: MK Community, Learning Center

Participants
Atabak Allaei MD (Presenter): Nothing to Disclose
Glenn Erski MD: Nothing to Disclose
Ryan Braun MD: Nothing to Disclose
Scott Alan Lehto MD: Nothing to Disclose
Srinivas Kolla MD: Nothing to Disclose

TEACHING POINTS
Patients with sickle cell disease (SCD) suffer from intermittent, often severe episodes of pain which often will require hospitalization. These patients have a high number of hospitalizations with a presenting complaint of pain. These painful episodes are usually secondary to bone and joint sequelae of vaso-occlusive processes which include osteonecrosis, osteomyelitis and septic arthritis. Given the high morbidity of bone and joint sequelae in sickle cell disease, we will review imaging characteristics such that the viewer will become more familiar with:
1. Pediatric bone and joint manifestations of SCD and long term sequelae.
2. Imaging characteristics of dactylitis, osteonecrosis, septic arthritis, osteomyelitis in the setting of SCD.
3. Progression of osteonecrosis.
4. Soft tissue infarctions.

TABLE OF CONTENTS/OUTLINE

MKE197
Quality Improvement in Dual X-ray Absorptiometry (DXA): Approach to Artifacts

Education Exhibits
Location: MK Community, Learning Center
Certificate of Merit

Participants
Philip Joel Benfield MD (Presenter): Nothing to Disclose
Scott David Wuertz MD, MS: Nothing to Disclose
Bahram Kiani MD: Nothing to Disclose
Leon Lenchik MD: Nothing to Disclose

TEACHING POINTS
1. Artifacts are commonly seen on DXA images 2. DXA artifacts may be internal or external to the patient 3. It is important to recognize which internal artifacts influence BMD measurement 4. Some artifacts may be eliminated by reanalysis of the scans by the technologists 5. Reporting of artifacts should be standardized

TABLE OF CONTENTS/OUTLINE

MKE199
Abnormal Signal Intensity in the Bone Marrow at MR Imaging: Pattern Recognition, Pearls, and Pitfalls

Education Exhibits
Location: MK Community, Learning Center

Participants
Mustafa Mohamed Alikhan MD (Presenter): Nothing to Disclose
Liem Thanh Mansfield MD: Nothing to Disclose

TEACHING POINTS
On MR, abnormal signal in bone marrow has wide differential diagnosis
Recognition of pattern to signal abnormality helps to narrow differential diagnosis
The common patterns of bone marrow abnormality are subtendinous, subligamentous, subchondral, subphyseal, endosteal, periosteal, kissing bone contusions, double line sign, penumbra sign, fat containing, fluid-fluid level, and multiplicity

TABLE OF CONTENTS/OUTLINE

MKE200
Absent Findings at Musculoskeletal Imaging: It Can Be Hardest to See What’s Not There!

Education Exhibits
Location: MK Community, Learning Center

Participants
Brandon Murti (Presenter): Nothing to Disclose
George Robert Matcuk MD: Nothing to Disclose
Eric Allan White MD: Nothing to Disclose
Daksheh Bhulabhai Patel MD: Nothing to Disclose
Aaron Schein MD: Nothing to Disclose
Deborah M. Forrester MD: Nothing to Disclose
Linda Anne Vachon MD: Nothing to Disclose
Christopher Joseph Gottsegen MD: Nothing to Disclose
Sulabha Masih MD: Nothing to Disclose

TEACHING POINTS
1. Identify common and uncommon reasons why normally present structures may be absent on musculoskeletal imaging
1. Review the differential diagnoses of these various absent findings.

**TABLE OF CONTENTS/OUTLINE**

Categories Bones: Congenital (e.g. thrombocytopenia-absent radius syndrome, proximal focal femoral deficiency) vs. Acquired (e.g. Gorham disease, trapezeotomy) Joint spaces (e.g. coalition, ankylosis) Radiologic signs (e.g. absent bow tie and ghost meniscus signs, winking owl sign) Miscellaneous (e.g. Poland syndrome) Abnormal locations (e.g. tendon tears or dislocations, ulnar nerve transposition) Conclusion Absent musculoskeletal findings may be difficult to identify, but awareness can make the radiologist more cognizant and more likely to include commonly missed absent findings in their search patterns. Knowledge of these absent findings and their differential diagnoses is important and helpful to clinicians and patients. Although some of these findings may be obvious, the differential diagnostic considerations of their etiology may not be. Sometimes it is hardest to see the things that aren't there.

MKE202

Bad to the Bone: Musculoskeletal Complications of Solid Organ Transplantation

**Education Exhibits**

Location: MK Community, Learning Center

**Participants**

Lindsey Minshew MD (Presenter): Nothing to Disclose
Daniel Edward Wessell MD, PhD: Research Consultant, Biomedical Systems

**TEACHING POINTS**

1. To review the most common MSK complications of solid organ transplantation, their pathophysiology and epidemiology.
2. To discuss the key imaging findings in common MSK complications of solid organ transplantation recipients.
3. To explain the utility of various imaging modalities (e.g. DXA, radiographs, CT, bone scintigraphy and MR) in the diagnosis of these complications.
4. Illustrate the utility of the various imaging modalities through the presentation of example cases.

**TABLE OF CONTENTS/OUTLINE**

- Review the most common MSK complications of solid organ transplantation, their pathophysiology and epidemiology.
- Review key imaging findings and utility of various modalities, along with presentation of cases for the following MSK complications:
  - Decreased Bone Mineral Density
  - Fractures
  - Infection: Osteomyelitis, Septic Arthritis, Soft Tissue Infections
  - Osteonecrosis
  - Other: Neoplasm, Inflammatory conditions

MKE203

Basic Anatomy Concepts for Understanding Nerve Entrapments in the Upper Limb

**Education Exhibits**

Location: MK Community, Learning Center

**Participants**

Joao F. Costa MD (Presenter): Nothing to Disclose
Cesar Santos: Nothing to Disclose
Filpe Caseiro Alves MD, PhD: Consultant, Bayer AG
Antonio Bernardes MD, PhD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is to describe and illustrate the complex anatomy of the upper limb nerves, most affected by nerve entrapment, using cadaveric dissections, schematic drawings and multimodality imaging (ultrasound, CT and MRI). This exhibit will be a core learning tool for the residents and radiology physicians.

**TABLE OF CONTENTS/OUTLINE**

Overview Relevant anatomy and pathophysiology of the most affected upper limb nerves: - median nerve, - radial nerve, - ulnar nerve, - axillary nerve - suprascapular nerve Conclusions

MKE206

Clavicle Fractures: A Review of Imaging, Treatment, and Complications

**Education Exhibits**

Location: MK Community, Learning Center

Certificate of Merit

**Participants**

Christina Ma MD (Presenter): Nothing to Disclose
Benjamin Eric Plotkin MD: Nothing to Disclose
Benjamin David Levine MD: Nothing to Disclose
Leanne Louise Seeger MD: Scientific Advisory Board, Amgen Inc
Kambiz Motamedi MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: (1) To review the classification of clavicle fractures based on Allman and Neer classification system (2) To illustrate the techniques developed to fixate these fractures (3) To highlight the expected postoperative appearance and potential complications.

**TABLE OF CONTENTS/OUTLINE**

1. Allman and Neer Classification
Allman and Neer Classification
Medial clavicle fractures
- Most are minimally displaced and managed nonoperatively
- Posterior displacement with neuromuscular injury

Midshaft clavicle fractures
- Nonoperative management
- Complications: nonunion and malunion
- Operative management: dynamic compression plates, precontoured anatomic plates, intramedullary nailing, other fixation methods
- Complications: malunion and nonunion, hardware failure, intramedullary nail migration, clavicle re-fracture

Distal clavicle fractures
- Nonoperative management: Type I and III
- Operative management: Type II displaced distal clavicle fractures
- Complications: delayed union and nonunion, hardware complications

In summary, classification, surgical treatment, and complications of clavicle fractures are reviewed. It is critical that the radiologist be familiar with current clinical management of clavicle fractures so that they understand complications and can help guide appropriate treatment planning.

MKE207
Gas-containing Periarticular Cysts: Imaging Appearance and Clinical Significance
Education Exhibits
Location: MK Community, Learning Center

Participants
Vivek Kalia MD, MPH (Presenter): Nothing to Disclose
Jesse Myers MD : Nothing to Disclose
Diego F. Lemos MD : Nothing to Disclose

TEACHING POINTS
1. To review the clinical settings in which gas may be found in the periarticular soft tissues, with particular emphasis on gas-containing periarticular cysts. 2. To describe the imaging findings of air within parameniscal and paralabral cysts and their association with meniscal and labral tears. 3. To emphasize the importance of recognition of air within periarticular cysts to avoid misdiagnosis and unnecessary additional workup.

TABLE OF CONTENTS/OUTLINE
- Objectives of Exhibit Introduction, including differential diagnosis for gas in periarticular soft tissues
- Illustrative Examples of gas-containing periarticular cysts (CT, MR) - Shoulder - Knee - Hip
- Discussion
- Conclusions
- References

MKE208
High Resolution Ultrasound for Evaluation of Nail Dystrophy: A Feasibility Study
Education Exhibits
Location: MK Community, Learning Center

Participants
Elena Gallardo MD, PhD (Presenter): Nothing to Disclose
Rosa Maria A. Landeras MD : Nothing to Disclose
Eugenio Trillo MD : Nothing to Disclose
Angelica Lamagrande Obregon : Nothing to Disclose
Vanessa Gomez Dermit : Nothing to Disclose
Gerardo Lopez Rasines MD : Nothing to Disclose

TEACHING POINTS
1.- Illustrate the normal sonoanatomy and its variability with age and gender. 2.- Show the most relevant sonographic findings of those entities that can cause nail dystrophy. 3.- Propose a systematic sonographic evaluation and standardized report.

TABLE OF CONTENTS/OUTLINE
- Sonoanatomy of the nail unit -Main normal measurements of the nail unit -Sonographic features and clinical view of most frequent causes of nail dystrophy: onychomycosis, psoriasis, subungual tumors, systemic disorders, repetitive traumatism -Standardized report

MKE209
Imaging from Stem to Sternum: Sternal, Sternocostal and Sternoclavicular Joint Disease
Education Exhibits
Location: MK Community, Learning Center

Participants
Joseph Cardwell Fuller MD (Presenter): Nothing to Disclose
Kurt Friedrich Scherer MD : Nothing to Disclose
Felix Sze-Kway Chew MD : Nothing to Disclose
Alice S. Ha MD : Nothing to Disclose

TEACHING POINTS
The sternum functions as both a scaffold for proper function of the chest wall and upper extremities as well as a protector of intra-thoracic contents. The sternum, sternocostal and sternoclavicular joints are an uneremphasized site of disease in
musculoskeletal radiology. Our goal is to demonstrate that the broad subcategories of musculoskeletal disease such as arthritis, infection, trauma and tumor have unique entities within the sternum. Sample diagnoses include sternoclavicular hyperostosis, septic arthritis, rhomboid ligament sprain, and hemangioma, respectively.

**TABLE OF CONTENTS/OUTLINE**

1) Review radiologic and cross-sectional anatomy of the sternum, sternoclavicular joints and costochondral junctions, including relevant muscular and ligamentous attachments. 2) Describe variant anatomy of the sternum. 3) Describe the patterns of degenerative and inflammatory arthritides affecting the sternoclavicular joints. 4) Describe benign/malignant primary and secondary tumors of the sternum. 5) Describe the causes and mechanisms of traumatic injury to the sternum and potentially life-threatening associated injuries. 6) Describe imaging patterns of sternal infection and the role of imaging in diagnosis and treatment.

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**MKE210**

**Imaging Review: Running Injuries, Hip to Toe**

*Education Exhibits*

*Location: MK Community, Learning Center*

> Certificate of Merit

**Participants**

Burke Morin DO (Presenter): Nothing to Disclose  
Brett S. Talbot MD: Nothing to Disclose  
Gary M. Hollenberg MD: Nothing to Disclose  
Valery Kheyfits MD: Nothing to Disclose

**TEACHING POINTS**

1. Provide an overview of osseous and soft tissue injuries encountered in long-distance runners, which are not complicated by other recent trauma.  
2. Describe clinical presentation and pertinent biomechanical factors associated with these conditions.  
3. Illustrate characteristic radiographic and MR imaging features of these conditions in a systematic fashion.

**TABLE OF CONTENTS/OUTLINE**

Ankle/Foot Osseous: Stress fractures of calcaneus, navicular and metatarsal bones, Sesamoid stress injury Soft tissue: Achilles, Posterior tibial and Peroneal tendinopathy, tenosynovitis and tearing; Tarsal tunnel syndrome, Haglund’s syndrome, Ankle sprain, Planter fasciitis, Morton’s neuroma, Turf toe

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**MKE212**

**Key Sonographic Signs in Lesions of the Nail**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

Ximena Loreto Wortsman MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

- To provide basic knowledge on the key sonographic signs for diagnosing lesions of the nail and periungual region

**TABLE OF CONTENTS/OUTLINE**

Nail sonography has emerged as a diagnostic tool for studying lesions of the nail. This imaging technique provides detailed anatomical information on the echostructure, dimensions, location and blood flow of nail conditions. This educational exhibit is composed of the technical requirements, the examination technique, the normal anatomy and 20 cases of histologically proven lesions of the nail. The lesions are classified according to their origin, into ungual and periungual. Location and growth alterations (i.e. onycholyisis, onychomadesis, retronychia), inflammatory diseases (i.e. psoriasis, subungual fluid collections, median canaliform dystrophy), tumors and pseudotumors (i.e. glomus tumor, fibrous tumor, onychomatricoma, granuloma, wart, myxoid cyst and subungual exostosis) are demonstrated. The key sonographic signs are illustrated through drawings, and clinical, sonographic, surgical and histological images. Summary: Nail sonography can provide valuable anatomical information for the clinician. Knowledge of the key sonographic signs in lesions of the nail may facilitate the performance and interpretation of unogingural sonographic examinations.

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**MKE213**

**Lions and Tigers and Bears, Oh My!: The Zoo of Signs in Musculoskeletal Radiology**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

Ryan Braun MD (Presenter): Nothing to Disclose  
Abraham Haimed: Nothing to Disclose  
Glenn Erski MD: Nothing to Disclose  
Atabak Allaei MD: Nothing to Disclose  
Srinivas Kolla MD: Nothing to Disclose  
Scott Alan Lehto MD: Nothing to Disclose
TEACHING POINTS

Musculoskeletal imaging is a "species" of radiology well known for its varied and diverse eponymous findings and classification schemes. While many of these eponyms are related to the physician who first characterized the pathology on imaging, a subset of descriptions based upon an animal or part of an animal that the finding resembles, continue to thrive in modern interpretation. This presentation will provide a biographical background on the animal descriptors, a comparison of the classic imaging finding to its namesake and a discussion of the clinical importance of each finding.

TABLE OF CONTENTS/OUTLINE

Many eponymous animal findings related to musculoskeletal imaging are presented on radiograph, CT and/or MRI. Biographical background, illustrative images and the pathophysiology behind the image characteristics accompany each eponym. The animalistic signs to be discussed include: Head and Neck Leontiasis Ossea (Fibrous Dysplasia of the Facial Bone) Spine Fishmouth Vertebra Vertebral Scalloping Winking Owl (vertebral metastases) Butterfly Vertebra Butterfly Fracture Scotty Dog (visualization of normal vertebral anatomy) Extremities Fishtail Deformity of the Elbow Gull Wing (erosive osteoarthritis) Swan Neck Deformity (rheumatoid arthritis) Talar Beaking Anteater Nose (calcaneonavicular coalition)

MKE214

Looking for Uncommon Orthopedic Postoperative Complications

Education Exhibits
Location: MK Community, Learning Center

Participants
Sandra Baleato Gonzalez MD (Presenter): Nothing to Disclose
Joan C. Vilanova MD, PhD: Nothing to Disclose
Xavier Tomas-Battle MD: Nothing to Disclose
Luis Cerezal MD: Nothing to Disclose
Maria Cruz Ageitos Casais MD: Nothing to Disclose
Gabriel Carlos Fernandez MD: Nothing to Disclose

TEACHING POINTS

Postoperative imaging is critical for the prompt recognition of postoperative complications in order to minimize adverse patient outcomes. However, imaging identification of these complications is sometimes a radiologic challenge. The aim of this exhibit is:
1. To understand and illustrate several uncommon complications related to orthopedic surgical procedures
2. To discuss the appropriate selection of imaging modalities to provide optimal patient evaluation in these entities
3. To review their characteristic and imaging findings and recognize their typical signs.

TABLE OF CONTENTS/OUTLINE

Illustrate unusual complications after orthopedic surgery: - vascular - displacement; - storage (metallosis, cobalt intoxication) - neurologic - capsular contracture after prosthesis, and others... Advantages and limitations of each imaging technique for diagnosis these complications and a proper algorithm will be provided. Summary

MKE215

MR and Ultrasound Imaging of Musculoskeletal Injuries in Professional Male Soccer Players

Education Exhibits
Location: MK Community, Learning Center

Participants
Claudia Fontan MD: Nothing to Disclose
Lidianne Sousa Andrada Medina MD: Nothing to Disclose
Adonis Manzella MD (Presenter): Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:
1- to discuss the most common musculoskeletal injuries in professional male soccer players, emphasizing the role of each method in the diagnosis of such lesions
2- to illustrate using ultrasound and MR imaging musculoskeletal lesions found in 26 cases collected in our institution
3- to provide a brief review of the physiopathology of these types of injuries.

TABLE OF CONTENTS/OUTLINE

Soccer is one of the most popular sports in the world. Musculoskeletal injuries are common findings in this activity and represent a critical challenge for radiologists and medical teams staffs. Both ultrasound and magnetic resonance represent effective techniques not only to detect indirect injuries but also to accurately determine severity, location, and, consequently, the prognosis. This presentation will include:
1- Introduction/background
2- Physiopathology of musculoskeletal injuries in soccer players
3- Muscle injuries
4- Tendon lesions
5- Spine injuries
6- Meniscal tears
7- Other lesions

MKE216

MRI-Neurography: Why Is It Necessary to include a Diffusion-weighted Imaging Approach?

Education Exhibits
Location: MK Community, Learning Center
Certificate of Merit

Participants
Teodoro Martin MD (Presenter): Nothing to Disclose
Antonio Luna MD: Nothing to Disclose
Jordi Broncano MD: Nothing to Disclose
Jose Pablo Martinez Barbero MD, PhD: Nothing to Disclose

TEACHING POINTS
1. Review the main MRI neurography techniques for the evaluation of brachial and lumbar plexi as well as peripheral nerves. 2. Define the technical adjustments necessary to obtain high resolution neurographic sequences based on diffusion weighted and diffusion tensor imaging. 3. Illustrate with practical examples the utility of DWI and DTI-neurography for evaluation of both normal and pathological peripheral nerves and its advantages over morphological MRI-neurography techniques.

TABLE OF CONTENTS/OUTLINE
1. Introduction 2. Morphological MRI-neurography techniques : T2-TSE, STIR, 3D isotropic T1 and T2-weighted sequences, 3. Functional MRI neurography a. DWI neurography b. DTI neurography 4. Why to use DWI and DTI neurography: a. Advantages and disadvantages b. Integration in MRI protocols c. Technical and anatomical considerations d. 1.5 vs 3.0 Tesla 5. Clinical applications a. Brachial and lumbar plexopathy b. Carpal tunnel syndrome c. Pyramidal syndrome d. Peripheral nerve tumors SUMMARY The use of DWI based neurographic sequences allow not only a morphological approach to study nerve structures but also provides functional information. DWI and DTI parameters derived such as ADC, mean diffusivity or fractional anisotropy may be used as potential biomarkers of axonal nerve integrity.
not uncommon, and are often overlooked. Radial head injury is the most common associated injury in adults. Displacement of the pronator quadratus and scaphoid fat stripes are unreliable signs of occult distal radius and scaphoid fracture, respectively.

TABLE OF CONTENTS/OUTLINE

Plain radiographic images of effusions of large joints (e.g. knee, elbow, ankle etc) and selected small joints, with cross sectional imaging correlation. Discussion of the key plain radiographic imaging findings, underlying anatomy, and salient clinico-radiologic anecdotes.

**MKE221**

Rock Climbing Injuries – Acute and Chronic Repetitive Trauma

*Education Exhibits*

*Location: MK Community, Learning Center*

Certificate of Merit

**Participants**

Connie Y. Chang MD: Nothing to Disclose
Ambrose J. Huang MD: Nothing to Disclose
Martin Torriani MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

1. As indoor and outdoor rock climbing becomes an increasingly popular sport, it is important to be familiar with the type of injuries that can occur.
2. Climbing injuries occur in up to 82% of participants, and most commonly involve fingers, ankles, elbows, and shoulders.
3. Injuries are secondary to both acute trauma and chronic repetitive trauma/overuse, with the lower extremity having more acute traumatic injuries and the upper extremity having more overuse injuries.

**TABLE OF CONTENTS/OUTLINE**


**MKE222**

Roentgenography Hot Seat: Congenital Disorders and Anomalies of the Musculoskeletal System

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

Swati Deshmukh MD (Presenter): Nothing to Disclose
William Wallace Scott MD: Nothing to Disclose

**TEACHING POINTS**

A broad spectrum of congenital anomalies, disorders, and malformations have musculoskeletal manifestations. Recognition and accurate identification of characteristic findings on plain radiographs can be challenging, especially when dealing with rare or unusual diagnoses. The purpose of this exhibit is to expose radiologists to a series of stimulating and fun cases in order to help improve the radiologist's accuracy when facing congenital musculoskeletal lesions.

**TABLE OF CONTENTS/OUTLINE**

The cases will be presented in a quiz format. Key findings and pertinent differential diagnostic points will be highlighted in the discussion of each case. The list of cases includes: Chondrodysplasia punctata Spondyloepiphyseal dysplasia Neurofibromatosis Nail-Patella syndrome Sprengel's deformity Osteopoikilosis Club feet Melorheostosis Calcaneonavicular coalition Pseudoarthrosis Multiple hereditary exostosis Tuberous Sclerosis Poland Syndrome Osteogenesis Imperfecta Maffucci syndrome

**MKE226**

Soft Tissue Hemangioma: Variable Imaging Feature according to Their Different Component

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

Se Kyoung Park (Presenter): Nothing to Disclose
In Sook Lee: Nothing to Disclose
Jang Ho Suh MD: Nothing to Disclose

**TEACHING POINTS**

Soft tissue hemangioma has mixed components, which are composed of vascular element, fat, smooth muscle, fibrous tissue, hemosiderin, calcification and thrombus. Therefore, soft tissue hemangiomas can have various imaging features according to their different component.

The purpose of this exhibit is to analyze imaging features of soft tissue hemangioma with their different component in these cases.

**TABLE OF CONTENTS/OUTLINE**

Definition and nomanclatures of soft tissue hemangioma
Component of soft tissue hemangioma
MKE227

Triathlon Injuries: Trauma and Overuse Injuries of the Upper and Lower Extremities

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit

Participants
Daichi Hayashi MBBS, PhD (Presenter): Nothing to Disclose
Shaun Scheepers MBChB, FFARAD(D)SA: Nothing to Disclose
Ali Guermazi MD, PhD: President, Boston Imaging Core Lab, LLC Research Consultant, Merck KgaA Research Consultant, Sanofi-Aventis Group Research Consultant, TissueGene, Inc
Frank W. Roemer MD: Chief Medical Officer, Boston Imaging Core Lab LLC Research Director, Boston Imaging Core Lab LLC Shareholder, Boston Imaging Core Lab LLC
Richard V. De Villiers MMed: Nothing to Disclose

TEACHING POINTS
To describe epidemiology of triathlon injuries To illustrate types and mechanisms of acute and chronic injuries of the upper and lower extremities in triathletes To review importance of multimodality imaging, including x-ray, ultrasound, MRI and angiography in clinical management

TABLE OF CONTENTS/OUTLINE
1. Epidemiology of triathlon injuries 2. Pictorial review of triathlon injuries including illustration of each pathology and explanation of injury mechanisms Shoulder: subacromial bursitis; biceps tendinopathy; AC joint arthritis; supraspinatus tendinosis; biceps tenosynovitis; Paget-Schroetter syndrome Elbow/wrist: De Quervain's tenosynovitis; intersection syndrome Thigh/hip/groin: hip bursopathy; snapping hip syndrome; piniformis syndrome; osteitis pubis Knee: jumper's knee; patellofemoral stress syndrome; iliotibial band friction syndrome; meniscal tears; plica syndrome; popliteal artery entrapment syndrome; cystic adventitial disease; Morel-Lavallee syndrome Calf: stress fractures; medial tibial stress syndrome; chronic exertional compartment syndrome; delayed onset muscle soreness Ankle/foot: metatarsalgia, Achilles tendinopathy, retrocalcaneal bursitis, calcaneal stress fracture, plantar fasciitis, sural nerve entrapment
3. Role of multimodality imaging for treatment decisions and conclusion

MKE228

Utility of PET-MRI in Musculotskeletal Imaging

Education Exhibits
Location: MK Community, Learning Center

Participants
Ammar Ahmed Chaudhry MD (Presenter): Nothing to Disclose
Samantha D. Glass MD: Nothing to Disclose
Kevin S. Baker MD: Nothing to Disclose
Mingqian Huang MD: Nothing to Disclose
Robert Matthews MD: Nothing to Disclose
Dinko Franceschi MD: Nothing to Disclose
Elaine S. Gould MD: Nothing to Disclose

TEACHING POINTS
1- Review physical principles and techniques of PET-MRI (positron emission tomography-magnetic resonance imaging).
2- Discuss clinical utility of using functional information obtained from a PET scan and structural information obtained from MR imaging in evaluating musculoskeletal pathology.

TABLE OF CONTENTS/OUTLINE
Outline: 1. Physical principles and techniques of PET-MRI: review image acquisition and postprocessing 2. Utility of PET-MRI in oncology: role in initial tumor diagnosis, treatment planning and post-treatment follow-up 3. Role of PET-MRI in evaluation of infectious and inflammatory conditions (such as osteomyelitis, post-radiation changes, etc) 4. Pearls and Pitfalls: Common pitfalls and controversies regarding PET-MRI in musculoskeletal radiology. 5. Future of PET-MRI: Discuss current challenges facing PET-MRI in radiology. Conclusion: PET-MRI is an emerging hybrid imaging modality offering detailed functional and structural imaging with promising clinical applications especially in the field of oncology, infectious and inflammatory conditions. Familiarity with the technical and clinical aspects of PET-MRI along with knowledge of common pearls and pitfalls of PET-MRI will aid in better integration and relevant usage of this modality in clinical practice.

MKE229

Varus to Valgus: A Hip to Ankle Review of Abnormal Angulations within the Lower Extremity

Education Exhibits
Location: MK Community, Learning Center

Participants
Ian Amber MD (Presenter): Nothing to Disclose
Woojin Kim MD: Co-founder, Montage Healthcare Solutions, Inc Shareholder, Montage Healthcare Solutions, Inc Board of Directors, Montage Healthcare Solutions, Inc Advisory Board, Zebra Diagnostics Ltd
TEACHING POINTS

1. Understand how to characterize coxa vara and coxa valga, along with potential complications and surgical indications. 2. Understand how to characterize genu varum and genu valgum, along with their most common etiologies and complications. 3. Understand the normal angular measurements of the foot, along with the altered anatomy and morphology of talipes equinovarus, as well as the potential long term effects of treatment.

TABLE OF CONTENTS/OUTLINE

I. Describe the etiology and characterization of coxa vara, along with its associated complications. Discuss indications for surgery as well as the most common valgus-inducing femoral osteotomy procedures. II. Describe the characterization of coxa valga. Discuss potential complications and surgical indications. III. Describe the expected physiologic changes of knee angulation, along with the characterization of genu varum and genu valgum. Briefly discuss the differential considerations for each of the above described deformities, followed by potential complications. IV. Describe the normal angular measurements of the foot, along with the abnormalities associated with talipes equinovarus. Discuss the role of operative and non-operative treatment, as well as the risk of long term arthritic complications.

MKE231

‘Imaging the Groin beyond a Hernia’ - The Spectrum of Pathology Encountered in Musculoskeletal Radiology

Education Exhibits
Location: MK Community, Learning Center

Participants

Omar Azmat MBBS, FRCR (Presenter): Nothing to Disclose
Andrew J. Grainger MRCP, FRCR: Speaker, General Electric Company Equipment support, Siemens AG
Philip Robinson MBChB: Nothing to Disclose

TEACHING POINTS

The teaching points of this exhibit are: To explain the normal anatomy of the inguino-femoral region (groin) and understand the anatomical layers from superficial to deep where groin pathology may occur. To review a variety of non-hernia related groin pathology that a Musculoskeletal Radiologist may encounter, illustrating their typical location and imaging characteristics.

TABLE OF CONTENTS/OUTLINE

Table of contents/outline - Introduction Normal anatomy - A review of the normal anatomy of the groin using MRI and correlating each anatomical layer with a schematic representation Case mix - An illustration of non-hernia related groin pathology using the radiological modalities of plain film, ultrasound and magnetic resonance imaging (MRI) Summary - To conclude with the importance of understanding groin anatomy and realizing the variety of pathological findings a Musculoskeletal Radiologist may encounter once a hernia has been excluded.

MKE232

Don’t Get Stressed Out about Stress Fractures: Pattern Recognition of Atypical Fractures in Patients Using Long-Term Bisphosphonate Therapy

Education Exhibits
Location: MK Community, Learning Center

Participants

Rehan Riaz MD (Presenter): Nothing to Disclose
Shehbaz Shaikh MD: Nothing to Disclose
Matthew Brennan O'Brien MD: Nothing to Disclose
Ishani B. Dalal MD: Nothing to Disclose

TEACHING POINTS

1. Review the revised definition, epidemiology and characteristics of atypical femoral fractures. 2. Recognize the pattern of subtrochanteric fractures associated with bisphosphonate therapy and the appearance on radiographs, scintigraphy and MR imaging. 3. Increase awareness in the role of the Radiologist in early diagnosis and reducing patient morbidity. 4. Brief overview of current literature and evidence for prophylactic nailing improving patient outcomes.

TABLE OF CONTENTS/OUTLINE

I. Introduction to Bisphosphonates as a Drug II. Mechanism of atypical subtrochanteric femur fractures vs stress fractures Revised case definition by American Society of Bone and Mineral Research (ASBMR) III. Epidemiology of atypical femur fractures IV. Characteristic appearance using multimodality examples Radiographs Scintigraphy MR V. Case Examples VI. Brief overview of current literature and evidence for prophylactic nailing improving patient outcomes VII. Conclusion Radiographic findings play a crucial role in the workup of atypical fractures in patients using long-term Bisphosphonate therapy. The revised definition by the American Society of Bone and Mineral Research emphasizes the imaging characteristics to make a diagnosis. The use of prophylactic nailing is emerging to reduce patient morbidity.

MKE235

Imaging Characteristics of the Normal and Torn Ligamentum Teres on Hip MR Arthrography

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit

Participants

Rachel Shields MD (Presenter): Nothing to Disclose
Brian Giordano MD: Nothing to Disclose
Valery Khayfits MD: Nothing to Disclose
TEACHING POINTS
1. To illustrate the imaging characteristics of normal versus torn ligamentum teres on MR hip arthrography via a case based approach. 2. To provide the learner with a background on the clinical significance and current clinical approach related to ligamentum teres injuries.

TABLE OF CONTENTS/OUTLINE
- Normal MRI anatomy of the ligamentum teres on hip arthrography.

MKE236
MR Neurography of Sciatic Neuropathy In The Pelvis: Is It Only Piriformis Syndrome?

Education Exhibits
Location: MK Community, Learning Center

Participants
Gina Cho Sims MD (Presenter): Nothing to Disclose
Vibhor Wadhwa MBBS: Nothing to Disclose
Avneesh Chhabra MD: Research Grant, Siemens AG Research Consultant, Siemens AG Research Grant, Integra LifeSciences Holdings Corporation Research Grant, General Electric Company Consultant, ICON plc

TEACHING POINTS
1. Learn normal imaging anatomy of the sciatic plexus and nerve in the pelvis and its regional neuromuscular variations. 2. Gain knowledge of imaging appearances of various causes of sciatic neuropathy in the pelvis, apart from the more common piriformis syndrome. 3. Learn the systematic diagnostic approach towards the evaluation of such lesions.

TABLE OF CONTENTS/OUTLINE
1. Normal imaging anatomy of sciatic nerve and regional musculature on MR Neurography. 2. Table outlining various causes of pelvic sciatic neuropathy apart from piriformis syndrome, such as traumatic and iatrogenic (including thermal) injuries, sacral neuropathy, ischemia, infection, endometriosis, nerve sheath tumors including perineuroma, hereditary neuropathy, reverse ischiofemoral impingement, perineural cyst, amyloidosis, and heterotopic ossification. 3. Relevant case examples on MR Neurography with short discussion in a quiz format. 3. Outline a diagnostic algorithm approach towards the evaluation of such lesions.

MKE237
MRI of Hip Arthroplasty

Education Exhibits
Location: MK Community, Learning Center

Participants
Oscar Luis Casado Verdugo (Presenter): Nothing to Disclose
Estrella Prieto PhD: Nothing to Disclose
Maria Jose Ereno Ealo MD: Nothing to Disclose
Patricia Ruiz: Nothing to Disclose
Teresa Salinas: Nothing to Disclose

TEACHING POINTS
1. To discuss an appropriate MR protocol with tips to reduce susceptibility artefacts caused by metallic components. 2. To explain limitations and usefulness of MRI in assessing complications of hip arthroplasty. 3. To review the pathophysiology of the appearance of wear-synovitis, induced periprosthetic resorption and osteolysis. 4. To show the MR imaging findings of complications of hip arthroplasty.

TABLE OF CONTENTS/OUTLINE
Tips to reduce susceptibility artefacts caused by metallic components. Proposed MRI protocol for hip arthroplasty. Pathophysiology of the appearance of wear-synovitis, induced periprosthetic resorption and osteolysis. MRI findings of complications of hip arthroplasty including periprosthetic bone resorption and osteolysis with and without loosening, wear-induced synovitis, infection and abscesses, mechanical overload changes, periprosthetic collections / ALVAL lesions, heterotopic ossification, bursal and tendinous abnormalities. Value of intravenous contrast injection in the MRI diagnosis of complications associated to hip arthroplasty.

MKE239
Pain in the Butt: A Review of Extra-Articular Hip Pain

Education Exhibits
Location: MK Community, Learning Center

Participants
Roger J. Bartolotta MD (Presenter): Nothing to Disclose
Alice S. Ha MD: Nothing to Disclose

TEACHING POINTS
While fracture and arthritis are important initial considerations for acute and chronic hip pain, respectively, several extra-articular etiologies for 'hip' pain should be considered. This purpose of this exhibit is to: 1. Review the normal complex musculotendinous and bursal anatomy about the hip on magnetic resonance imaging. 2. Examine the pathophysiology and
imaging appearance of several common extra-articular causes of pain about the hip and buttock.

**TABLE OF CONTENTS/OUTLINE**

1. Gluteus: Anatomy, Calcific Tendinosis, Injury, Bursitis
2. Iliopsoas: Anatomy, Internal Snapping Hip Syndrome, Bursitis
3. Hip Adductors: Anatomy, Athletic Pubalgia
5. Osseous: Sacroiliitis, Stress/Insufficiency Fracture

**MKE240**

**Piriformis Syndrome: What Are We Imaging? A Review of Primary and Secondary Causes**

*Education Exhibits*

*Location: MK Community, Learning Center*

*Certificate of Merit*

**Participants**

- Ellie Song-Yi Kwak MD (Presenter): Nothing to Disclose
- Jonathan Khedoori Kazam MD: Nothing to Disclose
- Tony T. Wong MD: Nothing to Disclose

**TEACHING POINTS**

1. Understand anatomy of the sciatic nerve and greater sciatic foramen
2. Identify the anatomic causes in primary piriformis syndrome
3. Recognize various secondary causes of piriformis syndrome

**TABLE OF CONTENTS/OUTLINE**

1. Pre-test questions
2. Anatomy Review -Sciatic nerve anatomy -Greater sciatic foramen anatomy -Variations in the exit of the sciatic nerve out of the pelvis
3. Clinical features of piriformis syndrome
4. Primary causes of piriformis syndrome -Piriformis muscle hypertrophy -Intramuscular nerve roots -Accessory muscle slips -Anomalous origin of piriformis muscle
5. Secondary causes of piriformis syndrome -Myositis ossificans -Sacral schwannoma -Abscess from adjacent osteomyelitis -Soft tissue neoplasms -Gluteal hematoma -Post traumatic scarring
6. Answers and review of pre-test questions

**MKE241**

**Ultrasound Evaluation of Athletic Pubalgia**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Nicholas Morley MD (Presenter): Nothing to Disclose
- Thomas Howard Grant DO: Nothing to Disclose
- Kevin John Blount MD: Nothing to Disclose
- Imran Muhammad Omar MD: Nothing to Disclose

**TEACHING POINTS**

1. Describe the anatomy of the pubic symphysis and its ultrasound appearance
2. Discuss the scanning techniques and protocol for a tailored athletic pubalgia exam at ultrasound
3. Describe the findings seen in athletic pubalgia and its differential diagnosis at ultrasound

**TABLE OF CONTENTS/OUTLINE**

- Athletic pubalgia, also commonly called “sports hernia,” is a painful groin condition usually seen in athletic patients performing quick acceleration and side to side cutting. It represents a spectrum of injuries around the pubic symphysis, often resulting from a rectus abdominis-adductor longus aponeurosis tear. Previous studies have described the MRI appearance of athletic pubalgia, however, advantages of diagnosis at ultrasound include high resolution imaging and ability to direct imaging to the exact area of patient pain. The aim of this educational exhibit is to detail our institutional experience diagnosing athletic pubalgia at ultrasound. This includes an overview of the complex sono graphic appearance of pubic symphysis anatomy, our institutional scanning protocol for an athletic pubalgia exam, and to detail the findings of athletic pubalgia and its differential diagnoses. Suggestions for optimizing image acquisition while maintaining patient comfort are also included.

**MKE242**

**What the Radiologist Needs to Know about Hip Resurfacing Arthroplasty: Indications, Normal Radiologic Findings and Detection of Complications**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Carolina Luisa Calvo Corbella MD (Presenter): Nothing to Disclose
- Pablo Cendrero Cendrero: Nothing to Disclose
- Ana Sanchez Martin MD, PhD: Nothing to Disclose
- Begona Garcia Castano Gandiaga: Nothing to Disclose

**TEACHING POINTS**

After reviewing the presentation, the radiologist should be able to: - know which patients with hip disease could be appropriate
candidates for hip resurfacing arthroplasty. To evaluate conventional radiographs of the patient with normal and normal hip resurfacing arthroplasty. To detect the presence of complications specifically related to the hip resurfacing procedure in conventional radiographs. To indicate and detect presence of certain complications in the periprosthetic tissues in other techniques of imaging, such as MRI, CT or even US. To diagnose general complications associated with any type of hip arthroplasty.

**TABLE OF CONTENTS/OUTLINE**

Indications of the Hip Resurfacing Arthroplasty. Review of Imaging Findings:
- Conventional radiographs: Normal and abnormal positioning of both the femoral and acetabular components of the prosthesis. Complications specifically related to the hip resurfacing procedure: femoral neck notching, areas of stress shielding and neck fractures; avascular necrosis, loosening, osteolysis and metalosis. Conventional MRI: Metalosis (seudotumors, particle induced synovitis...). CT, US: general complications associated with any type of hip arthroplasty, such as dislocation, deep vein thrombosis and thromboembolic disease, vascular and neural damage. Sample cases

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### MKE244

**Broken Wings: Preoperative Imaging Indications for Open Reduction Internal Fixation of Scapular Fractures**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Alan Matthew Ropp MD (Presenter): Nothing to Disclose
- Derik L. Davis MD: Nothing to Disclose

**TEACHING POINTS**

1. Describe the function of the scapula as a dynamic stabilizer at the shoulder girdle.
2. Discuss the imaging, injury mechanism(s), classification, and management of complex intra-articular glenoid fractures requiring open reduction internal fixation (ORIF).
3. Recognize signs of trauma to the superior shoulder suspensory complex (SSSC) that result in uncommon unstable floating shoulder injuries.
4. Define rare isolated extra-articular scapular fractures that require ORIF.

**TABLE OF CONTENTS/OUTLINE**

Biomechanics of the scapula at the shoulder girdle Brief review of common indications for ORIF following scapular fracture Management, classification and imaging examples of complex intra-articular glenoid fracture - Isolated - Combined intra-articular + extra-articular scapular fracture patterns - Associated shoulder dislocation injuries Review of uncommon unstable floating shoulder injuries - Scapular neck + clavicle fractures - Scapular fracture + ligamentous injury - Double SSSC injuries with associated intra-articular fracture - Double SSSC injuries with associated scapular developmental anomalies Case examples of rare isolated extra-articular scapular fracture - Severely displaced coracoid process fracture - Severely displaced acromion process fracture - Angled acromion process fracture with impingement on rotator cuff

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### MKE247

**From Crescent to Delta- Understanding the Many Different Roles of the ABER Position on MRI Assessment of the Shoulder**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Waqar Aslam Bhatti MBCh (Presenter): Nothing to Disclose
- Gulraiz Sarfaraz Ahmad MBChB: Nothing to Disclose
- Shahrukh Raees Ahmad: Nothing to Disclose
- Brahah Chaouch Reda: Nothing to Disclose
- Muhammad Mubashar MBBS, FRCR: Nothing to Disclose
- Jawad Naqvi BSC, MBBS: Nothing to Disclose

**TEACHING POINTS**

1. To review current understanding and role of ABER. 2. To describe its importance in the assessment of post traumatic instability, rotator cuff and biceps tendon disease. 3. The role of ABER in micro-instability, glenohumeral alignment, capsular insertion type and inferior capsular morphology including the description of the delta sign and crescent sign in relation to instability.

**TABLE OF CONTENTS/OUTLINE**

A. Anatomy of the glenohumeral joint in the ABER position B. Technique for the performing the ABER position and tips in the evaluation. C. Existing uses for the ABER in the evaluation of the IGHL and the rotator cuff D. New role of the ABER position in the assessment of micro-instability - the crescent and the delta signs. E. ABER in the assessment of biceps and labral pathology F. Pitfall in evaluation of the ABER sequences.

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### MKE248

**Glenohumeral Osteoarthritis: Cross-sectional Imaging Findings the Orthopedic Surgeon Needs to Know Prior to Arthroplasty**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Erin Flaherty MD (Presenter): Nothing to Disclose
- Gregg William Bean MD: Nothing to Disclose
- Melissa Mei Chen MD: Nothing to Disclose
Glenohumeral osteoarthritis results in considerable disability, and affected patients have significant pain with activities and loss of motion. Shoulder arthroplasty is the mainstay of operative treatment when conservative measures fail. Good or excellent pain relief and restoration of function has been reported in 80% of those who have undergone hemiarthroplasty, and greater than 90% of patients with total shoulder arthroplasty. Preoperative planning for shoulder arthroplasty with cross-sectional imaging is critical in selecting the correct prosthesis for long-term success. With this exhibit, the learner should gain knowledge of:

- Important glenohumeral and rotator cuff pathologies/findings as demonstrated on CT and MRI that result in the need for or attribute to the success of shoulder arthroplasties
- Different types of arthroplasties and what imaging findings help determine which prosthesis will be used.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction to shoulder osteoarthritis
2. Review of the types of shoulder arthroplasties
3. Familiarization of the pathologic findings that influence the choice of arthroplasty and their CT and MR imaging findings
4. Pre-operative evaluation of the glenoid axis using 3D and 2D images through the true scapular axis

### MKE249

**Imaging of Anterior Glenohumeral Instability: What the Orthopedist Wants to Know**

**Education Exhibits**

**Location:** MK Community, Learning Center

**Participants**

- William J. Reed MD (Presenter): Nothing to Disclose
- Joseph Michael Bestic MD: Nothing to Disclose
- Hillary Garner MD: Nothing to Disclose
- Jeffrey James Peterson MD: Nothing to Disclose
- Daniel Edward Wessell MD, PhD: Research Consultant, Biomedical Systems

**TEACHING POINTS**

After viewing this exhibit the reader will be able to:

1. Explain the pathophysiology of anterior glenohumeral joint instability
2. Accurately quantify the extent of glenoid bone loss using Computed Tomography (CT) and Magnetic Resonance Imaging (MRI)
3. Understand the clinical ramifications associated with the extent of glenoid bone loss
4. Understand the multiple reconstructive surgical techniques for correcting anterior glenohumeral instability with emphasis on the Latarjet procedure (coracoid transfer to glenoid) and its normal and abnormal postoperative imaging appearance

**TABLE OF CONTENTS/OUTLINE**


### MKE250

**Imaging of the Acromioclavicular Joint: A Comprehensive Multimodality Review of Normal Anatomy, Pathology and Variants**

**Education Exhibits**

**Location:** MK Community, Learning Center

**Participants**

- Adam Noah Rucker MD: Nothing to Disclose
- Anthony Dennis Mohabir MD: Nothing to Disclose
- Jarett Burak MD: Nothing to Disclose
- Michael Brown MD: Nothing to Disclose
- Daniel M. Walz MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

The Purpose of this Exhibit is:

1. To explain the role imaging plays in diagnosing various post-traumatic, degenerative, inflammatory and developmental conditions.
2. To allow the viewer to gain an understanding of the important clinical implications and treatment options related to various pathologic conditions of the AC joint and how a correct imaging diagnosis can lead to more focused and effective therapy.
3. To review variant and pathologic developmental anatomy of the AC joint.

**TABLE OF CONTENTS/OUTLINE**


### MKE252

**MR Imaging of Rotator Cuff Repair: Pearls and Pitfalls**

**Education Exhibits**
Participants
Anthony Samir Tadros  MD (Presenter): Nothing to Disclose
Karen Chi-Lynn Chen  MD : Nothing to Disclose
Brady Kirk Huang  MD : Nothing to Disclose
Eric Y. Chang  MD : Nothing to Disclose

TEACHING POINTS
1. MR appearance of the repaired rotator cuff varies with time. 2. Patterns of rotator cuff repair failure are highly dependent on repair techniques. 3. Postoperative rotator cuff tears may not correlate with clinical outcomes.

TABLE OF CONTENTS/OUTLINE

MKE253
Postoperative Imaging after Shoulder Surgery: Spectrum of Normal and Abnormal Findings
Education Exhibits
Location: MK Community, Learning Center

Participants
Jung-Ah Choi  MD (Presenter): Nothing to Disclose
Joo Han Oh  MD : Nothing to Disclose
DaeHyun Hwang MD, PhD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the spectrum of normal postoperative imaging findings after shoulder surgery, including rotator cuff surgery, labrum surgery, and arthroplasty 2. To review typical abnormal postoperative imaging findings, after shoulder surgery, such as recurrent cuff tear, recurrent labral tear, periprosthetic complications and infection

TABLE OF CONTENTS/OUTLINE
Spectrum of normal postoperative findings after rotator cuff surgery, labrum surgery, total and reverse total shoulder replacement arthroplasty - Radiography - MR imaging/MR arthrography - CT arthrography - ultrasound Spectrum of abnormal postoperative imaging findings after rotator cuff surgery, labrum surgery, shoulder arthroplasty - recurrent rotator cuff tear, labral tear - periprosthetic complications: breakage, loosening - infection Summary/Conclusion

MKE254
Scapulothoracic Bursitis and Snapping Scapula Syndrome
Education Exhibits
Location: MK Community, Learning Center

Participants
Walter Alan Osias  MD (Presenter): Nothing to Disclose
Eric Allan White  MD : Nothing to Disclose
Matthew Raymond Skalski DC : Nothing to Disclose
Aaron Schein MD : Nothing to Disclose
Dakshesh Bhulabhai Patel MD : Nothing to Disclose
George Robert Matcuk  MD : Nothing to Disclose
Deborah M. Forrester  MD : Nothing to Disclose
George Hatch MD : Nothing to Disclose

TEACHING POINTS
This project aims to provide a thorough and current review of scapulothoracic bursitis and the snapping scapula syndrome and educate the radiologist about imaging findings, diagnosis, and management.

TABLE OF CONTENTS/OUTLINE
-Review the anatomy of the scapulothoracic articulation including its major components; the bony structure, muscular anatomy, scapulothoracic bursae, and neurovascular anatomy. -Describe the different causes of STB and snapping scapula syndrome, and their appearances on radiography, CT, MRI and ultrasound. -Discuss the clinical manifestations of STB and snapping scapula syndrome including crepitus and specific neuromuscular deficits. -Examine treatment options including ultrasound or CT guided aspiration and/or injection, resection of osseous lesions such as osteochondromas, superomedial angle scapular resection, and bursectomy.

MKE255
Shoulder Arthroplasty, from Indications to Complications: What the Radiologist Needs to Know
Education Exhibits
Location: MK Community, Learning Center
Selected for RadioGraphics

Participants
Dana Lin MD (Presenter): Nothing to Disclose
TEACHING POINTS

1. Review the major clinical indications for shoulder arthroplasty and their key imaging features.
2. Understand the role of preoperative imaging and review the normal imaging appearance of different shoulder arthroplasties.
3. Understand the role of multimodality imaging for evaluation of postoperative complications.

TABLE OF CONTENTS/OUTLINE

1. Pre-test questions
2. Review of clinical indications and key imaging features
   - Osteoarthrosis
   - Inflammatory Arthritis
   - Rotator Cuff Arthropathy
   - Proximal Humerus Fractures
   - Avascular Necrosis
   - Failed Prior Shoulder Arthroplasty
3. Preoperative imaging and normal postoperative appearance of shoulder arthroplasties with key imaging features
   - Total Shoulder Arthroplasty
   - Hemiarthroplasty
   - Resurfacing Arthroplasty
   - Reverse Total Shoulder Arthroplasty
4. Multimodality imaging of postoperative complications including ultrasound and metal reduction MRI
   - Loosening
   - Instability
   - Rotator Cuff Tear
   - Periprosthetic Fracture
   - Infection
   - Deltoid Dysfunction
5. Answers and review of pre-test questions

MKE256

Subscapularis: All about the Forgotten Rotator Cuff Tendon

Education Exhibits
Location: MK Community, Learning Center
Certificate of Merit

Participants
Maria Jose Ereno Ealo MD (Presenter): Nothing to Disclose
Alberto Sanchez Sobrino: Nothing to Disclose
Oscar Luis Casado Verdugo: Nothing to Disclose
Rosa Monica Rodrigo Del Solar: Nothing to Disclose
Eva Llopis MD: Nothing to Disclose
Silvia Martin MD: Nothing to Disclose

TEACHING POINTS

1. To review the anatomy and pathophysiology of the subscapularis (SSC) tendon.
2. To describe the role of different imaging techniques in the evaluation of the pathology of the SSC.
3. To correlate the point of view of radiologists and arthroscopists before and after treatment.

TABLE OF CONTENTS/OUTLINE

The subscapularis (SSC) is the largest of the 4 rotator cuff muscles. However, SSC tendon lesions are difficult to find, especially partial ones, and many authors called them "hidden lesions." We analyze this issues: - The anatomic footprint of the SSC tendon. Function and role in the stability of the shoulder. - Pathophysiology of SSC tendon tears. - Relationship of SSC tendon tears to other shoulder lesions. - Diagnosis of SSC dysfunction. - The physical examination maneuvers. - Review of imaging findings. - Ultrasonography (US). - Computed Tomography (CT). - Conventional and arthro- MRI. - New aspects of treatment of the SSC. - Correlation radiology-arthrography. - Images and videos. - Cases

MKE259

The Scapula: What Every Radiologist Needs to Know

Education Exhibits
Location: MK Community, Learning Center

Participants
Parisa Mazaheri (Presenter): Nothing to Disclose
Laura Marie Fayad MD: Nothing to Disclose
Shadpour Demehri MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to: 1. Review the clinically relevant anatomical and embryological features of the scapula and their implications. 2. Describe clinical features of scapular pathologies. 3. Highlight the radiographic characteristics of a wide spectrum of pathologies involving the scapula. 4. Characterize and highlight the value of cross-sectional imaging in detection of various pathologies of the scapula which otherwise could be challenging to characterize using plain radiography. 5. Provide
examples of CT and MR images for various pathologies. 6. Discuss the differential diagnosis and, overlap features, and how not to misdiagnose the lesions.

TABLE OF CONTENTS/OUTLINE

- Anatomy of the scapula  
- Review of imaging findings of a wide spectrum of scapular pathologies and sample cases
  - Congenital anomalies  
  - Os acromial  
  - Spregel’s deformity  
  - Glenoid dysplasia  
  - Traumatic injuries  
  - Benign scapular lesions  
  - Chondroblastoma  
  - Hemangioma  
  - Malignant scapular lesions  
  - Chondrosarcoma  
  - Osteosarcoma  
  - Ewing’s and PNET Sarcoma  
  - Others

MKE260

Total Assessment of Shoulder Arthroplasties: What the Surgeon Looks for Preop, Intra-op, and Post-op

Education Exhibits

Location: MK Community, Learning Center

Participants

Nicholas Marc Beckmann MD (Presenter): Nothing to Disclose
Manickam Kumaravel MD, FRCR: Nothing to Disclose
Susanna Claire Spence MD: Nothing to Disclose

TEACHING POINTS

1. Preoperative factors that affect shoulder arthroplasty type and placement. 2. How surgeons determine adequate hardware positioning of shoulder arthroplasties. 3. Common intra-operative and post-operative complications of shoulder arthroplasties.

TABLE OF CONTENTS/OUTLINE


MKE262

Atypical MR Findings of Early Spondylodiscitis Mimicking Other Lesions

Education Exhibits

Location: MK Community, Learning Center

Certificate of Merit

Participants

Hie Bum Suh MD (Presenter): Nothing to Disclose
In Sook Lee: Nothing to Disclose
You Seon Song: Nothing to Disclose
Jong Woon Song: Nothing to Disclose

TEACHING POINTS

Early presentation of spondylodiscitis may have an atypical MR findings mimicking neoplasm or acute inflammatory conditions or traumatic conditions. In the iatrogenic infectious conditions, atypical imaging findings at unusual sites may be seen. To avoid delay diagnosis of spondylodiscitis, radiologists should be familiar with atypical MR findings of early spondylodiscitis and it is important to differentiate from other lesions with similar findings.

TABLE OF CONTENTS/OUTLINE

- Only thin epidural enhancement - differentiation from non-specific inflammatory conditions
- Single vertebral body involvement - mimicking neoplasm
- Similar Modic changes, especially type I
- Similar acute Schmorl’s node - extensive bone marrow edema
- Similar acute compression fractures - paraspinal signal intensity obliterating fat plane
- Facet joint or linear back muscle enhancement - iatrogenic infection

MKE264

Extraspinal Incidental Findings on MRI of the Cervical, Thoracic, and Lumbar Spine for the Musculoskeletal Radiologist

Education Exhibits

Location: MK Community, Learning Center

Participants

Elisabeth Garwood MD (Presenter): Nothing to Disclose
Daria Motamedi MD: Nothing to Disclose
Cameron H. Gates DO: Nothing to Disclose
Joshua J. Leeman MD: Nothing to Disclose
Brian MacNeill Everist MD: Nothing to Disclose
Lynne S. Steinbach MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to review a series of incidental findings on spine MRI with the goal of demonstrating: 1. Incidental findings on spine MR are common and demonstrate variable clinical significance. 2. Incidental findings may only be present on the localizer sequence, partially imaged in the narrow field of view, obscured by saturation bands, or incompletely characterized. 3. Incidental findings may be easy to miss if a structured approach is not employed.

TABLE OF CONTENTS/OUTLINE
Brief literature review of extraspinal incidentals: Presentation of cases by anatomic region.


MKE265

Facet Joint Syndrome: A Comprehensive Approach for the Radiologist

Education Exhibits

Location: MK Community, Learning Center

Participants

Hugues Gilles Brat MD (Presenter): Research Consultant, Medtronic, Inc
Tino Tancredi MD: Nothing to Disclose
Dominique Fournier MD: Nothing to Disclose
Tarik Bouziane MD: Nothing to Disclose

TEACHING POINTS

1. To understand complexity of facet joint syndrome
2. To differentiate facet joint related pain and disability from other causes
3. To use appropriate evaluation methods and diagnostic modalities
4. To use an age-related management algorithm for suspected facet joint related back pain
5. To understand current treatment options with their limitations and success rates

TABLE OF CONTENTS/OUTLINE

1. Definition of facet joint syndrome
2. Epidemiology
3. Clinics Clinical presentation and physiopathology
   Red and yellow flag signs
   Spine and 'other-than-spine' differential diagnosis of facet joint syndrome
4. Diagnosis Physical examination
   Pain and disability evaluation: VAS and Roland-Morris Disability Questionnaire (RMDQ)
   When to use imaging? Imaging strategy (focus on contrast-enhanced MRI and SPECT-CT)
   Semi-invasive diagnosis (CT-guided facet block)
5. Treatment Proposal of an age-related algorithm
   Physical treatment and medication strategy
   Levels of evidence
   Intra-articular or peri-articular facet joint infiltration
   Radiofrequency facet denervation/neurotomy
   Multidisciplinarity and follow-up
6. Conclusion Take home messages

MKE267

Intraspinal Calcifications or Ossifications: "Where Are They from?"

Education Exhibits

Location: MK Community, Learning Center

Participants

Seon-Jeong Kim MD (Presenter): Nothing to Disclose
Ok Hwa Kim: Nothing to Disclose
Sun Joo Lee MD: Nothing to Disclose
Hye Jung Choo MD: Nothing to Disclose
Jae Hyuck Yi MD: Nothing to Disclose
Kil Ho Cho: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To review various causes, pathophysiologies and clinical relevancies of intraspinal calcifications/ossifications
2. To present imaging findings of various disorders that can manifest as intraspinal calcifications/ossifications

TABLE OF CONTENTS/OUTLINE

Pathophysiologic, clinical relevancces, and imaging findings of disorders that can manifest as intraspinal calcifications/ossifications categorized into 5 groups based on their etiopathogenesis:
- Degenerative/arthritides
- Calcified intervertebral disc herniation
- Ossification of posterior longitudinal ligament
- Ossification of lamina
tum flavum
- Calcified facet joint synovial cyst
- CPPD
- Infectious/Inflammatory disease
- Tuberculosis
- Brucellosis
- Cysticercosis
- Paragonimiasis
- Sarcoidosis
- Neoplastic
- Calcified meningioma
- Osteoblastoma
- Osteochondroma
- Chondrosarcoma
- Osteosarcoma
- Iatrogenic
- Vertebroplasty/Kyphoplasty
- Steroid injection
- Miscellaneous
- Arachnoiditis ossificans
- Calcified dural plaque
- Retropulsion of burst fracture
- Calcification in epidural hematoma

MKE268

Magnetic Resonance Neurography (MRN) of the Lumbosacral Plexus

Education Exhibits

Location: MK Community, Learning Center

Participants

Vinicio Neves Marcos MD: Nothing to Disclose
Francisco Julio Muniz Neto MD (Presenter): Nothing to Disclose
Vitor Serrao Margotto MD: Nothing to Disclose
Tahan Rivas Tirapani MD: Nothing to Disclose
Victor Hada Sanders MD: Nothing to Disclose
Joao Carlos Rodrigues MD: Nothing to Disclose
Atul Kumar Taneja MD: Nothing to Disclose
Laercio A. Rosemberg MD: Nothing to Disclose
Marcelo Buarque Gusmao Funari MD: Nothing to Disclose
TEACHING POINTS

• MRN adds relevant imaging information in the clinical work-up of neuropathy involving the lumbosacral plexus, especially when electrophysiological tests are inconclusive. The key imaging findings related to neuropathies of the lumbosacral plexus detected by MRN include abnormal course, thickening, high signal intensity and contrast-enhancement of the nerve.

TABLE OF CONTENTS/OUTLINE

A. Suggested MRN protocol and sequences parameters, as performed in our institution. B. Clinical indications to perform MRN of the lumbosacral plexus, using both scientific literature and authors' experience. C. Normal anatomy of the lumbosacral plexus, main anatomic variants and illustrative pathologies related to the lumbosacral plexus will be presented in cases with clinical history and MR images. D. Additional and secondary findings related to denervation will also be discussed.

MKE270

MRI of the Psoas Major Muscle: Anatomy, Anatomical Variants and a Catalogue of Pathologies Affecting the Muscle

Education Exhibits
Location: MK Community, Learning Center

Participants
Claude Pierre-Jerome MD, PhD: Nothing to Disclose
Mehdi Sadat Akhavi (Presenter): Nothing to Disclose
Hasan Banitalebi MD: Nothing to Disclose

TEACHING POINTS

1) Review of the anatomy and biomechanical role of the psoas muscle in the motion of the trunk and spine, 2) presentation of both frequent and rare anatomical variants of the psoas muscle 3) role of MRI in imaging the pathological psoas.

TABLE OF CONTENTS/OUTLINE

This exhibit will display: 1) MR images of the normal psoas in three planes with emphasis on the insertion points and origin of the muscle and its relationship with the intervertebral disc, 2) illustration of the vascular supply to the psoas, 3) illustration of the innervation of the psoas, 4) the diverse anatomical variants of the psoas such as: a) asymmetry of the insertion of the psoas, b) abnormal low insertion points below L1 level, c) asymmetry of the psoas size, d) unusual bilateral convex shape of the psoas, and e) unilateral absence of the psoas. The pathologies of the psoas will include: muscular hematoma and bleeding, muscle contusion, muscle tear, myositis ossificans, unilateral atrophy, bilateral atrophy, atrophy of the psoas associated with atrophy of the paraspinal muscles, atrophy and deformity of the psoas muscle associated with scoliosis, psoas edema, isolated psoas abscess and psoas abscess associated with spondylodiscitis.

MKE271

MultiModality Imaging Signs of Spondlylolysis and Isthimic Listhesis Revisited

Education Exhibits
Location: MK Community, Learning Center

Participants
Rammohan Vadapalli MD (Presenter): Nothing to Disclose
Raghavadutt Mulukutla MChir: Nothing to Disclose
Harshavardhan KR MD: Nothing to Disclose
Abhinav Sriram Sriram Vadapalli: Nothing to Disclose
Prasad Gunturi: Nothing to Disclose

TEACHING POINTS

List and Illustrate the Imaging signs of Isthimic Spondlylolysis and Listhesis on CT, MRI, F18 PET CT.

TABLE OF CONTENTS/OUTLINE

Pars Defect sign on CT with broken neck of Scotty Terrier pattern Pars defect on MRI The Edema sign on STIR Sag MRI The Edema sign on PET CT The Edema Sign with Neighbourhood enhancement The Napolean hat sign The Inverted napolean hat Sign The Wide canal Sign Abnormal posterior Wedge Sign or Spinous Process Step off Sign The Horizontal neural Foramen Sign. The Fat Isthmus Sign. The above signs are described illustrated with clinical examples

MKE272

Spondylodiscitis; What Radiologists Need to Know

Education Exhibits
Location: MK Community, Learning Center

Participants
Najmeh Rohani MD (Presenter): Nothing to Disclose
Oleg Teytelboym MD: Nothing to Disclose

TEACHING POINTS

Become familiar with typical clinical presentations of spinal infections. Understand imaging findings in spinal infection. Become aware of potential interpretative pitfalls. Understand various imaging options including CT, MRI, FDG PET-CT, and nuclear medicine. Identify challenges in follow up and evaluating response to treatment.

TABLE OF CONTENTS/OUTLINE

Epidemiology and typical clinical presentations of spinal infections.
MKE273

The Sternal-rib Complex Is the Fourth Column of the Thoracic Spine: 3D Modeling of Its Role in the Mechanism of Injury to the Chest Wall and Spine

Education Exhibits
Location: MK Community, Learning Center

Magna Cum Laude

Participants
Bradley John Carra MD (Presenter): Nothing to Disclose
Liem Thanh Mansfield MD: Nothing to Disclose
Michael Jason Reiter DO: Nothing to Disclose

TEACHING POINTS

The three-column model of the spine is widely recognized and used to classify the stability of spinal fractures. The sternal-rib complex has been shown to provide additional stability to the thoracic spine and as such has been designated the lesser known fourth column of the thoracic spine. Disruption of the sternal-rib complex can contribute to destabilization of the spine after injury and this should be recognized during assessment of stability. The biomechanical relationship between the sternal-rib complex and thoracic spine leads to specific osseous and soft tissue injury patterns in trauma and results in sternal insufficiency fractures after multiple thoracic spine osteoporotic fractures. The anatomy and biomechanics of the thoracic cage, mechanisms of traumatic and atraumatic sternal fractures, and associated injuries will be reviewed.

TABLE OF CONTENTS/OUTLINE

1. Review concept of three-column model of spine
2. Review anatomy of biomechanics of the thoracic cage
3. Illustrate stabilization of the thoracic cage by the sternal-rib complex, the so-called fourth column of the thoracic spine
4. Review mechanisms of both traumatic and osteoporotic insufficiency fractures of the sternum with three-dimensional computer animations
5. Describe life-threatening thoracic injuries associated with traumatic thoracic cage fractures

MKE274

Utility of MRI of the Spine in Axial Spondiloarthritis

Education Exhibits
Location: MK Community, Learning Center

Participants
Ana Alonso-Torres MD (Presenter): Nothing to Disclose
Felix Guerra-Gutierrez PhD: Nothing to Disclose
Juan Jesus Gomez-Herrera PhD: Nothing to Disclose
Franziska Charlotte Elisabeth Baudraxler PhD: Nothing to Disclose
Víctor Manuel Suarez-Vega PhD: Nothing to Disclose
Jaime Fernandez-Cuadrado: Nothing to Disclose
Fernando Ybanez-Carrillo PhD: Nothing to Disclose

TEACHING POINTS

- To understand the relevance of spine involvement in Axial Spondyloarthritis (SpA).
- Description of characteristic spinal MRI lesions in Axial SpA: Inflammatory and structural changes, with radiographic correlation.
- To discuss the role of MRI as a biological marker of disease activity: definition of positive MRI of the spine, and utility for monitoring.

TABLE OF CONTENTS/OUTLINE


MKE275

Above and beyond Digital Tomosynthesis: Emphasis on Musculoskeletal Application

Education Exhibits
Location: MK Community, Learning Center

Participants
Seun Ah Lee MD (Presenter): Nothing to Disclose
Eun Sil Kim: Nothing to Disclose
Seon Jeong Oh: Nothing to Disclose
Jung Won Choi: Nothing to Disclose
Baek Hyun Kim MD: Nothing to Disclose
Kyung-Sik Ahn MD: Nothing to Disclose
Chang Ho Kang MD: Nothing to Disclose
Suk-Joo Hong MD: Nothing to Disclose

TEACHING POINTS
1. To review the history and basic principles of digital tomosynthesis. 2. To introduce current experimental and clinical applications of digital tomosynthesis. 3. To understand the benefits and limitations of digital tomosynthesis. 4. To understand the role of digital tomosynthesis as a problem solver in the musculoskeletal part during daily clinical practice.

TABLE OF CONTENTS/OUTLINE
1. Background and basic principles of digital tomosynthesis with illustration. 2. Current experimental and clinical applications of digital tomosynthesis in other sub-specialties. 3. Pros and cons of digital tomosynthesis. 4. The potential applications of digital tomosynthesis in the musculoskeletal part with sample cases. (1) Trauma: fracture detection, follow-up for fracture healing (callus formation, evaluation of union status at the fracture site with/without metallic implant) (2) Arthroplasty: periprosthetic loosening (3) Arthrography: wrist arthrography for triangular fibrocartilage complex tear (4) Arthritis: bone erosion, joint space narrowing for rheumatoid arthritis, osteoarthritis, sacroiliitis, and gout (5) Bone tumor: tumor evaluation, follow-up after tumor curettage (6) Others: avascular necrosis, osteochondrosis, crystal deposition disease

MKE276
An Automated 3D Kinematic Measurement for Total Joint Arthroplasty Using X-ray Fluoroscopic Images

Education Exhibits
Location: MK Community, Learning Center

Participants
Takaharu Yamazaki PhD (Presenter): Nothing to Disclose
Ryogo Kamei: Nothing to Disclose
Tetsuya Tomita MD: Nothing to Disclose
Hideki Yoshikawa MD: Nothing to Disclose
Kazuomi Sugamoto MD: Nothing to Disclose

TEACHING POINTS
1. To experience the benefits of an automated 3D kinematic measurement for total joint arthroplasty (TJA) using x-ray fluoroscopic images 2. To understand the 3D kinematics for the different types of joint motion after TJA including knee, hip, elbow and ankle in order to improve surgical techniques.

TABLE OF CONTENTS/OUTLINE
Outline: Quantitative assessment of 3D dynamic motion after TJA is very important for understanding the effects of joint diseases, dysfunction and for evaluating the outcome of surgical procedures. This exhibit demonstrates an automated 3D kinematic measurement system using x-ray fluoroscopic images, and also present various 3D kinematics for TJA. This system can be a strong motivation for orthopaedic surgeon to improve surgical techniques.

MKE277
Angle-sensitive Magnetic Resonance Imaging of Articular Cartilage (ASMRIC)

Education Exhibits
Location: MK Community, Learning Center
Certificate of Merit

Participants
Nikita Garnov (Presenter): Nothing to Disclose
Wilfried Gruender PhD: Nothing to Disclose
Thomas Kurt Kahn MD: Nothing to Disclose
Harald F. Busse PhD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To make ASMRIC understandable for radiologists To demonstrate its capabilities for in-vivo analysis of articular cartilage To discuss initial results and promises of ASMRIC

TABLE OF CONTENTS/OUTLINE
Angle-Sensitive Magnetic Resonance Imaging of Cartilage (ASMRIC) Physics background Cartilage ultrastructure model MR intensity behavior Measurement requirements ASMRIC analysis Orientation-dependent MR images Weight-bearing measurements Native cartilage analysis in vivo Results and Discussion Experimental results Clinical applications Strengths, limitations/issues and promises of the technique

MKE278
Approaches to the Upper Cervical Spine for Percutaneous Vertebroplasty

Education Exhibits
Selected for RadioGraphics

Participants

Idan Genah MD (Presenter): Nothing to Disclose
Sebastien Touraine MD: Nothing to Disclose
Caroline Parlier MD: Nothing to Disclose
Bassam Hamze MD: Nothing to Disclose
Valerie Bousson: Nothing to Disclose
Elodie Sibleau MD: Nothing to Disclose
Jean-Denis Laredo MD: Research Consultant, Cardinal Health, Inc Research Consultant, Laurane Medical Research Consultant, F. Hoffman-La Roche Ltd Research Grant, SERVIER

TEACHING POINTS

To describe different approaches for performing percutaneous vertebroplasty of the upper cervical spine. To present an original transvertebral approach of C1 and C2 under fluoroscopic control. To discuss the advantages and disadvantages of surgical approaches used and described in the literature.

TABLE OF CONTENTS/OUTLINE

Destruction processes especially metastasis of C1 and C2 put the bulb and spinal cord at risk. Surgical approach to this skeletal site carries some risk of bleeding, vascular and nervous lesions, and anaesthetic risk. Interest for vertebroplasty of C1 and C2 is therefore obvious. Due to variety in the exact location of bone destruction area and vital anatomical structures, several approaches are needed. Percutaneous vertebroplasty remains for the upper cervical spine a challenging procedure because major vessels, nerves, the airway, often intervene in the projected needle path. In this presentation, we review the five different approaches used for vertebroplasty of upper cervical spine (anterolateral, transvertebral, posterolateral, lateral and transoral approach), focusing on the relevant anatomy, technical aspects, and advantages and limitations of each approach.

MKE279

Crying Out for Pain Relief with Cryoablation and Cementation for Pelvic Osseous Metastases

Education Exhibits

Participants

Brathaban Rajayogeswaran MBBCh (Presenter): Nothing to Disclose
Neal C. Chhaya MBBS, FRCR: Nothing to Disclose
Paul Ian Mallinson MBChB: Nothing to Disclose
Peter L. Munk MD: Nothing to Disclose

TEACHING POINTS

To review the patient selection procedure for cryoablation and cementation of pelvic osseous metastasis, principles of cryoablation, planning of intervention, potential complications of cryoablation and cementation, post procedural imaging.

TABLE OF CONTENTS/OUTLINE

Osteolytic metastases are painful in 70% of patients and cause considerable loss of function and decreased quality of life. Radiotherapy alone is usually unable to control the pain, and increasing opiates usage causes significant morbidity. Cryoablation and cementation is offered as an adjunct in our institute as a minimally invasive palliative procedure providing instant reduction in pain and improving structural integrity.

Our pictorial review demonstrates the integration of multiple disciplinary care with techniques of cryoablation and cementation of variety of pelvic lesions.
1) Consideration of cryoablation in palliative care patients with pelvic metastases and pathological fractures.
2) Description of the principles of cryoablation and cementation.
3) Pictorial review of position and probe size selection to create a satisfactory ablation zone.
4) Discussion on techniques to minimise procedural complications.
5) Principles of reviewing post procedural imaging.

MKE280

CT-Guided Pain Interventions of the Spine

Education Exhibits

Participants

Michael Gregory Rodriguez MD (Presenter): Nothing to Disclose
Tatum Adams Mcarthur MD: Nothing to Disclose
Samuel J. Galgano MD: Nothing to Disclose

TEACHING POINTS

1. To review the various CT-guided pain interventions that can be performed in the cervical, thoracic, and lumbar spine.
2. To review the indications and contraindications for performing CT-guided pain interventions in the spine.
3. To discuss the techniques in performing CT-guided pain interventions in the spine.
4. To review the complications associated with CT-guided pain interventions in the spine.
5. To review the advantages and disadvantages of performing pain interventions in the spine using CT versus fluoroscopy.

TABLE OF CONTENTS/OUTLINE

**MKE282**

**Diffusion Weighted MRI: MSK Applications - Merits and Disadvantages**

*Education Exhibits*

*Location: MK Community, Learning Center*

Certificate of Merit

**Participants**

Avneesh Chhabra MD (Presenter): Research Grant, Siemens AG Research Consultant, Siemens AG Research Grant, Integra LifeSciences Holdings Corporation Research Grant, General Electric Company Consultant, ICON plc

Stephen Fisher MD: Nothing to Disclose

Robert N. Joodi MD: Nothing to Disclose

Lulu Tenorio MD: Nothing to Disclose

Gina Cho Sims MD: Nothing to Disclose

**TEACHING POINTS**

1. Learn the technical considerations of Diffusion (DWI) techniques including diffusion tensor imaging (DTI). 2. Learn the normal and abnormal appearances of musculoskeletal soft tissues and peripheral nerves on DWI. 3. Learn the role of ADC in benign versus malignant bone and soft tissue lesions, and role of DTI parameters (FA and ADC) and tractography in neuromuscular lesions. 4. Gain knowledge of the artifacts and imaging pitfalls on DWI.

**TABLE OF CONTENTS/OUTLINE**

1. Technical considerations of DWI and DTI. 2. Normal DWI and DTI qualitative imaging appearances as well as ADC and FA values of relevant musculoskeletal structures (fluid, fat, muscles, nerves, bones). 3. Discussion of role of DWI in malignancy detection, tumor grading and post-treatment response. 4. Discussion of role of DTI in neuromuscular imaging including tractography. 5. Application of DWI in whole body imaging. 6. Imaging pitfalls and artifacts.

**MKE283**

**Elite Soccer Players and Platelet Rich-plasma Injection: Why Radiologist Is Important?**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

Lourdes Guillen Vargas MD (Presenter): Nothing to Disclose

Pilar Ferrer Ripolles: Nothing to Disclose

Luisa Arinyo Montaner: Nothing to Disclose

Moises Hernando MD: Nothing to Disclose

**TEACHING POINTS**

To show the indications, technique and results of US-guided platelet rich plasma injection in MSK injuries in elite soccer players.

**TABLE OF CONTENTS/OUTLINE**

A. PLATELET RICH PLASMA PHYSIOLOGY'S Volume of the plasma fraction having a platelet concentration above baseline. Growth factors play a central role in the healing process and tissue regeneration. B. INDICATION In soccer players, tendons are vulnerable to injury and stubborn to heal. In this kind of patients, it is very important to have a shorten recovery time and effective healing. C. HOW WE DO IT 38 ultrasound guided infiltrations were performed in 18 male patients, mean age 24.5 yo. HD15 ultrasound, linear probe L12-5 and L15-7io, centrifuge and 20-22G needles are used. 30 ml blood patient is extracted, then 15 minutes spin at 3,200 rpm. About 3-4 ml of PRP are separated. We proceed to inject PRP intra and perilesion under US-guidance. Injection is avoided if there are signs of local inflammation or infection. D. OUTCOME Most soccer players treated with PRP had faster recovery and they play before than in not treated with PRP. It is essential a radiologist who knows properly handle ultrasound and who has experience in this type of lesions of the musculoskeletal system, since in this way the lesion is located suitably to treat it accurately.

**MKE288**

**Musculoskeletal Ultrasound (US)-guided Interventional Procedures of the Lower Limb: A Didactical Approach**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

Giulio Ferrero (Presenter): Nothing to Disclose

Emanuele Fabbro MD: Nothing to Disclose

Davide Orlandi MD: Nothing to Disclose

Silvia Perugin Bernardi MChir: Nothing to Disclose

Luca Maria Sconfienza MD, PhD: Nothing to Disclose

Enzo Silvestri MD: Nothing to Disclose

Giovanni Serafini MD: Nothing to Disclose

**TEACHING POINTS**

The aim of this educational exhibit is to:
1. review the US-guided percutaneous procedures aimed to the treatment of lower limb musculoskeletal pathologies;
2. show technical aspects, precautions and tricks that may help to improve the outcome of such treatments;
3. provide anatomical schemes with didactic purpose and show correlations both with US static images and procedural US videos.

TABLE OF CONTENTS/OUTLINE
Ultrasound guidance is very helpful in the guidance of percutanous musculoskeletal procedures on the lower limb due to the relatively deep location of some joint structures such as the hip, where free-hand techniques are affected by a low level of accuracy, and the superficial location of other structures that could be instead very small or close to neurovascular structures. Authors will show how to correctly perform several US-guided procedures aimed to treat lower limb pathologies such as: - hip osteoarthritis; - degenerative tendonitis of the hip; - iliopsoas and trochanteric bursitis; - Morel-Lavallée and other soft tissues haematomas; - knee osteoarthritis; - Baker cyst; - patellar tendinopathy; - tibiotalar osteoarthritis; - tenosynovitis; - Achilles tendinopathy; - plantar fasciitis; - Morton’s neuroma; - intermetatarsal bursitis.

MKE289
Myofascial Scars- Revolutionary Treatments Using Hyaluronic Acid Scar Stripping

Participants
Nicola Lindsay Robertson MBChB, MRCS (Presenter): Nothing to Disclose
Aniket N. Tavare MA, MBChB: Nothing to Disclose
Sophia Tincey MBBS: Nothing to Disclose
Hardi Madani FRCR: Nothing to Disclose
Nat Padhar MS: Nothing to Disclose
Otto Chan MD: Nothing to Disclose
Nicola Maffulli: Nothing to Disclose
Brian Holloway MBCh: Nothing to Disclose

TEACHING POINTS
Myofascial scars are a common response to traumatic injury and surgery in various locations in the musculoskeletal system. However this overzealous healing response can be a cause of reduced function and pain in both athletes and non-athletes. These scars can be visualised on ultrasound and MRI. Conventional conservative management is of limited value but at present there are no alternatives. 1. Outline of the pathophysiology leading to the development of myofascial scars 2. Clinical features of myofascial scars 3. Review of the imaging appearances on Us and MRI 4. Theory behind “Scar Stripping” 5. Practical step by step guide to performing this novel ultrasound guided percutaneous technique using hyaluronic acid (ostenil plus), large volumes of Marcaine 0.5% and 25mgs of hydrocortisone.

TABLE OF CONTENTS/OUTLINE

MKE290
Opportunities and Limitations with Interventional MRI Performed at 3 Tesla

Participants
John Nicholas Morelli MD (Presenter): Nothing to Disclose
John A. Carrino MD, MPH: Consultant, BioClinica, Inc Consultant, Pfizer Inc Advisory Board, General Electric Company
Jonathan S. Levin MD: Nothing to Disclose
Jan Fritz MD: Research Grant, Siemens AG Research Consultant, Siemens AG

TEACHING POINTS
1. Although interventional MR-guided procedures have conventionally been performed on low- and mid-field open MR systems, performance of interventional MRI at 3 Tesla (T) is technically feasible. 2. Similar to diagnostic imaging, utilization of 3 T MR for procedural guidance presents many potential advantages including the ability to leverage signal-to-noise gains in order to achieve greater temporospatial resolution. 3. Challenges for 3 T interventional MRI include needle artifact reduction, patient access, specific absorption rate, fat saturation and coil limitations.

TABLE OF CONTENTS/OUTLINE
Transition to 3T MR Intervention -Standard protocols for effective imaging guidance -Work flow considerations -Overview of advantages and disadvantages versus 1.5 T Pulse Sequence Optimization -Managing specific absorption rate limitations (Level 0 vs. First Level) -Needle artifact reduction techniques (WARP and SEMAC) -Fat saturation approaches (STIR vs. SPAIR vs. spectral techniques) System Attributes and Design -Coil design, optimization, and preparation -In-room console interface -Acoustic noise -Patient access and target localization -Future directions including augmented reality navigation

MKE291
Percutaneous Intervertebral Disc Coagulation Therapy (PDCT) by Plasma Light: A New Method for the Treatment of Lumbar and Cervical Disc Herniations; Description of Procedure, Technical Aspects and Preliminary Results

Education Exhibits
Location: MK Community, Learning Center
TEACHING POINTS

1) To illustrate a new method and materials to perform a percutaneous minimally invasive treatment of symptomatic cervical and lumbar disc herniations using Plasma Light fiber. 2) The work shows inclusion criteria, technical aspects of fluoroscopic guidance, and how to use the plasma fiber inside the intervertebral disc.

TABLE OF CONTENTS/OUTLINE

A. Review of Indication and Contraindication of the treatment. B. Diagnostic Imaging (CT - MRI) C. Plasma light: physical aspects and differences from standard laser systems (Percutaneous Laser Disc Decompression - PLDD) D. Preliminary experience in 18 patients (patients selection, inclusion criteria; age range 18-77; contained symptomatic lumbar (n.19) and cervical (n.5) disc herniations) E. Treatment (fluoroscopic guidance findings and anatomy technique for lumbar an cervical approach, local anesthesia, anti-infectious therapy, technical aspects and positioning of plasma fiber inside lumbar and cervical discs) F. Follow-up Management (VAS scale, ODI score, clinical assessment, Imaging follow-up) G. Outcomes (Results: 15/18 patients had significant improvement in symptoms with relevant post-operative VAS scale and ODI score reduction, p
TEACHING POINTS

1. Complex regional pain syndrome (CRPS) is a chronic impairment characterised by severe pain associated with sensory, autonomic and motor symptoms. 2. Stellate ganglion has proven to be involved in the physiopathology of CRPS. 3. Patients suffering from CRPS suffer from long lasting refractory pain. 4. The objective is to describe the prerequisites to perform Stellate ganglion block and neurolysis.

TABLE OF CONTENTS/OUTLINE


MKE295

The Not-So-Obvious: CT-guided Biopsy of CT-occult Musculoskeletal Lesions

TEACHING POINTS

1. Computed tomography (CT)-guidance for percutaneous biopsy of musculoskeletal lesions remains the gold standard imaging modality for biopsy of musculoskeletal lesions, particularly osseous lesions. 2. Typically, most suspicious lesions have an identifiable CT correlate and biopsy can be easily targeted to the lesion of interest. However, with the increasing use of positron emission tomography-CT (PET/CT) and MRI for the surveillance and staging of cancer, suspicious lesions necessitating biopsy are sometimes identified which have no CT correlation. 3. Although PET/CT- and MR-guided biopsies are technically feasible, they are not without limitation or entirely necessary. Rather, these lesions, even if CT-occult, can often be biopsied with CT-guidance using anatomic landmarks for lesion targeting.

TABLE OF CONTENTS/OUTLINE


MKE296

The Painful Foot: Imaging-guided Interventions for Pain Management

TEACHING POINTS

1. Review techniques for imaging-guided pain management at the foot including potential risks and complications. 2. Describe arthrographic techniques at selected joints of foot, focusing on positioning, tube angulation and specifics of injectate. 3. Discuss normal communications between specific joints at arthrography and how they influence technique and procedure success. 4. Describe technical approaches to ultrasound-guided tendon sheath injection including the advantages of in-plane technique. 5. Describe techniques for sonographic guided treatment of a variety of other painful soft tissue conditions in the foot.

TABLE OF CONTENTS/OUTLINE


MKE297

The Sural Nerve: A Review of Anatomy, Pathology, and Intervention

Participants
TEACHING POINTS

1. To review the normal anatomy of the sural nerve on various imaging modalities including MRI and ultrasound. 2. To review the clinical presentation of sural nerve neuropathy. 3. To review the pathologic conditions that affect the sural nerve and their imaging appearances. 4. To review the non-surgical and surgical management of pathologies affecting the sural nerve. 5. To discuss the techniques in performing image-guided intervention of the sural nerve.

TABLE OF CONTENTS/OUTLINE


MKE298
The Union Gap: What Radiologists Need to Know about Bone Grafting and Osteogenesis

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit

Participants
Xue Susan Bai MD (Presenter): Nothing to Disclose
Sana Parsian MD : Nothing to Disclose
Jonelle Marie Pettsavage-Thomas MD, MPH : Consultant, Medical Metrics, Inc
Felix Sze-Kway Chew MD : Nothing to Disclose
Alice S. Ha MD : Nothing to Disclose

TEACHING POINTS

After this exhibit, learners will acquire understanding of:
1) Radiographic appearances of common current devices/techniques for filling bone defects/augmentation and
2) Illustrate radiographic appearances of common complications from these techniques.

TABLE OF CONTENTS/OUTLINE

We will examine the imaging appearances of common bone defect filling/augmentation techniques and their complications, including: 1) Autografts: e.g. iliac crest, fibula shaft for glenoid reconstruction. 2) Allografts: e.g. cadaveric transplants, osteochondral allograft for osteochondral defects, intercalary graft for tumor resection, whole joint allograft for arthritis or tumor, morselized bone. 3) Manufactured implants and bone graft substitutes: e.g. titanium wedge, methyl methacrylate, calcium sulfate, hydroxyapatite. 4) Biologicals: e.g. bone morphogenetic protein and tissue growth factor-derived products 5) Distraction osteogenesis: e.g. finger distraction and reconstruction, leg lengthening with Ilizarov device.

MKE300
Ultrasound Guided Musculoskeletal Procedures: Indications, Methods, Complications and Efficacy

Education Exhibits
Location: MK Community, Learning Center

Participants
Adam Daniel Singer MD (Presenter): Nothing to Disclose
Jean Jose MS, DO : Nothing to Disclose
Jonathan Tresley MD : Nothing to Disclose
Evan Ross Finkelstein MD : Nothing to Disclose
Nicholas Mark Gutierrez MD : Nothing to Disclose
Vinay Pai MS, MD : Nothing to Disclose

TEACHING POINTS

Various causes of musculoskeletal pain result in significant morbidity and loss of productivity Ultrasound expertise facilitates the radiologist’s diagnosis and minimally invasive management of musculoskeletal pain

TABLE OF CONTENTS/OUTLINE

Type of ultrasound devices used for diagnostic and therapeutic musculoskeletal imaging - Injectate materials and their associated mechanisms of action and side effect profile Procedures (indications, methods, risks, efficacy): Upper extremity: AC joint pain Subacromial bursitis Biceps tendinitis Calcific tendinitis Paralabral cyst aspiration Rotator cuff tears and PRP Extensor and flexor wrist tenosynovitis Ganglion cysts of the wrist Cubital and carpal tunnel syndromes Intra-articular aspirations and injections (shoulder, elbow, wrist) Percutaneous tenotomy and fasciotomy Lower extremity: Greater trochanteric bursitis Gluteus medius/minimus tendinosis Paralabral cyst aspiration Ischiofemoral impingement Baker’s cyst Perimisnical cyst aspiration IT band syndrome Tarsal tunnel syndrome Ankle impingement syndromes Retrocalcaneal bursitis Planatar fasciitis Intra-articular aspirations and injections (hip, knee, ankle) Hematoma aspiration

MKE301
Ultrasound of Bone Fracture and Healing: Make It Easy

Education Exhibits
Location: MK Community, Learning Center
Participants

Audrey Massein (Presenter): Nothing to Disclose
Guillaume Mercy: Nothing to Disclose
Aziza Abi-Yaac MD: Nothing to Disclose
Jerome Renoux MD: Nothing to Disclose
Delphine Zeitoun MD: Nothing to Disclose
Jean-Louis Brasseur: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To illustrate the spectrum of fractures on ultrasonography, with correlations with radiography, CT and MRI. 2. To illustrate various types of normal and pathologic healing seen with ultrasound. 3. To discuss the role of ultrasound in the initial diagnostic and in the assessment of bone healing process, in particular for the early detection of delays of healing.

TABLE OF CONTENTS/OUTLINE

- Fracture - Common aspects - Particular findings: stress fracture, costal cartilages, osteochondral fragment, pathologic fractures
- Bone healing: normal evolution of callus and pathologies
- Role of sonography

MKE302

Ultrasound of Peripheral Nerves of the Upper Extremity: A Landmark Approach

Education Exhibits

Certificate of Merit
Selected for RadioGraphics

Participants

Jordan Brown MD (Presenter): Nothing to Disclose
Corrie Marlene Yablon MD: Nothing to Disclose
Matthew Ryan Hammer MD: Nothing to Disclose
Catherine J. Brandon MD: Stock options, VuCOMP, Inc
Yoav Morag MD: Nothing to Disclose
Jon A. Jacobson MD: Consultant, BioClinica, Inc Royalties, Reed Elsevier Equipment support, Terumo Corporation Equipment support, Arthrex, Inc

TEACHING POINTS

After reviewing this exhibit, the viewer will be able to: 1. Describe the course of the peripheral nerves of the upper extremity, including their motor and sensory innervation. 2. List the important anatomical landmarks and transducer position used to locate the peripheral nerves of the upper extremity when performing sonographic evaluation. 3. Describe how US is useful for the evaluation of the upper extremity nerves. 4. Discuss the importance of dynamic imaging when evaluating for peripheral nerve entrapment.

TABLE OF CONTENTS/OUTLINE


MKE305

Ultrasound-guided Musculoskeletal Interventions in the Upper and Lower Extremities: Tunnels, Sheaths and Other Uncommon Sites

Education Exhibits

Participants

Aaron J. Wyse MD (Presenter): Nothing to Disclose
Andrew Cordle MD, PhD: Nothing to Disclose

TEACHING POINTS

The exhibit purpose is: 1. To review indications for ultrasound-guided musculoskeletal injections in the upper and lower extremities for neurovascular and tendinous structures, with examples of relevant pathology. 2. To illustrate interventional methods for injection of structures including, but not limited to, the radial tunnel and tarsal tunnel as well as the flexor / extensor tendon sheaths of the extremities, with MR correlation. 3. To discuss role of ultrasound-guided intervention in the postoperative joint. 3. To summarize current radiologic literature regarding efficacy, including outcomes and complications.

TABLE OF CONTENTS/OUTLINE

- I. Neurovascular ultrasound-guided intervention (including radial tunnel and tarsal tunnel injections) A. Pathology B. MR and ultrasound anatomy C. Intervention technique D. Efficacy, including outcomes and complications II. Tendon sheath ultrasound-guided intervention (including flexor hallucis longus, peroneal, digit flexor and long head biceps tendon injections) A. Pathology B. MR and ultrasound anatomy C. Intervention technique D. Efficacy, including outcomes and complications III. Postoperative joint ultrasound-guided intervention A. Diagnostic aspiration B. Synovial biopsy

MKE306

Ultrasound-guided Musculoskeletal Interventions: Where Are We Now?

Education Exhibits

Location: MK Community, Learning Center
TEACHING POINTS

After reviewing this exhibit, the learner will be able to: 1. List common indications for ultrasound-guided musculoskeletal procedures 2. Describe commonly performed ultrasound-guided musculoskeletal procedures 3. Outline technical aspects, procedural considerations, and potential pitfalls

TABLE OF CONTENTS/OUTLINE


MKE307

Utility of Multi-detector CT for the Evaluation of Hip and Knee Arthroplasty: Assessment of Component Alignment and Complications

Education Exhibits
Location: MK Community, Learning Center

Participants

Elina Zaretsky MD, MA (Presenter): Nothing to Disclose
Kevin R. Math MD: Nothing to Disclose
Douglas S. Katz MD: Nothing to Disclose
Steven Harwin: Nothing to Disclose

TEACHING POINTS

CT is an effective method of assessment of the painful joint arthroplasty, and can be used to detect common conditions such as loosening, periprosthetic fracture, osteolysis related to particulate debris, and component malalignment or malpositioning. The exhibit will: 1) Review and demonstrate the current utility of multi-detector CT for the assessment of the painful knee and hip arthroplasty, including loosening, periprosthetic fracture, osteolysis related to particulate debris, and component malalignment or malpositioning. 2) Demonstrate how current CT technology and techniques minimize the previously substantial problem of beam hardening artifacts.

TABLE OF CONTENTS/OUTLINE

1) Describe the optimal positioning of the acetabular and femoral components of a total hip arthroplasty (THA) and optimal rotational alignment of the femoral and tibial components of a total knee arthroplasty (TKA). 2) Describe and illustrate methods of CT assessment of important measurements of THA and TKA including acetabular version, acetabular cup abduction and femoral anteversion as well as the rotational alignment of the femoral and tibial components. 3) Review the important anatomical landmarks utilized for these measurements. 4) Present radiographic imaging as well as cadaveric specimens and intra-operative photographs to illustrate key principles.

MKE308

“BENIGN” Fat Containing Soft Tissue Tumors Which Can Be “ENHANCED” on MR Imaging

Education Exhibits
Location: MK Community, Learning Center

Participants

Sung Moon Kim MD (Presenter): Nothing to Disclose
Monica Kalume Brigido MD: Nothing to Disclose
Jon A. Jacobson MD: Consultant, BioClinica, Inc Royalties, Reed Elsevier Equipment support, Terumo Corporation Equipment support, Arthrex, Inc
David Paul Fessell MD: Nothing to Disclose
Corrie Marlene Yablon MD: Nothing to Disclose

TEACHING POINTS

After reviewing this exhibit, the learner will be able to: 1. Realize that enhancing fat containing soft tissue tumors are not always liposarcomas. 2. List differential diagnoses of benign enhancing fat containing soft tissue tumors on MR imaging. 3. Describe their clinical and MR imaging findings.

TABLE OF CONTENTS/OUTLINE

1. Background 1. Liposarcomas are malignant soft tissue tumors which often contain fat component and can have some portions of enhancement. 2. Benign lipomas usually does not have enhanced component. However, some benign fat containing soft tissue tumors can be enhanced on MR imaging, which can have the similar appearances with liposarcoma. II. Benign fat containing soft tissue tumors with contrast enhancement. 1. spindle cell lipoma 2. angiolipoma 3. lipoblastoma 4. hibernoma 5. hemangioma 6. heterotopic ossification

MKE309

Aneurysmal Bone Cysts: Imaging Review, Pitfalls in Diagnosis, and Treatment Overview

Education Exhibits
## Participants
- **Kavi Krishna Devulapalli MD, MPH (Presenter):** Nothing to Disclose
- **Jennifer Jen-Wei Wan MD:** Nothing to Disclose

## TEACHING POINTS
The purpose of this exhibit is to: 1.) Review the imaging of aneurysmal bone cysts. 2.) Discuss pitfalls in diagnosis including common mimic lesions. 3.) Demonstrate unusual presentations including aneurysmal bone cysts presenting outside of long bones, malignant transformation of primary aneurysmal bone cysts and metastasis. 4.) Review treatment options.

## TABLE OF CONTENTS/OUTLINE
1.) Overview of aneurysmal bone cysts including epidemiology, pathogenesis, and discussion of primary and secondary lesions. 2.) Review of multi-modality imaging findings including plain radiograph, computed tomography, magnetic resonance imaging and nuclear bone scintigraphy. 3.) Discussion of pitfalls in diagnosis including differentiation from other tumors exhibiting fluid-fluid levels such as telangiectatic osteosarcoma and giant cell tumor of the bone. 4.) Case-based presentation of unusual manifestations of aneurysmal bone cyst including those lesions outside of long bones, malignant transformation and metastasis. 5.) Review of treatment options including surgical management and radiation therapy.

### MKE311

**Cartilage Tumors on MR Imaging: Characterization of Hyaline vs Non-hyaline Cartilage Histology**

**Education Exhibits**

**Location:** MK Community, Learning Center

## Participants
- **Gaurav Kumar Thawait MD (Presenter):** Nothing to Disclose
- **Edward F. McCarthy MD:** Nothing to Disclose
- **Laura Marie Fayad MD:** Nothing to Disclose

## TEACHING POINTS
1. Cartilaginous tumors encountered in musculoskeletal practice can be classified by their hyaline and non-hyaline cartilage histology. 2. MR imaging features are related to the histology of each tumor. 3. Correlation of the histologic features of cartilage lesions with their MR imaging appearance is valuable to the practicing radiologist.

## TABLE OF CONTENTS/OUTLINE

### MKE312

**Cartilaginous Bone Tumors: What to Look for?**

**Education Exhibits**

**Location:** MK Community, Learning Center

## Participants
- **Yessica Ruth Foutes Costa MS (Presenter):** Nothing to Disclose
- **Angela Daniela dos Santos Figueiredo MD:** Nothing to Disclose
- **Cristina Marques MD:** Nothing to Disclose
- **Luis Curvo-Semedo MD, PhD:** Nothing to Disclose
- **Joao Fale Pisco:** Nothing to Disclose
- **Filipe Caseiro-Alves:** Nothing to Disclose

## TEACHING POINTS
- To describe and illustrate the multimodality imaging findings of cartilaginous bone tumors and tumor-like lesions.  

## TABLE OF CONTENTS/OUTLINE
Cartilaginous bone tumors are a relatively common lesion encountered in daily clinical practice. In this essay the authors include a wide range of benign and malignant entities focusing on distinctive imaging features (Osteochondroma, Enchondroma, Chondroblastoma, Chondromyxoid fibroma, Synovial chondromatosis and Chondrosarcoma). Plain film characteristic associated with demographic and clinical information may sometimes be enough to identify a given cartilaginous bone tumor. Computed tomography and magnetic resonance complement the characterization of these lesions, mostly in the attempt to clarify the possibility of malignant transformation.

### MKE314

**Diversity of Atypical Lipomatous Tumor/Well-Differentiated Liposarcoma (ALT/WDLS)**

**Education Exhibits**

**Location:** MK Community, Learning Center

## Participants
- **Akio Tsukabe MD (Presenter):** Nothing to Disclose
- **Hisashi Tanaka MD:** Nothing to Disclose
- **Yoshiyuki Watanabe MD, PhD:** Nothing to Disclose
**TEACHING POINTS**

1. To recognize the diversity of imaging features of an atypical lipomatous tumor / well-differentiated liposarcoma (ALT/WDLS) reflecting its morphological variation. 2. To know the differential diagnosis and recognize the difficulty in diagnosing ALT/WDLS. ALT/WDLS is subdivided into three main subtypes; adipocytic (lipoma-like), sclerosing, and inflammatory. The presence of more than one pattern in the same lesion is common. Moreover, some have the component like enchondroma or osteosarcoma without dedifferentiation. In the literatures, the lipoma-like subtype is so emphasized that little mentioned to another types. We should know the diversity in radiological features of ALT/WDLS to diagnose and treat it precisely.

**TABLE OF CONTENTS/OUTLINE**

1. Definition and pathological features of ALT/WDLS
2. Typical and atypical imaging features of ALT/WDLS corresponding to pathological features
3. Mimics of ALT/WDLS including benign or malignant adipocytic tumors, other tumors with fat and tumor-like lesions (i.e. dedifferentiated liposarcoma, myxoid liposarcoma, spindle cell lipoma, hibernoma, lipomatosis of nerve, lipoma with necrosis or hemorrhage, lipomatous hemangiopericytoma, ectopic hamaromatous thymoma, retroperitoneal angiomyolipoma, adrenal or retroperitoneal myelolipoma, liopleioiomyoma, elastofibroma, superior lumber hernia etc)

**Elastofibroma Dorsi; Imaging Characteristics with CT, MRI, Thallium-201 Scintigraphy and FDG-PET/CT**

**Location:** MK Community, Learning Center

**Participants**

- Maho Tsubakimoto MD (Presenter): Nothing to Disclose
- Masahiro Okada MD: Nothing to Disclose
- Tsuneo Yamashiro MD: Nothing to Disclose
- Hiroki Maehara MD: Nothing to Disclose
- Sadayuki Murayama MD, PhD: Nothing to Disclose

**TEACHING POINTS**

The epidemiology and clinical presentation of elastofibroma dorsi. Characteristic imaging appearance on MRI and CT in comparison with underlying pathological appearance; composed of fibrous tissue with streaks of fat components. To define the enhancement level and pattern on MRI, accumulation pattern of thallium-201 (201Tl) and FDG uptake. Pitfalls in the diagnosis of elastofibroma dorsi.

**TABLE OF CONTENTS/OUTLINE**

1. Epidemiology 2. Clinical presentation from the literature and data from our institution. 3. Pathological features 4. Radiological features of each modality: CT, MRI, 201Tl scintigraphy and FDG-PET/CT. CT: lenticular mass in the subscapular region; typical findings. MRI: fibrous signal mass with fat streaks; patterns of Gd-DTPA contrast enhancement and diffusion weighted image (DWI). 201Tl scintigraphy: no uptake in the mass; figures from our institution. FDG-PET/CT: moderate FDG uptake in the lesion; range of the SUV max. 5. Other chest wall tumors for differential diagnosis of elastofibroma dorsi. Fibrous or fibrohistiocytic tumors Muscular tumors Vascular tumors Peripheral nerve tumors Adipocytic tumors Other tumors 6. Characteristic imaging pattern of elastofibroma dorsi for diagnosis. 7. Pitfalls in the diagnosis of elastofibroma dorsi.

**Ewing's Sarcoma in the Older Age Group**

**Location:** MK Community, Learning Center

**Participants**

- George Hermann MD (Presenter): Nothing to Disclose
- William Louie Simpson MD: Research Consultant, BioClinica, Inc
- Roberto Garcia MD: Nothing to Disclose
- Vivek Joshi BEng, MD: Nothing to Disclose
- Darren Fitzpatrick MD: Nothing to Disclose
- Alex Baer Maderazo MD: Nothing to Disclose

**TEACHING POINTS**

1. Ewing's sarcoma is a rare tumor. 2. It occurs most commonly in the first and second decades but can be seen later in life as well. 3. Slightly more common in males (1.6:1 male to female). 4. Can occur in bone or soft tissues. 5. Occurs most commonly in the pelvis and long tubular bones. 6. The tumor arises in the bone marrow. 7. Most common presenting symptom is pain. 8. Ewing's sarcoma should be included in the differential diagnosis of bone and soft tissue masses in older patients.

**TABLE OF CONTENTS/OUTLINE**

- Description of the typical presentation of Ewing's sarcoma.
- Description and examples of the typical radiologic appearance.
- Genetics of the tumor.
- Majority of the exhibit will be based on review of all pathologically proven Ewing's sarcoma in our institution between 2001 and 2014 with emphasis on tumors in atypical locations or outside the normal age group with pathologic correlation.
Hand Bumps: Tricks and Tips for a Useful Report

Education Exhibits
Location: MK Community, Learning Center

Participants
Queralt Ordi I Camprubi ARRT (Presenter): Nothing to Disclose
Kathleen Ramirez Tucás MD : Nothing to Disclose
Sara Roché : Nothing to Disclose
CLEOFE ROMAGOSA : Nothing to Disclose
Xavier Merino-Casabiel MD : Nothing to Disclose
Rosa Dominguez-Oronoz MD : Nothing to Disclose

TEACHING POINTS
The objectives of the exhibit are: 1 - To show what MRI technique should be used for a correct diagnosis of the masses in the hand and the current role of contrast administration and dynamic vascular imaging. 2.- To explain how to make an accurate approach to hand masses that leads us to the perfect report for the clinician. 3. - To evaluate different cases showing key imaging features that can help us identify different masses showing its anatomopathologic correlation.

TABLE OF CONTENTS/OUTLINE
The presentation will we divided in four parts; 1.- Important anatomical features to consider when evaluating a hand. 2.- MRI 3T imaging technique 3.- Tips to write an orderly report that leads us to the final diagnosis. 4.- Cases which will be presented in a quiz format. Key differential diagnostic points will be highlighted in the discussion of each case as well as the anatomopathologic correlation. The list of cases includes: - Cystic pseudotumors; epidermoid cyst, mucoid cyst, synovial cyst - Lipoma, fibrolipomatous hamartoma - Vascular; glomus, capilar hemangioma - Fibromatosis; Gardner fibroma, Giant cell tumor of the tendon sheath - Neural; postsurgical neuroma

MKE318
How to Perform and Evaluate Whole Body, Dynamic Contrast-enhanced and Diffusion MR Imaging in Multiple Myeloma

Education Exhibits
Location: MK Community, Learning Center

Participants
Julie Celine Dutoit MD (Presenter): Nothing to Disclose
Matthias Vanderkerken : Nothing to Disclose
Anne-Sophie Beerens MD, MA : Nothing to Disclose
Koenraad L. Verstraete MD, PhD : Nothing to Disclose

TEACHING POINTS
1. How to perform whole body, dynamic contrast-enhanced and diffusion weighted MRI in patients with multiple myeloma or its prestages.
3. How to recognize common pitfalls and mimics.

TABLE OF CONTENTS/OUTLINE
MR imaging is the most sensitive technique for the detection of bone marrow pathologies such as multiple myeloma (MM) or its prestages monoclonal gammopathy of undetermined significance (MGUS) and smoldering myeloma (SMM). Part 1: Technical aspects. Imaging consists of coronal T1-weighted and STIR T2-weighted images of the whole body, sagittal T1-weighted and fat-suppressed T2-weighted images of the spine, multislice dynamic contrast enhanced MRI with time-intensity curves and diffusion weighted b-images (0-1000) with ADC calculation of the thoracolumbar spine. Part 2: Evaluation. How can a combined 'skeletal score' be obtained based on the pattern and extent of bone marrow invasion, the type of TIC and enhancement rate, and data from diffusion weighted imaging. This approach allows differentiation between MGUS, SMM, MM and assessment of response to treatment. Part 3: Displays several mimics and pitfalls (e.g. vertebral fractures, intracorporal disc herniation, red bone marrow hyperplasia, ...)

MKE324
MR Imaging of Lower Extremity Peripheral Nerve Sheath Tumors (PNST) and Neuromas: A Pictorial Review

Education Exhibits
Location: MK Community, Learning Center

Participants
Van D. Trinh MD (Presenter): Nothing to Disclose
Michael H. Ngo MD : Nothing to Disclose

TEACHING POINTS
- Identify the imaging characteristics of peripheral nerve sheath tumors (PNST) and neuromas
- Review the anatomic distribution of the major lower extremity nerves with description of important distal branch nerves
- Describe the muscle denervation pattern in specific muscle compartments based on the location of the PNS

TABLE OF CONTENTS/OUTLINE
Anatomic review of the major lower extremity nerve distributions and their muscular innervation MRI Pictorial Review of biopsy proven peripheral nerve sheath tumors* and neuromas of each of the major lower extremity nerves. femoral nerve (3 cases) -- *1 case involving the femoral nerve was the exception that was thought initially to represent a PNST but was histologically proven to be a sarcoma obturator nerve tibal nerve (2 cases proximal and distal) Sciatic nerve (stump neuroma status post...
Multimodality Imaging Features, Orthodox and Unorthodox Avatars of Fibrous Lesions of Bone: A Pictorial Essay

Participants
Rammohan Vadapalli MD (Presenter): Nothing to Disclose
Harshavardhan KR MD: Nothing to Disclose
Krishna Mohan Pottal MD: Nothing to Disclose
Anuj Jain MD: Nothing to Disclose
Abhinav Sriram Vadapalli: Nothing to Disclose

TEACHING POINTS
Multimodality Imaging features of Fibrous lesions of Bone are illustrated and the cardinal features of these lesions on Radiography, CT, MRI and Nuclear Imaging (PET CT) are described. Atypical Imaging features of the Fibrous lesions of Bone are Illustrated.

TABLE OF CONTENTS/OUTLINE
A: Common and Uncommon Fibrous lesions of Bone are classified and listed with their Cardinal Radiographic, CT, MR and Nuclear Imaging Features are described. Fibrous lesions of bone include entities with a wide range of radiographic appearance and clinical behavior. Benign Fibrous lesions: Fibrous cortical defect medial supra condylar defects Non ossifyinf Fibromas Desmolytic fibromas Fibrous histiocytoma of bone Fibrous Dysplasia: Monoostotic and Poly ostotic forms Malignant fibrous lesions, malignant fibrous histiocytomas and fibrosarcoma B: Unorthodox Imaging Features and Avatars of Fibrous lesions are presented with Differential diagnosis and Radio pathological Correlation

Multimodality Imaging of Tendon sheath Masses (Tumours and Tumour Like Lesions): A Pictorial Essay

Participants
Rammohan Vadapalli MD (Presenter): Nothing to Disclose
Harshavardhan KR MD: Nothing to Disclose
Prasad Guntuluri: Nothing to Disclose

TEACHING POINTS
Approach to Diagnosis of tendon sheath masses is outlined with common Clinical and Imaging Differential Diagnosis. Radiographic features, Ultrasound and MR Imaging findings of Common and Uncommon Tendon sheath masses is illustrated with examples.

TABLE OF CONTENTS/OUTLINE
Common Tendon Sheath Masses: Localized PVNS Giant Cell Tumour of Tendon sheath The clinical differential diagnosis includes desmoids ganglion cysts, foreign body granuloma, epidermoid cyst, lipoma, knuckle pad, Cavernous haemangioma, Lymphatic Gout, necrobiotic granuloma, tendinous xanthoma, fibroma of the tendon sheath, infection, rheumatoid nodule, pseudogout and amyloidoma Imaging based Differential Diagnosis Includes any soft-tissue mass with low signal intensity on both T1-weighted and T2-weighted images, such as a desmoid tumor (particularly if deep) or pigmented villonodular synovitis, which more commonly involves the larger joints. Aside from possessing similar signal characteristics, giant cell tumor of the tendon sheath also histologically resembles pigmented villonodular synovitis as both of them contain haemosiderin Tendon sheath neoplastic entities tend to be localized processes. Involvement of multiple tendon sheaths and involvement of long segments of the tendon sheath would be more typical of infection: e.g. Tuberculosis+

Navigating the Web of Musculoskeletal Vascular Anomalies: Nomenclature, Anatomic and MR Angiographic Imaging Features, and Treatment Strategies

Participants
Swati Deshmukh MD (Presenter): Nothing to Disclose
Laura Marie Fayad MD: Nothing to Disclose

TEACHING POINTS
1. Accurate vascular anomaly terminology remains a notable area of confusion in clinical practice and the medical literature. 2. The ISSVA classification scheme provides a practical approach for evaluating vascular neoplasms and malformations. 3. Correct identification of a vasculoproliferative lesion on imaging studies is crucial to facilitate communication and guide treatment strategies.

TABLE OF CONTENTS/OUTLINE
Case examples with description of demographics, imaging findings, and treatment for:
1. Vascular tumors
Patterns in Quantitative Diffusion-weighted Imaging of Soft Tissue Masses That Are Associated with Different Histologies

Education Exhibits
Location: MK Community, Learning Center

Participants
Shivani Ahlawat MD (Presenter): Nothing to Disclose
Shadpour Demehri MD: Nothing to Disclose
Laura Marie Fayad MD: Nothing to Disclose

TEACHING POINTS
1. Diffusion weighted imaging (DWI) is a functional non-contrast MRI technique that adds little time to a routine soft tissue mass MR imaging protocol. 2. Soft tissue masses can be categorized by their different imaging patterns on quantitative DWI with apparent diffusion coefficient (ADC) mapping. 3. ADC values obtained by quantitative DWI often correspond with the histologic composition of tumors, and non-neoplastic soft tissue masses have a variable appearance that can mimic tumors.

TABLE OF CONTENTS/OUTLINE
TEACHING POINTS

1. Review the clinical, pathologic and radiologic findings of benign fibrous histiocytoma of bone including plain radiographs, CT, MRI.
2. Review specific possible helpful findings on MRI that may help narrow the diagnosis
3. Review a case report of features of PET-CT and diffuse weighted imaging

TABLE OF CONTENTS/OUTLINE

Introduction including definition, clinical and pathologic findings of benign fibrous histiocytoma
Review of imaging findings
-- Radiographic and CT findings
-- Bone scintigraphy and 18F FDG PET-CT
-- Qualitative and Quantitative diffusion-weighted MR imaging with high b values
-- Possible distinguishing MR features

MKE332

Role of Imaging in Non-surgical Management of Desmoid Fibromatoses

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit
Selected for RadioGraphics

Participants
Marta Braschi Amirfarzan MD (Presenter): Nothing to Disclose
Sreeharsha Tirumani MBBS, MD : Nothing to Disclose
Atul Bhanudas Shinagare MD : Nothing to Disclose
Michael Hayden Rosenthal MD, PhD : Nothing to Disclose
Nikhil H. Ramaiya MD : Nothing to Disclose
Jyothi Jiya Jagannathan MD : Nothing to Disclose

TEACHING POINTS

- Desmoid fibromatoses are rare locally aggressive tumors with no known potential for metastasis, that can develop at virtually any body site. - Surgical resection may be offered in selected cases, however recurrences following surgery are high, and tend to be more aggressive than the primary tumor. - Non-surgical options includes observation, medical management and radiotherapy - Imaging plays a critical role in the initial assessment, treatment planning, monitoring of response to treatment and detection of complications.

TABLE OF CONTENTS/OUTLINE

- Illustration of common and uncommon imaging appearances of desmoid tumors at various locations (abdominal, extraabdominal, extremity, head and neck), and in various settings (FAP associated, preganancy associated, post traumatic, and sporadic) - Review the role of imaging in treatment planning, surgical decision making, and assessment of resectability - Discuss the gamut of non-surgical treatment options, including observation, chemotherapy (Doxil), hormonal therapy (tamoxifen), molecular targeted therapy (Imantinb, sorafenib) and radiation therapy - Describe the patterns of tumor response on different imaging modalities (CT, MRI and PET), with particular emphasis on MRI. - Illustrate the common complications of desmoid tumors, both on and off therapy.

MKE334

Skin Deep: Radiologic Pathologic Correlation of Epidermal Inclusion Cysts in the Extremities

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit

Participants
Brittany Ritchie MD (Presenter): Nothing to Disclose
Liem Thanh Mansfield MD : Nothing to Disclose
Steven Peckham : Nothing to Disclose

TEACHING POINTS

1. Epidermal inclusion cyst is commonly seen in the extremities.
2. Despite its name, epidermal inclusion cysts may present as a solid mass on clinical exam and imaging studies mimicking soft tissue sarcomas.
3. On radiography, they present as non-calcified masses that may erode the adjacent bone.
4. On sonography, epidermal inclusion cysts arise from the dermis without or with visible sinus tract to the skin. They have variable echiogenicity, distal acoustic enhancement, and without internal vascularity.
5. On CT, they are found in the subcutaneous fat compartment, contact the dermis, and have Hounsfield measurement of fluid. Post contrast, there is peripheral enhancement of the cyst wall.
6. On MR, epidermal inclusion cysts are subcutaneous masses that contact the dermis. On T2WI, they may have heterogeneous
appearance mimicking a solid mass. However, on T1WI with fat suppression, there is peripheral enhancement consistent with a simple cyst.

**TABLE OF CONTENTS/OUTLINE**

1. Review the clinical presentation of epidermal inclusion cysts
2. Review the histopathological appearance of epidermal inclusion cysts
3. Imaging appearance of epidermal inclusion cysts
   a. Radiography
   b. Sonography
   c. CT
   d. MR imaging
4. Imaging appearance of unruptured and ruptured epidermal inclusion cysts

**MKE335**

**Soft Tissue Mass of the Hand and Foot: Diagnostic Approach**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Maria Dolores Lopez Parra MD (Presenter): Nothing to Disclose
- Jose Acosta Batlle: Nothing to Disclose
- Catalina Maria Garcia Barrio: Nothing to Disclose
- Carmen Soteras MD: Nothing to Disclose
- Blanca Palomino: Nothing to Disclose
- Alejandro Urbina Balanz: Nothing to Disclose

**TEACHING POINTS**

- to review the most common soft tissue masses of the foot and hand, focusing on those lesions, that based, on their behavior and location, the radiologist can suggest a specific type of tumor. - to describe the role of imaging techniques in the diagnostic approach.

**TABLE OF CONTENTS/OUTLINE**

The differential diagnosis of soft tissue lesions of the foot and hand can be narrowed significantly with the aid of imaging (X-ray, sonography, CT and MRI). Radiographs are critical in determining the presence/absence of mineralization and setting whether soft tissue mineralization are chondral or ossific in nature and to evaluate cortical involvement versus isolated soft tissue lesion. The ultrasound seems well suited for screening soft tissue masses, allowing us to differentiate cystic from solid nature. In noncystic lesion the location and signal characteristics can suggest the diagnosis of some specific pathologies such as Morton’s neuroma, giant cell tumor of tendon sheath, and plantar fibromatosis. Equally, and based on the presence or absence of mineralization, lesion density/signal intensity, and enhancement pattern synovial based lesions of the foot and hand can be suggested. Finally, knowledge of the incidence of specific neoplasms of the foot and hand based on patient age aids radiologists in providing a limited differential diagnosis.

**MKE336**

**Spectrum of Fat-Containing Soft Tissue Masses on MRI: The Common, the Characteristic, and the (Sometimes) Confusing**

*Education Exhibits*

*Location: MK Community, Learning Center*

**Participants**

- Tom Potti MD (Presenter): Nothing to Disclose
- David Andrew Pacholke MD: Nothing to Disclose

**TEACHING POINTS**

Proper characterization of a fat-containing mass on MRI requires careful evaluation of lesion complexity on T1 weighted imaging. Lipomas are the most commonly encountered mesenchymal tumors. Lipomas typically consist of encapsulated homogeneous fat, similar to adjacent subcutaneous fat. Some lipomas demonstrate few, thin septations and other nonlipomatous elements. Lipoma variants and fat necrosis can resemble well-differentiated liposarcomas on MRI. Well-differentiated liposarcomas often demonstrate thickened (greater than 2 millimeters), irregular, enhancing septations and nonlipomatous globular and/or nodular areas. A focal, nonlipomatous mass seen within or adjacent to a well-differentiated liposarcoma suggests a dedifferentiated liposarcoma.

**TABLE OF CONTENTS/OUTLINE**

- Disclosure
- Introduction
- Benign Lipomatous Tumors
  - Lipoma
  - Lipoma Variants
  - Lipomatous Tumors
  - Infiltrating Lipoma
  - Hibernoma
- Malignant Lipomatous Tumors
  - Well-Differentiated Liposarcoma
  - Dedifferentiated Liposarcoma
Systematic Approach to Soft Tissue Vascular Anomalies. Not Everything Is a Hemangioma!

Education Exhibits
Location: MK Community, Learning Center

Participants
- Ruairi Meagher MD (Presenter): Nothing to Disclose
- Christopher B. Lightfoot MD: Nothing to Disclose

TEACHING POINTS
1. To review the International Society for the Study of Vascular Anomalies (ISSVA) classification system of vascular tumors and malformations and stress the importance of using proper nomenclature.
2. To review the natural growth patterns of common vascular anomalies.
3. To present a systematic reliable approach to classifying soft tissue vascular anomalies based on clinical presentation, ultrasound imaging and magnetic resonance imaging.

TABLE OF CONTENTS/OUTLINE
Review the ISSVA classification system Stress the need for a classification system Review out of vogue terms Briefly review embryology and pathogenesis of common vascular anomalies General approach to vascular anomalies

The Abdominal Wall Mass: An Imaging-based Algorithm for Diagnosis

Education Exhibits
Location: MK Community, Learning Center

Participants
- Usman Bashir MBBS (Presenter): Nothing to Disclose
- Venus Hedayati MRCP, FRCR: Nothing to Disclose
- Christina Messiou MD, BMBS: Nothing to Disclose

TEACHING POINTS
1. Guidelines for imaging masses in the anterior abdominal wall including sonography, computed tomography, MRI, FDG PET/CT and image guided biopsy.
2. Imaging features of the most common lesions presenting as a mass to the anterior abdominal wall as well as highly specific features of less common pathologies.
3. The use of imaging and clinical features to guide accurate diagnosis.

TABLE OF CONTENTS/OUTLINE
Overview Imaging Technique Benign Entities - Abdominal wall fibromatosis - Hemorrhagic lesions Haematoma Endometriosis - Fat containing lesions Lipoma Well-differentiated liposarcoma (discussed here for simplicity) Vascular malformation Fat necrosis - Nerve sheath tumors Malignant Entities - Primary malignant tumors Sarcoma Dermatofibrosarcoma protuberans Solitary fibrous tumors - Metastasis Proposed Diagnostic Algorithm based on imaging and clinical features.
MKE340
Whole Body MRI (WB-MRI) for Detecting Bone Metastases: Usefulness of Fused Coronal Images of Diffusion-weighted Images (DWI) and T1-weighted Images (T1-WI)

Education Exhibits
Location: MK Community, Learning Center

Certificate of Merit

Participants
Katsuyuki Nakanishi MD, PhD (Presenter): Nothing to Disclose
Yoshikazu Tanaka MD: Nothing to Disclose
Tetsuro Nakazawa MD: Nothing to Disclose
Tadashi Ueda MD: Nothing to Disclose
Kazuya Oshima MD, PhD: Nothing to Disclose
Noriyuki Tomiyama MD, PhD: Nothing to Disclose

TEACHING POINTS
Teaching point: Whole body MRI has been widely used. However, the standard protocol is not established. In this exhibit, we introduce an example of the imaging protocol of WB-MRI, especially, to show the usefulness of fused image of coronal DWI and T1WI of body. The purposes of this exhibit are: 1. to introduce the imaging protocol which is used in our department. 2. list the various metastatic bone tumor and multiple myeloma. 3. to show the importance of coronal images. The major teaching points of this exhibit are: 1. how to improve the image quality of DWI of 3T MR machines. A technique to shorten the echo time, reduce bulk susceptibility artifacts and spatial distortions without significantly affecting SNR or scan time is explained. 2. to introduce the usefulness of the fused image combining the DWI coronal maximal intensity projection images and coronal T1-WI. 3. to teach a method for analyzing the images or comparison of other imaging modalities such as CT and FDG-PET/CT.

TABLE OF CONTENTS/OUTLINE
1. Femoral involvement of multiple myeloma
2. Multiple bone metastases from prostate cancer
3. Femoral metastasis from testicular tumor
4. Vertebral metastasis from hypopharyngeal cancer
5. Retroperitoneal metastases from leiomyosarcoma

MSE001-b
Artistic Expression for Diagnostic Imaging: Thinking Outside of the Light Box

Education Exhibits
Location: MS Community, Learning Center

Certificate of Merit

Participants
Marlene Rackson MD: Nothing to Disclose
Stacey Verzosa MD: Nothing to Disclose
Douglas S. Katz MD (Presenter): Nothing to Disclose
Darienne Segura RT: Nothing to Disclose
A. Orlando Ortiz MD, MBA: Nothing to Disclose
Perry J. Pickhardt MD: Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc
Miguel Trelles: Nothing to Disclose
Susan Judith Frank MD: Nothing to Disclose
Kitt Schaffer MD, PhD: Nothing to Disclose

TEACHING POINTS
Radiology is used in art in a variety of ways, both by professional artists and those inspired to create art, by utilizing both pre-existent diagnostic images and images of everyday objects. Radiology art enables us to explore our specialty in a creative light, and allows patients to relate to our specialty through media which are familiar to them. The purposes of this exhibit are to raise awareness of how diagnostic images are used in art; to provide examples of how to use radiology images to create art; to show how using radiology as art allows patients to relate to our specialty; and to inspire radiologists to be creative with the tools which they have.

TABLE OF CONTENTS/OUTLINE
Topics to be covered with illustrations include using old diagnostic images as the primary palate; the use of silhouette images; using animate objects other than humans as the medium; radiography of ordinary objects; turning diagnostic images into abstract art; neo-conceptual art - a profile of the artist Wim Delvoye; prenatal ultrasound as sound; and creation of new art specifically for this exhibit from pre-existing diagnostic images, by an academic studio artist, to complement many of the principles demonstrated with radiology art previously created by others. Examples of art from professional artists incorporating images into their art, e.g. Nick Veasey and Leslie Wright, will be shown.

MSE002-b
Reshaping Individualized Medicine: 3D Printing Integration of Anatomic Models in Care of Complex Patients

Education Exhibits
Location: MS Community, Learning Center

Certificate of Merit

Participants
Jane Sexton Matsumoto MD (Presenter): Nothing to Disclose
TEACHING POINTS

OVERVIEW: Highly detailed radiographic imaging sets are transformed into useful life-sized anatomic models (AMs) using additive manufacturing (3D printing). USE: AMs provide preoperative information and accurate perspective of critical anatomic relationships by segmentation of imaging data. COLLABORATION: Care is optimized when radiologists team with surgeons preoperatively to plan construction of AMs to illuminate anatomic points of interest.

TABLE OF CONTENTS/OUTLINE

1. Our Experience: 108 AMs
   a. Clinical: MSK (41), Cardiovascular (20), Neuro (33), Abdominal (6)
   b. Education (3)
   c. Quality: Phantom Development (2)
   d. Validation (3)
2. Mechanism
   a. Segmentation process outlines and separates critical anatomy
      i. Choose best data for segmentation and to display needed anatomy
      ii. Thinner section offers higher detail
   b. Variables in printing process
      i. Type and color of material
      ii. Printing time varies
3. Consultation: In-depth discussion with surgeon to understand unique needs of individual patient and anatomic relationships important for surgical procedure. Radiologist tailors AM construction to these needs. Surgical colleagues report improvement in safety, efficiency and outcome of complex surgical procedures.

MSE003-b

The Great Pretender—How Sarcoidosis Gained Its Reputation as the Mimic of Other Pathology

Education Exhibits
Location: MS Community, Learning Center

Participants
Thomas Robert Semple MBBS, BSC (Presenter): Nothing to Disclose
Susan Jane Buckingham MBChB: Nothing to Disclose

TEACHING POINTS

The aim of this exhibit is to
1. Review the pathophysiology of sarcoidosis
2. Demonstrate the typical radiological features of sarcoid within the chest, abdomen and central nervous system
3. Share some particularly good cases of sarcoid mimicking other conditions and the key features that suggest sarcoid could be the underlying cause

TABLE OF CONTENTS/OUTLINE

The Pathophysiology of Sarcoidosis
Typical Radiological Features (radiography, CT, MRI)
- Chest
- Abdomen
- Central Nervous System
Sarcoid as mimic of other pathology - illustrative cases and tell tale signs all is not what it seems
(INCLUDING, amongst others, cases of sarcoïd masquerading as metastatic bowel cancer (granulomatous colitis with necrotic lymphadenopathy and multiple pulmonary lesions) and mimicking high grade lymphoma with extensive bone marrow involvement (lymphadenopathy and diffuse bone FDG avidity on PET-CT)). All cases presented were subsequently biopsy proven to represent sarcoidosis
Summary

MSE004-b

Imaging of Tularemia in Various Argans: A Review

Education Exhibits
Location: MS Community, Learning Center

Participants
Ignacio Martin-Garcia MD (Presenter): Nothing to Disclose
Rodrigo Blanco-Hernandez MD: Nothing to Disclose
Roberto Tabernero: Nothing to Disclose
Manuel Angel Martin Perez MD: Nothing to Disclose
Piedad Arias-Rodriguez: Nothing to Disclose
Jose Marin: Nothing to Disclose
- Review the role of radiology in the battery of tests in patients with suspicion of tularemia. - Show the radiological findings in the patient with positive serology results for Francisella Tularensis. - Present the typical spectrum of lesions in patients with a confirmed diagnosis of tularemia.

**TABLE OF CONTENTS/OUTLINE**

We performed a retrospective study taking a population of 172 patients who were treated in our centre between February 2008 and October 2009, with few of unknown origin and adenopathies, and who underwent a specific serological analysis. We present the spectrum of radiological findings with CT, MR an US, with different clinical forms of presentation of tularemia. According to our database, they correspond to: -Glandular tularemia: 23% (axillary, inguinal adenopathies). -Pharyngeal tularemia: 28% (cervical adenopathies and abscesses). -Typhoidal tularemia: 6% (splenic and hepatic involvement). -Pneumonic tularemia: 40% (pleuropulmonary symptoms and mediastinic adenopathies) - and a rare case of spondylodiscitis: 3%.

**MSE005-b**

Recognition of These Imaging and Clinicopathological Features May Be Helpful in Suggesting the Possibility of Peripheral Primitive Neuroectodermal Tumor (pPNET)/Ewing Sarcoma (EWS)

**Education Exhibits**

**Location**: MS Community, Learning Center

**Participants**

- Jingfeng Zhang PhD, MD (Presenter): Nothing to Disclose
- Yanyuan Li: Nothing to Disclose
- Qidong Wang : Nothing to Disclose
- Lingxiang Ruan PhD, MD : Nothing to Disclose
- Shunliang Xu : Nothing to Disclose

**TEACHING POINTS**

We will be using case material from our Imaging Center to illustrate the imaging findings and pathological manifestations. We have collected imaging and pathological data on sixteen patients with pPNET/EWS. The purpose of this exhibit is:

1. To review the radiological and clinicopathological findings of the peripheral primitive neuroectodermal tumor (pPNET)/Ewing sarcoma (EWS).
2. To discuss the radiological and pathological correlation of pPNET / EWS.
3. To explain the utility of CT/MRI particularly contrast enhanced CT/MRI in the diagnosis of pPNET / EWS.

**TABLE OF CONTENTS/OUTLINE**

Clinicopathology of pPNET / EWS  
Review of imaging findings of pPNET / EWS  
- Conventional CT and MRI  
- Contrast enhanced CT and MRI  
Sample cases and mimics  
Summary

pPNETs showed various radiological appearances. Tumors arising from different sites had different signs correspondingly. MRI could reveal more precisely the size and shape of tumor and its local invasion than CT and X-ray. The correct diagnosis depended on the inspection of pathology and immunohistochemistry.

**MSE006-b**

Endoluminal Contrast for the Abdominal and Pelvic MRI: When, Where, and How?

**Education Exhibits**

**Location**: MS Community, Learning Center

**Participants**

- Mohit Kumar Gupta MD (Presenter): Nothing to Disclose
- Daniella Ferraro Fernandes Costa Pinho MD : Nothing to Disclose
- April Alexander Bailey MD : Nothing to Disclose
- Gaurav Khatri MD : Nothing to Disclose
- Ivan Pedrosa MD : Shareholder, Humana Inc

**TEACHING POINTS**

1. To review the types of endoluminal contrast agents available for abdominal and pelvic MRI examinations.
2. To highlight specific clinical scenarios where endoluminal contrast agents help in the identification of abdominal and pelvic pathology.
3. To illustrate how to implement endoluminal contrast agents into clinical abdominal and pelvic MRI protocols.

**TABLE OF CONTENTS/OUTLINE**

Endoluminal contrast agents- Water, US gel, Diluted gadolinium, Barium, Iron-based Route of Administration- Endovaginal, endorectal, retrograde transurethral, oral, loopogram, fistulogram Applications of endoluminal contrast - Clarify conventional MRI findings, congenital anomalies, fistula formation, inflammatory bowel disease, extent of pelvic malignancies, endometriosis Use of endoluminal contrast agents in clinical practice - Indications, Selection of contrast agent, Preparation, and MRI Protocol design for specific contrast agents Conclusions - A variety of endoluminal contrast agents are available for clinical use in detecting specific abdominal and pelvic pathology. - Endoluminal contrast agents help identify or accentuate a wide variety of pathologic conditions in the abdomen and pelvis. - Use of endoluminal contrast agents in clinical practice requires understanding specific indications, preparation, and selection of a proper imaging protocol.
Other Emergencies that May Occur During Imaging

**Education Exhibits**

**Location:** MS Community, Learning Center

**Participants**

Mohammed Ezuddin MD (Presenter): Nothing to Disclose
Gary H. Danton MD, PhD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this abstract is: Demonstrate use of electronic application on mobile computing devices is an efficient means for keeping track of quick information to manage contrast reactions. Application will be available for download. This is in use at our institution. Review evidence based summative guidelines for managing contrast reactions including but not limited to allergic reactions, bronchospasm, laryngeal edema, vasovagal reaction, angina, seizures, and others in both pediatric populations and adults.

**TABLE OF CONTENTS/OUTLINE**


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**MSE008-b**

Challenges of CT Imaging of Ancient Irish Bog Bodies and Diagnostic Questions to be Answered at CT

**Education Exhibits**

**Location:** MS Community, Learning Center

**Participants**

Kate Anne Harrington BMBCh, MRCPI (Presenter): Nothing to Disclose
Hong Kuan Kok MBCh, MRCP: Nothing to Disclose
Emma Phelan: Nothing to Disclose
Barry Callinan: Nothing to Disclose
Fintan Regan MD: Nothing to Disclose
Orla Buckley MD: Nothing to Disclose

**TEACHING POINTS**

To learn about the Irish Bog Body, naturally preserved human remains discovered in peat bogs, which date back to the Bronze and Iron Ages (3000–700 BC) and the use of MDCT at our institution to image, study and contribute to the archaeological work performed on 2 such remains.

- The acquisition of raw data sets using MDCT and dual energy CT. Imaging parameters used to obtain good x-ray interaction of demineralised specimen.
- Technical challenges of image acquisition related to the shape of the specimen and risk of specimen desiccation.
- Image post-processing and analysis on a dedicated medical review workstation to produce axial, multiplanar and volumetric three-dimensional (3D) reconstructions.
- Key questions in evaluating the specimen by CT such as age, gender, signs of ante mortem or post mortem injury, body positioning at burial.

**TABLE OF CONTENTS/OUTLINE**

Introduction on Bog Bodies. Outline of the logistics and technical parameters used for successful CT imaging of the Bog Body. Discussion and presentation of the radiological findings of 2 Irish Bog Bodies including the unusual final postures, injuries and fractures inflicted upon them and as of yet unidentified mysterious internal spherical bodies discovered within one Bog Body. Findings provide valuable insight into anthropological, medical and forensic aspects of prehistoric human life.

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**MSE009-b**

Sarcopenia: A Primer for Radiologists

**Education Exhibits**

**Location:** MS Community, Learning Center

**Participants**

Maria Daniela Martin MD (Presenter): Nothing to Disclose
Palmi Nitin Shah MD: Nothing to Disclose
Stephanie Marie Shors MD: Nothing to Disclose

**TEACHING POINTS**

- Sarcopenia, generally known as severe muscle wasting, has been redefined as a more complex syndrome related to muscle mass and strength. It can be present in patients of all body types (underweight, overweight, obese).
- Sarcopenia can be established from calculation of skeletal muscle cross-sectional area. This can be done using image analysis software and single cross-sectional images from routine CT and MR examinations. This measurement has been shown to correlate with whole-body skeletal muscle mass and is now the gold standard for diagnosing sarcopenia.
- Literature review has shown that sarcopenia can be a predictor of clinical outcome, including increased length of hospital stay, nosocomial infections, overall decreased survival and higher incidence of dose limiting toxicity during chemotherapy.
- As part of a multidisciplinary team, radiologists could help to identify patients with sarcopenia who may benefit from earlier and more aggressive intervention in order to improve their clinical outcomes.

**TABLE OF CONTENTS/OUTLINE**

- Sarcopenia - Definition - What are established standards: European consensus - Clinical relevance and emerging concepts in sarcopenia - Methods of measurement - Gold standard: CT vs MRI - Case examples: normal versus sarcopenic patient - Conclusion
PaleoCT of Two Colonial Period Andean Mummies from the Muisca Culture

**Education Exhibits**
Location: MS Community, Learning Center

**Participants**
- Anibal Jose Morillo Zarate (Presenter): Nothing to Disclose
- Andres Vasquez MD: Nothing to Disclose
- Jorge Andres Abreu MD: Nothing to Disclose
- Juliana Ocampo MD: Nothing to Disclose

**TEACHING POINTS**
CT is a useful tool for the non-invasive investigation of archaeological specimens. Multidetector CT can depict pathologies present in ancient civilizations and offer insight on their embalming and burial practices. Mummies can be affected by pathological entities or by taphonomic (burial) processes. CT can differentiate postmortem fractures from traumatic lesions occurring during the lifetime of the mummies. CT can reveal hidden offerings that can help in the understanding of extinct cultural practices.

**TABLE OF CONTENTS/OUTLINE**
Description of two human specimens from the Muisca Culture, one adult and one child, both from the colonial period in the andean region, that were found in two separate sites and were dated around the 17th century. Description of the burial practices of the Muisca indians, cadaver handling and mummification processes, and wrapping and burial practices of this Andean Culture. Depiction of anatomical and pathological features found in both specimens. Demonstration of a hidden offering discovered with CT within the wrappings of the child mummy.

Current Utilization Patterns on a Web Site Devoted to CT Education

**Education Exhibits**
Location: MS Community, Learning Center

**Participants**
- Melissa Ruth Ann Rowell MS (Presenter): Nothing to Disclose
- Pamela Tecce Johnson MD: Research funded, Becton, Dickinson and Company
- Sara Raminpour BS: Nothing to Disclose
- Pamela Tecce Johnson MD: Research funded, Becton, Dickinson and Company

**TEACHING POINTS**
1. Determine how the growth of handheld devices has changed utilization patterns of websites dedicated to medical education.
2. Evaluate whether viewing on handheld device has changed the content preferences 3. Discuss the role of social media (facebook, twitter) as expanded distribution methods

**TABLE OF CONTENTS/OUTLINE**
1. Introduction 2. Audience demographics and behavior country of origin new vs. returning users length of visit to web site user navigation pathways a. entrance page b. pages most viewed c. exit page 3. Access of web site platform used- tablet, mobile or desktop a. breakdown of specific devices and operating system browser used internet service provider used 4. User procurement referrals search engines 5. Social media (Facebook, Twitter) how social media is incorporated into an educational website and its role utilization metrics and experience based recommendations 6. Conclusion

DWI in Treatment Planning and Response Assessment of Abdomino-pelvic Malignancies: All you Need to Know

**Education Exhibits**
Location: MS Community, Learning Center

**Participants**
- Leslie Ka-Hung Lee MD (Presenter): Nothing to Disclose
- Susanna I. Lee MD, PhD: Nothing to Disclose
- Onofrio Antonio Catalano MD: Nothing to Disclose
- Debra Ann Gervais MD: Research Grant, Covidiem AG
- Dushyant V. Sahani MD: Research Grant, General Electric Company
- Avinash Ranesh Kambadakone MD, FRCR: Nothing to Disclose

**TEACHING POINTS**
The purpose of this educational exhibit is 1) to discuss the basic principles and technique of DWI at 1.5 T and 3T for oncological applications in the abdominal and pelvis, 2) to discuss the role of DWI in treatment planning and response assessment of abdomino-pelvic malignancies and 3) to review the potential pitfalls and challenges in interpretation of DWI

**TABLE OF CONTENTS/OUTLINE**
MSE100

The Embryology of the Inferior Vena Cava Explained, Where and How it Can Go Wrong

Education Exhibits
Location: MS Community, Learning Center

Participants
Steven Raeymaeckers (Presenter): Nothing to Disclose
Frederik Vandenbroucke MD: Nothing to Disclose
Johan De Mey: Research Grant, General Electric Company

TEACHING POINTS
Understanding the normal embryology of the inferior vena cava Understanding the different anomalies of the vessel in light of it’s embryological formation Understanding the importance of these anomalies for surgeons and interventionalists Understanding that some of these anomalies present an increased risk of venous thrombosis and thus may be associated with previously thought idiopathic pulmonary emolism

TABLE OF CONTENTS/OUTLINE
- Normal embryology of the vena cava inferior
- Abnormal embryology
  1. Suprarenal
  2. Renal
  3. Infrarenal
- Clinical consequences
  1. Surgery
  2. Interventional procedures
  3. Venous trombosis

MSE101

Cardiopulmonary and Gastrointestinal Manifestations of Eosinophilic Diseases (ED) and Idiopathic Hypereosinophilic Syndromes: Radiological Spectrum with Emphasis on Cross Sectional Imaging

Education Exhibits
Location: MS Community, Learning Center

Selected for RadioGraphics

Participants
Rashmi S. Katre (Presenter): Nothing to Disclose
Carlos S. Restrepo MD: Nothing to Disclose
Abhijit Sunnapwar MD: Nothing to Disclose
Venkata S. Katabathina MD: Nothing to Disclose
Sushilkumar K. Sonavane MD: Nothing to Disclose
Ameya Jagadish Baxi MBBS, DMRD: Nothing to Disclose

TEACHING POINTS
1. ED are a diverse group of disorders associated with peripheral or tissue eosinophilia. System involvement can be due to primary ED with no known cause or secondary due to underlying condition or known cause. Diagnosis of ED is established by clinical, laboratory and imaging findings. 2. CT and MR play important role to assess the extent of disease and end organ damage. Delayed gadolinium enhancement on cardiac MRI is particularly helpful in confirming myocarditis or pericarditis

TABLE OF CONTENTS/OUTLINE
- Pulmonary manifestations of ED: simple eosinophilic pneumonia, chronic eosinophilic pneumonia, allergic bronchopulmonary aspergillosis, parasitic infections, drug reactions, Churg-Strauss syndrome and primary hypereosinophilic syndromes - radiographic and CT findings
- Cardiac involvement: typically seen as endomyocarditis and rarely pericarditis - role of CT and post gadolinium MRI
- Eosinophilic gastrointestinal disorders: esophagitis, gastritis, enteritis and colitis - conventional radiography and CT findings
- Chest radiograph may be the first screening tool to suggest ED along with patient symptoms. Correlation between CT/ MR findings and the results of careful clinical evaluation may be helpful in developing a differential diagnosis for eosinophilic disease. Radiologists should be aware of these entities and their imaging appearances

MSE104

IgG4-Related Disease, the Great Mimic; Imaging Manifestations from the Top Down

Education Exhibits
Location: MS Community, Learning Center

Participants
Lisa P. Lavelle MBCh, FFR(RCSI) (Presenter): Nothing to Disclose
Sinead Helena McEvoy MBCh, FFR(RCSI): Nothing to Disclose
Jan Frank Gerstenmaier FFR(RCSI), FRCR: Nothing to Disclose
Elaine Ni Mhurchu MBCh: Nothing to Disclose
Aoife McCarthy: Nothing to Disclose
Niall Swan: Nothing to Disclose
Ronan Killeen: Nothing to Disclose
Eric John Heffernan MBCh, FR CR: Nothing to Disclose
Stephen John Skehan MBCh: Nothing to Disclose
Dermot E. Malone MD: Nothing to Disclose
Robert Gerard Gibney MBCh: Nothing to Disclose

TEACHING POINTS
IgG4-related disease is a systemic condition, first recognized in 2003. It is characterized by focal or diffuse infiltration and encasement by inflammatory and fibrotic tissue. Histologically a dense lymphoplasmacytic infiltrate rich in IgG4 positive plasma cells is seen. The pancreas is the most commonly involved organ, however it can involve multiple other structures including; bile ducts, retroperitoneum, kidneys, aorta, periorbital tissue, salivary glands, pituitary, thyroid gland, pericardium, skin and lymph nodes. The aim of this exhibit is to provide a multimodality illustration of the spectrum of imaging findings in IgG4 related disease facilitating prompt diagnosis and assessment for further organ involvement.

**TABLE OF CONTENTS/OUTLINE**

To describe the common and uncommon manifestations of IgG4-related disease using an anatomic approach from the top down with radiological pathological correlation where appropriate:

1. Head and Neck: Periorbital tissue, pituitary, thyroid gland, cranial nerve involvement
2. Mediastinal: Inflammatory pseudotumor, central airway disease, interstitial pneumonia, pleural thickening
3. Hepatobiliary: Focal, diffuse and mass forming pancreatitis, IgG4-related cholangitis
4. Renal: Tubulointerstitial nephritis
5. Retroperitoneum: Periaortic, periureteral or plaque like mass involvement

### MSE105

**Tumefactive Fibro-inflammatory Disorders of the Abdomen and Pelvis: 2014 Update**

**Education Exhibits**

**Location:** MS Community, Learning Center

**Participants**

Venkata S. Katabathina MD (Presenter): Nothing to Disclose
Suhare K. Khalil MD: Nothing to Disclose
Venkateswar Rao Surabhi MD: Nothing to Disclose
Raghunandan Vikram MBBS, FRCR: Nothing to Disclose
Naoki Takahashi MD: Nothing to Disclose
Srinivasa R. Prasad MD: Nothing to Disclose

**TEACHING POINTS**

- Review select fibro-inflammatory diseases presenting as masses that may masquerade as malignancies
- Discuss recent advances regarding pathogenesis and clinico-pathological findings
- Describe MDCT/MRI/PET-CT findings and the role of radiologist in diagnosis, management and surveillance

**TABLE OF CONTENTS/OUTLINE**

- Introduction
- Taxonomy: Inflammatory pseudotumors, IgG4 sclerosing disease, auto-immune pancreatitis, sclerosing mesenteritis, retroperitoneal fibrosis and auto-immune prostatitis
- Recent advances in pathogenesis and molecular biology
- MDCT, MRI and PET-CT findings
- Natural history and prognosis
- Conclusion

Select fibro-inflammatory diseases of the abdomen and pelvis present with masses that may be mistaken for more common neoplasms. IgG4 related disease has recently been described and current concepts of autoimmune pancreatitis continue to evolve. Biopsy is definitive; select masses show exquisite response to steroids or immunosuppressive drugs. Imaging findings allow initial detection, treatment follow-up and surveillance.

### MSE106

**A Wolf in Sheep’s Clothing: Tumor in the Abdomen Mimicking Benign Conditions**

**Education Exhibits**

**Location:** MS Community, Learning Center

**Certificate of Merit**

**Participants**

Sarah Kyung Oh MD (Presenter): Nothing to Disclose
Zina Joan Ricci MD: Nothing to Disclose
Jeffrey Harmon Roberts MD: Nothing to Disclose
Victoria Chernyak MD: Nothing to Disclose
Alla M. Rozenblit MD: Nothing to Disclose
Fernanda Samara Mazzaroli MD: Nothing to Disclose
Milana Flusberg MD: Nothing to Disclose
Marjorie Werner Stein MD: Nothing to Disclose
Ellen Leslie Wolf MD: Nothing to Disclose

**TEACHING POINTS**

- Teaching points: Review multimodality (CT, Ultrasound, and MRI) imaging of malignant disease in the abdomen which simulates benign conditions, raising awareness of overlapping features and highlighting key imaging pearls for correct diagnosis.
- Malignant disease can simulate benign processes. 2. Superimposed infectious or inflammatory process may obscure the primary pathology.
- Behavior on follow up exam can be helpful in distinguishing malignant disease from benign conditions.

**TABLE OF CONTENTS/OUTLINE**

- A. Discuss differences between imaging modalities in the evaluation of tumor within the abdomen.
- B. Present cases where malignant disease simulates a benign condition.
- C. Present cases where a superimposed infectious or inflammatory process obscures the primary pathology.
- D. Highlight key features that may aid in correct diagnosis.
- E. Review imaging surveillance recommendations. Cases include but are not limited to the following: - Mucinous hepatic metastases as biliary hamartomas - HCC as FNH - Scirrrous colon carcinoma as diffuse colitis with toxic megacolon - Mucinous appendiceal neoplasm as acute appendicitis - TCC as normal renal sinus fat - Seminoma as orchitis - Psammomatous ovarian calcification as fibroids - Krukenberg tumors as tubo-ovarian abscesses - Buttock carcinoma as sacral decubitus ulcer
MSE107

Blast from the Past: Multimodality Imaging of Small Cell Carcinoma from Head to Toe

Education Exhibits
Location: MS Community, Learning Center

Participants
Tatiana Kelil MD (Presenter): Nothing to Disclose
Sreeharsha Tirumani MBBS, MD: Nothing to Disclose
Michael Hayden Rosenthal MD, PhD: Nothing to Disclose
Nikhil H. Ramaiya MD: Nothing to Disclose
Monica J. Wood BS: Nothing to Disclose
Stephanie A. Howard MD: Nothing to Disclose

TEACHING POINTS
1. The revised 2010 WHO classification of neuroendocrine tumors (NET) classifies small cell carcinoma (SCC) as grade 3 neuroendocrine carcinoma based on mitotic count and proliferation index. 2. SCC most commonly occurs in the lung and uncommonly in extrapulmonary sites (2-5%). 3. Extrapulmonary SCC most commonly occurs in GI (particularly esophagus) and GU (particularly cervix and bladder) tracts. 4. SCC is characterized by mutations in p53, loss of retinoblastoma gene (RB1) and telomerase function and activation of c-KIT, MYC and PARP1. 5. SCC of the lung has striking early response to chemoradiation with high relapse rates and unusual metastases. 6. Relapsed SCC is extremely difficult to treat, though some respond to temozolamide, particularly in the setting of brain metastases. 7. Novel molecular targeted therapies (MTTs) in SCC include Aurora kinase (MYC) and PARP inhibitors.

TABLE OF CONTENTS/OUTLINE
1. Revised 2010 WHO classification of NET, focusing on pulmonary and extrapulmonary SCC. 2. Risk factors and epidemiology of SCC. 3. Role of multimodality imaging (CT, MRI, PET/CT) in disease staging, focusing on prognostic implications of disease site. 4. Illustrate typical and atypical metastases evaluating for recurrent disease. 5. Future directions of treatment, including role of temozolomide and novel MTTs.

MSE108

Bone Marrow Assessments with Diffusion Weighted Imaging (DWI)

Education Exhibits
Location: MS Community, Learning Center

Participants
Amish Lakhani MBBS, MA (Presenter): Nothing to Disclose
Anwar Roshanali Padhani MD: Advisory Board, Acuitas Medical Ltd Advisory Board, Siemens AG Speakers Bureau, Siemens AG Researcher, Siemens AG Speakers Bureau, Johnson & Johnson
Andrew Cogbashian MD, FRCR: Nothing to Disclose
Tina Mistry MBBS, FRCP: Nothing to Disclose
Ashik Amlani: Nothing to Disclose
Subhadip Ghosh-Ray MBBS: Nothing to Disclose

TEACHING POINTS
1. DW-MRI is excellent at showing the distribution of bone marrow in health and disease; reflecting the cellular status of the bone marrow that correlates with histologic cellularity measurements. (2) There are non-linear relationships between bone marrow cellularity and DWI parameters (high b-value SI and ADC) with cellularity and fat have dominant competing effects. (3) Bone marrow assessments on DW-MRI should be done in conjunction with morphologic and quantitative fat sequences particularly for the assessment of changes in response to therapy.

TABLE OF CONTENTS/OUTLINE
1. Brief overview whole body DWI (WB-DWI) as a method suited for whole body applications including technique, post-processing and display methods. (2) Review of normal bone marrow structure, its variability with age and appearance on WB-DWI. (3) To demonstrate the non-linear relationships between diffusion imaging parameters (high b-value SI and ADC) and bone marrow fat fraction. (4) Review with case illustrations, the causes of bone marrow hypocellularity and hypercellularity, including the effects of chemotherapy, hormonal treatments and bone marrow stimulating factors. (5) Summary, teaching points and future directions.

MSE109

BRCA Associated Tumors—Not Just Breast and Ovarian Cancer

Education Exhibits
Location: MS Community, Learning Center

Participants
Aparna Balachandran MD (Presenter): Nothing to Disclose
Priya Ranjit Bhosale MD: Nothing to Disclose
Ajaykumar Chandrajai Morani MD: Nothing to Disclose
Tara Lynn Sagebiel MD: Nothing to Disclose
Catherine Ellen Devine MD: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose
Vikas Kundra MD, PhD: License agreement, Introgen Therapeutics Inc

TEACHING POINTS
The proteins encoded by BRCA genes are tumor suppressors involved in DNA damage repair. With mutations of the BRCA gene, the ability to repair DNA damage is impaired, which can result in tumor development. Although breast and ovarian cancer are classically thought to be associated with BRCA mutations, other tumors may also contain such mutations like pancreatic, prostate and peritoneal cancer. Knowledge of BRCA mutations has started to affect approaches to treatment strategies. In this exhibit, we will discuss and demonstrate
1. BRCA genes and their function.
2. Epidemiology and the radiographic appearance of tumors such as breast, ovarian, prostate and pancreatic cancer, which can be seen in the setting of BRCA mutations.

**TABLE OF CONTENTS/OUTLINE**
1. BRCA gene product function and genetic testing
2. Epidemiology
3. Tumors associated with BRCA mutations:
   a. Breast cancer
   b. Ovarian cancer
   c. Pancreatic cancer
   d. Fallopian tube cancer
   e. Peritoneal cancer
   f. Prostate cancer
4. Emerging therapy strategies in BRCA mutations

**MSE110**

**Comprehensive Update on Imaging Features and Management of Primary and Metastatic Synovial Sarcoma**

*Education Exhibits*

*Location: MS Community, Learning Center*

**Participants**
- Akshay Baheti MBBS, MD (Presenter): Nothing to Disclose
- Sreeharsha Tirumani MBBS, MD: Nothing to Disclose
- Rani S. Sewatkar MBBS: Nothing to Disclose
- Nikhil H. Ramaiya MD: Nothing to Disclose
- Jyothi Priya Jaggannathan MD: Nothing to Disclose

**TEACHING POINTS**
1. Synovial sarcoma (SS) occurs in the extremities and trunk in young adults and has indolent presentation mimicking benign tumor.
2. Extremity SS is best characterized on MRI as lobulated heterogeneously enhancing mass with characteristic imaging features such as ‘triple sign’, ‘bowl of grapes’ appearance and fluid levels.
3. Non-extremity synovial sarcomas can occur anywhere in the trunk. Infrathoracic SS is often pleural-based at presentation, and may represent a distinct entity called pleuropapenychymal syovial sarcoma (PPSS).
4. Pleural-based metastases are the most common sites of metastatic disease.
5. Synovial sarcomas are relatively sensitive to chemoradiotherapy in both neoadjuvant and adjuvant settings, and radiologists play a key role in assessing response.

**MSE111**

**CT Mapping of Patients Candidates to Cytoreductive Surgery (CRS) Combined with Perioperative Intraperitoneal Chemotherapy (PIC) and Correlation with Pathologist and Surgical Findings**

*Education Exhibits*

*Location: MS Community, Learning Center*

**Participants**
- Meylin Caballeros MD: Nothing to Disclose
- Isabel Vivas Perez MD: Nothing to Disclose
- Romina Zalazar MD (Presenter): Nothing to Disclose
- Jose Miguel Madrid MD: Nothing to Disclose
- Maria Paramo Alfaro MD: Nothing to Disclose
- Fernando Martinez-Regueira: Nothing to Disclose

**TEACHING POINTS**
1. To discuss the utility of CT imaging for the detection and characterization of intraperitoneal disease.
2. To review the peritoneal anatomy, paying special attention to the most common sites of tumor implants.
3. To compare the locations of tumor implants described in CT with the real locations found during surgery.

**MSE112**

'*If You Hear Hooves, Should you Only Think of Horses?* A Case-based Review of Lymphoma Mimicking Other Tumor Types'

*Education Exhibits*

*Location: MS Community, Learning Center*

Certificate of Merit
Participants
Antoni Aleksander Sergot MBBS, FRCR (Presenter): Nothing to Disclose
Tara Diane Barwick MBChB: Nothing to Disclose
Nishat Bharwani MBBS, FRCP: Nothing to Disclose
Nicola Hilary Strickland MD: Nothing to Disclose
Donald MacDonald MBChB, PhD: Nothing to Disclose
Kikkeri Naresh MBBS, MD: Nothing to Disclose

TEACHING POINTS
To highlight cases which at first review appeared consistent with established ‘classical’ tumor types but were ultimately revealed to be atypical radiological presentations of lymphoma. To highlight how lymphoma can mimic other tumor types and demonstrate imaging pearls which should alert the radiologist to the possibility of an atypical presentation of lymphoma. We aim to also demonstrate some of the features which should alert the reporting radiologist to the possibility of that the tumour being assessed is intact a lymphoma and not a more conventionally encountered tumour type. To illustrate a spectrum of cases incorporating a number of radiological sub-specialties seen across a number of imaging modalities.

TABLE OF CONTENTS/OUTLINE
- Introduction: A brief background of lymphoma, including typical patient characteristics.
- Imaging lymphoma: Typical modalities and radiological features.
- Individual case-by-case discussion of unusual presentations of lymphoma, mimicking more typical tumour types by anatomical site.
- Overview with learning points/imaging pearls and pitfalls.
- Conclusion.

MSE113
Imaging of Solitary Fibrous Tumor in Various Organs: A Comprehensive Review

Education Exhibits
Location: MS Community, Learning Center
Certificate of Merit
Selected for RadioGraphics

Participants
Shuji Nagata MD (Presenter): Nothing to Disclose
Hiroshi Nishimura MD: Nothing to Disclose
Kimberly Katz Amrami MD: Nothing to Disclose
Koji Hiraoka: Nothing to Disclose
Jun Akiba: Nothing to Disclose
Akiko Sumi MD: Nothing to Disclose
Tatsuyuki Tanon MD: Nothing to Disclose
Yusuke Uchiyama MD: Nothing to Disclose
Kiminori Fujimoto MD, PhD: Nothing to Disclose
Masaumi Uchida MD, PhD: Nothing to Disclose
Toshi Abe MD: Nothing to Disclose

TEACHING POINTS
1. To illustrate the spectrum of solitary fibrous tumors in a variety of anatomic sites. 2. To review various relevant cross-sectional imaging techniques with pathologic correlation which aid in diagnosis.

TABLE OF CONTENTS/OUTLINE
This presentation will start with discussion of pathological findings. Although solitary fibrous tumors (SFTs) were previously thought to occur most commonly in the pleura, it can originate any site of the body. We evaluate CT and MR imaging findings of SFTs in a variety of anatomic sites including meninges, maxillary sinus, orbit, pleura, breast, abdominal wall, mesentery, para-saginal, retroperitoneum, spermatic cord, prostate and several soft tissue regions (cutis, subcutaneous fat, and muscle), including both benign and malignant SFTs. They have variable signal intensity on T2-weighted imaging according to amount of collagen stroma, myxoid stroma, and cellularity. However, they also show some characteristic findings such as “well-defined and lobulated” morphology, “flow void”, “chocolate chip cookie appearance” and the “black-and-white mixed pattern”. Radiologists must know that SFTs have variable imaging features and biological behavior and be aware of tumor characteristics in order to suggest the diagnosis.

MSE114
Metastatic Melanoma: Pictorial Review of the Usual and Unusual Faces of this Serious Tumor

Education Exhibits
Location: MS Community, Learning Center

Participants
Silvana Castro Faria MD (Presenter): Nothing to Disclose
Tara Lynn Sagebiel MD: Nothing to Disclose
Brinda Rao MD: Nothing to Disclose
Shiva Gupta MD: Nothing to Disclose
Catherine Ellen Devine MD: Nothing to Disclose
Madhavi Patnana MD: Nothing to Disclose
Chaan Ng MD: Nothing to Disclose
Priya Ranjit Bhosale MD: Nothing to Disclose

TEACHING POINTS
1. Metastatic melanoma can involve multiple organs 2. Melanoma metastasizes most commonly via lymphatics to regional lymph nodes. 3. Melanoma has the potential to metastasize haematogenously to any organ including usual and unusual locations such as liver, lung, brain, adrenal glands, spleen, pancreas, soft tissues, intestines, heart, testicles, stomach and gallbladder. 4. Recent breakthroughs in immunotherapy and target therapy have revolutionized the treatment of patients with advanced...
melanoma. Cross section imaging plays an important role in the staging, monitoring and assessment of therapy response of metastatic melanoma.

**TABLE OF CONTENTS/OUTLINE**
With the use of annotated diagrams and high resolution multiplanar CT, MRI and PET/CT images we will: - discuss the staging of melanoma - review the pathways of spread of metastatic melanoma - highlight the typical and atypical imaging features of the common and uncommon sites of metastatic melanoma and its associated complications - show the changes in the metastatic melanoma before and after treatment with new immunotherapy and target therapy drugs such as ipilimumab and vemarafsenib. The attendee will become familiar and will be able to recognize the distinct image features of metastatic melanoma.

**MSE115**

**Myriad Manifestations of Multiple Myeloma: A Multi Modality Review with Emphasis on Extra Medullary Disease**

*Education Exhibits*

*Location: MS Community, Learning Center*

**Participants**
- Maharshi Harischandra Patel DO (Presenter): Nothing to Disclose
- Gitanjali Bajaj MBBS: Nothing to Disclose
- Kedar Jambhekar MD: Nothing to Disclose
- Tarun Pandey MD, FRCR: Nothing to Disclose
- Carey Lee Guidry MD: Nothing to Disclose
- Roopa Ram MD: Nothing to Disclose

**TEACHING POINTS**
1. Review the role of various imaging modalities in the diagnosis and follow up of multiple myeloma. 2. Recognize the various manifestations of multiple myeloma, including sclerotic variants, unusual sites and atypical imaging appearances of extra medullary disease. 3. Review of common pitfalls in the interpretation of extra medullary disease.

**TABLE OF CONTENTS/OUTLINE**
1. Typical and atypical manifestations of multiple myeloma as seen on Plain radiography, Computed tomography (CT), whole body Positron Emission Tomography (PET) and whole body Magnetic Resonance Imaging (MRI) including brief discussion on whole body diffusion weighted imaging (DWIBS). 2. Case examples showing rare sites of involvement of extra medullary disease, which mimic other malignancies. 3. Pearls and pitfalls to consider before making the diagnosis of extra medullary disease.

**MSE116**

**New Tumor Response Criteria in the Era of Targeted Therapies in Oncology**

*Education Exhibits*

*Location: MS Community, Learning Center*

**Certificate of Merit**

**Participants**
- Temel Tirkes MD (Presenter): Nothing to Disclose
- Tariq Arshad Hameed MD: Research Grant, Koninklijke Philips NV
- Fatih Akisik MD: Nothing to Disclose

**TEACHING POINTS**
Concepts in oncologic treatment have radically changed in past 10 years. Targeted therapies are designed with entirely new concept of inducing apoptosis compared to traditional cytotoxic drugs. Imaging modalities allow monitoring the changes in tumor size, morphology and metabolism during the course of therapy. Several criteria based on size, morphology or functional change of the tumor have been developed to analyze tumor response observed during the course of the therapy, in order to provide an early assessment of the treatment.

**TABLE OF CONTENTS/OUTLINE**
This is a case-based review of disease and therapy specific aspects of emerging response evaluation criteria by CT, MRI and FDG-PET. Focus is on what the radiologist needs to know when interpreting CT/MRI or CT-PET on oncologic patients who are being treated with new targeted therapies. 1. Review the most common targeted therapies and mechanism of action. 2. New response criteria specifically designed for targeted therapies in clinical trials Choi’s Response Criteria PERCIST mRECIST (for Hepatocellular Carcinoma) irRC (for melanoma) Cheson criteria (for Lymphoma) 3. Quantitative measurements and post-processing 4. Clinical summaries and case based images 5. Comparisons with traditional criteria; RECIST and WHO

**MSE118**

**Skeletal and Extraskeletal Ewing Sarcoma/Primitive Neuroectodermal Tumor**

*Education Exhibits*

*Location: MS Community, Learning Center*

**Participants**
- Ahmed-Emad Mahfouz MD (Presenter): Nothing to Disclose
- Hanan Sherif MD: Nothing to Disclose
- Hassan Abdulla Alansari MBBCh: Nothing to Disclose
- Batoul Mashhadi MD: Nothing to Disclose

**TEACHING POINTS**
Ewing sarcoma/primitive neuroectodermal tumor (PNET) may originate in different parts of the body within or outside the skeleton. Purely extraskeletal Ewing/PNET may represent a diagnostic challenge entering into the differential diagnosis of
Lesions in the anatomical location. Examples presented here are Ewing/PNET of the carotid sheath and the anterior abdominal wall. Predominantly extraskeletal soft tissue Ewing/PNET located adjacent to bone may have a subtle bony projection into the soft tissue mass, which gives a clue to the diagnosis. Predominantly skeletal Ewing/PNET classically involves the diaphysis in children. It shows the classical onion-peel periosteal reaction and may extend outside bone forming a soft tissue mass. Ewing/PNET tends to cross anatomical boundaries without complete destruction, leaving a ghost of the anatomical structure (particularly bone) while spreading on both sides of it.

**TABLE OF CONTENTS/OUTLINE**

Ewing/PNET with full radiologic-pathologic correlation  
Purely skeletal  
Predominantly skeletal with soft tissue extension after cortical disruption  
Predominantly extraskeletal with subtle nidus related to the adjacent bone  
Predominantly extraskeletal with spread through the bone forming the typical bone 'ghost' with soft tissue masses on both sides  
Purely extraskeletal

**MSE119**

**Sugarbaker Procedure: What Radiologists Need to Know About the New Standard of Care for Peritoneal Carcinomatosis**

**Education Exhibits**

Location: MS Community, Learning Center

**Participants**

- Aparna Srinivasa Babu MD (Presenter): Nothing to Disclose
- Oleg Teytelboym MD: Nothing to Disclose

**TEACHING POINTS**

- Image based illustration of peritoneal carcinomatosis  
- Principles behind the Sugarbaker procedure  
- Role of imaging in guiding surgical management, including imaging based exclusion criteria  
- Post operative imaging appearance  
- Common complications

**TABLE OF CONTENTS/OUTLINE**

- Introduction to the anatomical and pathophysiological factors that affect intraperitoneal dissemination of malignancies  
- Useful tips for identification of the primary tumor  
- Imaging appearance of peritoneal carcinomatosis  
- The Sugarbaker procedure  
- Overview of the procedure  
- Role of the radiologist in directing the surgical management  
- Emerging role of imaging to determine Peritoneal Carcinomatosis Index (PCI) for prognostic and preoperative assessment  
- Postoperative imaging appearances with focus on potential complications of the procedure  
- Challenges involved in application of tumor response assessment guidelines for follow up  
- Illustration of utilization of other modalities including MRI and FDG PET/CT  
- Synopsis of pertinent literature review  
- Summarization by highlighting a radiologist's role in the diagnosis and management of peritoneal carcinomatosis

**MSE120**

**The Devil is in the DNA: A Comprehensive Review of Rare Malignancies that Warrant Genetic Testing**

**Education Exhibits**

Location: MS Community, Learning Center

- Selected for RadioGraphics

**Participants**

- Venkata S. Katabathina MD: Nothing to Disclose
- Gowri Gutti MD (Presenter): Nothing to Disclose
- Abhinav Suri: Nothing to Disclose
- Sandhya Vinu-Nair: Nothing to Disclose
- Christine O. Menias MD: Nothing to Disclose
- Anil Kumar Dasyam MD: Nothing to Disclose

**TEACHING POINTS**

- Review select, rare malignancies that are highly associated with hereditary cancer predisposition syndromes  
- Discuss cytogenetic and molecular abnormalities of genetic conditions associated with these malignancies  
- Describe cross-sectional imaging findings; role of imaging in the diagnosis and surveillance of patients and family members

**TABLE OF CONTENTS/OUTLINE**

- Introduction Medullary thyroid carcinoma: Multiple endocrine neoplasia 2A and B - RET proto-oncogene  
- Carcinoid tumors: MEN 1 - MEN 1 gene  

**MSE124**

**Abdominal Pain in Pregnancy, Thinking Outside the Uterus**

**Education Exhibits**

Location: MS Community, Learning Center

**Participants**

- Elaine Ni Mhurchu MBCh (Presenter): Nothing to Disclose
- Lisa P. Lavelle MBCh, FFR(RCSI): Nothing to Disclose
- Sinead Helena McEvoy MBCh, FFR(RCSI): Nothing to Disclose
TEACHING POINTS
The purpose of this exhibit is: 1. To review the common, non obstetric causes of abdominal pain in pregnant patients. 2. To describe rare, interesting causes of abdominal pain in this cohort. 3. To discuss an appropriate imaging algorithm for these patients including newer MRI techniques, with an emphasis on radiation dose reduction.

TABLE OF CONTENTS/OUTLINE
Causes of abdominal pain in pregnancy
Illustration and explanation of common and rarer causes, including the following:
- Gastrointestinal/Hepatobiliary: Appendicitis, Inflammatory Bowel Disease, Intussusception, Pancreatitis, Cholecystitis, Cholelithiasis
- Genitourinary: Physiological Hydronephrosis, Obstructive Hydronephrosis
- Gynaecological: Ovarian cyst, endometrioma
- Vascular: Iliofemoral DVT
Outline an imaging pathway for assessment of the pregnant patient with abdominal pain, including the role of Ultrasound and MRI
Discussion regarding sequencing of MRI and the role of Diffusion Weighted Imaging in the assessment of acute inflammatory conditions.

MSE125
Adipose Tissue Distribution is More Important than Body Mass Index

Participants
Karine Sahakyan MD, PhD (Presenter): Nothing to Disclose
Philip A. Araoz MD: Nothing to Disclose
Francisco Lopez-Jimenez: Nothing to Disclose
Naima Covassin: Nothing to Disclose
Virend Somers: Nothing to Disclose

TEACHING POINTS
1. To emphasize the importance of fat distribution vs BMI. 2. To understand clinical application for assessment of adipose tissue.

TABLE OF CONTENTS/OUTLINE
BMI cutoff values to diagnose obesity have low sensitivity to identify adiposity, as they fail to identify half of the people with excess body fat percentage. 1. Simple techniques a. Waist circumference, Waist-to-Hip Ratio, Waist-to-Height Ratio b. Body impedance analysis c. Air displacement plethysmography 2. Imaging techniques to quantify adipose tissue a. Ultrasonography b. Dual Energy X-ray Absorptiometry (DXA) c. Computed Tomography (CT) d. Magnetic Resonance Imaging (MRI). 3. Differentiation between different types of adipose tissue a. Visceral fat b. Subcutaneous fat. 4. Clinical application a. Possible additional information on routine scans at screening (adding to CT colonoscopy to identify subjects at higher risk of colorectal cancer and poor postoperative outcomes) b. Quantification of fat percentage can be added to routine DXA screening for osteoporosis c. Quantification of visceral fat may provide risk stratification for development of pathologic conditions associated with visceral obesity d. Assessment of adipose tissue provides additional information for follow-up after lifestyle modification or pharmacologic intervention.

MSE126
An Institutional Model for International Humanitarian Teleradiology

Participants
Jerome Allen Swanson MD (Presenter): Nothing to Disclose
Waleed Brinjikji: Nothing to Disclose
Paul Philip Heideman MD: Nothing to Disclose
Annie McDonough: Nothing to Disclose
Dieuseul Saint-Ange: Nothing to Disclose
Sean Fedyna: Nothing to Disclose
Norbert Gilles Joseph Campeau MD: Nothing to Disclose
Terri Jo Vrtiska MD: Nothing to Disclose
Carl C. Reading MD: Nothing to Disclose
Sung Han Kim MD: Nothing to Disclose
Garry Choy MD, MS: Nothing to Disclose
Jeffrey Brian Mendel MD: Advisor, McKesson Corporation

TEACHING POINTS
- Humanitarian teleradiology is an effective tool for improving patient care in resource-poor settings. - International humanitarian teleradiology can be effectively integrated into a residency program. - International humanitarian teleradiology provides opportunities for radiologists interested in humanitarian work to use their advanced training to improve patient care.

TABLE OF CONTENTS/OUTLINE
- Introduction to humanitarian teleradiology services for a rural hospital in Haiti. - Integration of humanitarian teleradiology into a residency program, including logistics such as scheduling interpretation sessions and coordination with staff/trainees for optimal coverage. - Educational and service benefits for academic radiology departments. - Sample cases seen in global health outreach. - Summary educational points.
Applications of Diffusion Weighted Magnetic Resonance Imaging in the Assessment of Abdominal and Pelvic Pathology

Education Exhibits
Location: MS Community, Learning Center

Participants
Pamela Julia Walsh MD (Presenter): Nothing to Disclose
John J. Hines MD: Nothing to Disclose
Barak Friedman MD: Nothing to Disclose
Mark Evan Bittman MD: Nothing to Disclose

TEACHING POINTS
1. Diffusion weighted imaging (DWI) often provides valuable information on various inflammatory, infectious and neoplastic conditions in the abdomen and pelvis. 2. DWI can frequently reveal abnormalities which are difficult, if not impossible to see on conventional spin-echo, gradient echo or gadolinium-enhanced sequences. 3. DWI imaging takes on added importance in patients who are unable to receive gadolinium-based contrast agents, including patients with end stage renal disease, pregnant patients, and patients with allergy to gadolinium.

TABLE OF CONTENTS/OUTLINE
I. Introduction to DWI and ADC maps II. Examples of pathology in the abdomen and pelvis well characterized using DWI, with emphasis in which DWI added information not available with standard MR imaging sequences. Case examples include: • primary malignancy detection • metastatic disease • tumor recurrences • inflammatory processes: autoimmune pancreatitis, hepatic abscesses, pyelonephritis, inflammatory and infectious bowel disease III. Examples of the benefit of DWI in patients who are unable to receive contrast, including evaluation for appendicitis in pregnant patients and in characterization of renal masses in patients with severe renal insufficiency. IV. Discussion of some of the limitations and potential pitfalls in interpretation of DWI.

MSE128
Aunt Minnie’s and Classic Signs in Adult Abdominopelvic Ultrasonography: A Primer for Radiology Residents

Education Exhibits
Location: MS Community, Learning Center

Participants
Nanda Venkatanarasimha MRCP, FRCR (Presenter): Nothing to Disclose

TEACHING POINTS
Familiarity afforded by recognition of a classic sign or Aunt Minnie on ultrasound allows for a more confident and accurate diagnosis Identification and understanding the pathophysiologic characteristics associated with these signs can facilitate timely patient management

TABLE OF CONTENTS/OUTLINE
Systematic review of signs in Hepatobiliary: • Starry sky, halo, target, reverse target, short gun, double duct, central dot, double barrel, gamma-gandy bodies • WES, comet tail, Champagne, Murphy's Genitourinary: • Renal sweat, dromedary hump, milk of calcim, mickey-mouse, Jack stone, cobra, ureteric jet • Bilateral disease, onion skin Peritoneum & bowel • Cake and Sandwich; pseudokidney Pelvis • Picket fence, tip of iceberg, string of pearls, feeding artery, ring of fire, bridging vascular, plug and mesh Doppler • Spoke wheel, whirl pool, Ying-yang, String of beads, visible thrill, mosaic • Reverse ‘M’, Parvus tardus, hepatofugal Correlative imaging Summary

MSE129
Avoiding Tunnel Vision: Extra-Spinal Findings on Lumbar Spine Imaging

Education Exhibits
Location: MS Community, Learning Center

Certificate of Merit

Participants
Neha Gowali MD (Presenter): Nothing to Disclose
Gunja Paresh Parikh MD: Nothing to Disclose
Elana Beth Smith MD: Nothing to Disclose
Mark Oliver Cosentino MD: Nothing to Disclose
Neil B. Horner MD: Nothing to Disclose

TEACHING POINTS
1. Structures carefully evaluated as part of a standard search pattern on abdominal and pelvic imaging have the potential to be overlooked on spine imaging.
2. Due to a limited field of view, exam indication and satisfaction of search, extra-spinal findings may be missed on spine imaging.
3. The audience will learn to recognize potential blind spots in lumbar spine imaging. The importance of these blind spots will be illustrated.
4. A diagnostic approach to extra-spinal findings on lumbar spine imaging will be reviewed.

TABLE OF CONTENTS/OUTLINE
Extra-spinal abnormalities will first be shown on dedicated spine imaging, highlighting typical blind spots on lumbar spine
studies. The same findings will then be shown to better advantage on dedicated abdominal/pelvic studies. Cases will be presented in quiz format and will include the following: I. Abdomen A. Adrenal gland - adenoma, adrenocortical carcinoma B. Liver - FNH, adenoma, HCC C. Pancreas - pancreatitis, neoplasm, laceration D. Spleen - splenomegaly, laceration E. Kidneys - hydronephrosis, Lithium nephropathy, RCC F. Carcinoid II. Pelvis A. Adnexa - mucinous cystadenoma B. Uterus - leiomyoma III. Vascular A. Aorta - aneurysm, dissection, thrombosis B. Other - pelvic varices IV. Error analysis V. Diagnostic checklist

MSE130
Conquering the Calcifications of the Abdomen and Pelvis

Education Exhibits
Location: MS Community, Learning Center

Participants
Mahan Mathur MD (Presenter): Nothing to Disclose
Jonathan D. Kirsch MD : Nothing to Disclose
Mike Spektor MD : Nothing to Disclose
Kyle Elmer Pfeifer MD : Nothing to Disclose
Margarita V. Revzin MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to test the viewer on their knowledge of common and uncommon clinical entities that manifest primarily as calcifications within the abdomen and pelvis. The location and pattern of calcification will be emphasized thus allowing generation of a reasonable differential diagnosis.

TABLE OF CONTENTS/OUTLINE
Cases will be presented in a quiz format. The majority of the initial imaging findings will be presented on conventional radiographs, from which a differential diagnosis can be generated. This will be followed by a discussion of the findings, highlighting key imaging features with CT. The following cases will be presented: Nephrolithiasis (including nephrocalcinosis) Staghorn calculus Polycystic kidney disease (peripherally calcified cyst borders) Vas deferens calcifications Ureteral stent calcifications Gallstones Sclerosing encapsulating peritonitis Chronic pancreatitis Autoinfarcted spleen Fibroids Bladder stones (including stones in bladder diverticulum) Transitional cell carcinoma TB (putty kidney) Liver schistosomiasis Echinococcus Calcified lymph nodes Injection granulomas Transplanted kidney Peyronie’s disease Abdominal aortic aneurysm Calciphylaxis Twin gestation

MSE131
Demystifying Uncommon Questions about Iodinated Contrast

Education Exhibits
Location: MS Community, Learning Center

Participants
Simon Roh MD (Presenter): Nothing to Disclose
Archana T. Laroia MD : Research Consultant, VIDA Diagnostics, Inc Research Consultant, Siemens AG
Lillian May Lai MD : Nothing to Disclose
Joel Ziegelbein MD, MS : Nothing to Disclose
Sandeept. Laroia MD : Nothing to Disclose

TEACHING POINTS
1. Iodinated intravenous contrast agents are used daily in radiology practice. Radiologists are often the first or lone responders to contrast reactions and other situations. Being prepared in handling such situations has an imperative role in the radiology practice
2. We will answer questions to infrequent but real-life questions about shellfish allergy, breakthrough reactions, imaging of pregnant patients, etc. This exhibit will prepare residents and practicing radiologists to handle several such situations.

TABLE OF CONTENTS/OUTLINE

MSE132
Do You Feel Lucky or Prepared: Complications of Common Radiology Procedures and Tips to Avoid Them

Education Exhibits
Location: MS Community, Learning Center

Participants
Samuel Fairbrother MD (Presenter): Nothing to Disclose
Christopher Buros : Nothing to Disclose
Paul Richard Klepchick MD : Nothing to Disclose
Rishi Kumar Maheshwary MD : Nothing to Disclose
Matthew Scott Hartman MD : Nothing to Disclose

TEACHING POINTS
1. Review fundamental anatomy of common radiology procedures using multimodality imaging and illustrations. 2. Create a checklist to avoid complications of common radiology procedures. 3. Provide multimodality imaging examples of complications from violating proper technique and/or fundamental anatomy.
TABLE OF CONTENTS/OUTLINE


MSE133

Ectopic Tissues in the Abdomen: Anatomical, Clinical, and Radiologic Features of the Rare Entities

Education Exhibits
Location: MS Community, Learning Center

Selected for RadioGraphics

Participants
Ryosuke Taiji (Presenter): Nothing to Disclose
Nagaaki Marugami: Nothing to Disclose
Junko Takahama MD: Nothing to Disclose
Masayo Ogawa: Nothing to Disclose
Aki Takahashi MD: Nothing to Disclose
Kimiko Kichikawa MD: Nothing to Disclose

TEACHING POINTS
1. To understand anatomical common site, embryological etiology of ectopic tissues in the abdomen. 2. To demonstrate clinico-radiological features of ectopic tissues.

TABLE OF CONTENTS/OUTLINE
1. To review the abnormal development of ectopic tissues in the abdomen based on embryology. 2. To introduce the multimodality imaging using tissue-specific contrast media (contrast-enhanced US, SPIO-MRI, EOB-MRI and gastric mucosal membrane scintigraphy) for diagnosis of ectopic tissues in the abdomen. 3. To demonstrate clinico-radiological features of the ectopic tissues (1 Liver: ectopic liver and hepatocellular carcinoma from ectopic liver, 2 Gall bladder: double gall bladders, 3 Pancreas: ectopic pancreas in small intestine, 4 Spleen: intra-pancreatic spleen and splenosis, 5 Kidney: ectopic kidney in the pelvis, 6 Adrenal gland: adrenal rest tumor, 7 Gastric mucosa: Meckel diverticulum and gastric duplication, 8 Endometrium: endometriosis of the ureter, bladder and inguinal canal, 9 Ovarian stroma: mucinous cystic neoplasm of the pancreas).

MSE134

Ethical, Medicolegal and Financial Considerations of Teleradiology

Education Exhibits
Location: MS Community, Learning Center

Participants
Aparna Srinivasa Babu MD (Presenter): Nothing to Disclose
Amanda Lea Steinberger DO: Nothing to Disclose
Michael Lee Brooks MD, JD: Nothing to Disclose

TEACHING POINTS
• Overview of telemedicine in general • Financial factors driving teleradiology • American College of Radiology (ACR) guidelines for teleradiology • Teleradiology models • Pros and cons of teleradiology • Legal implications of teleradiology • Changes in state laws to accommodate issues pertaining to this field

TABLE OF CONTENTS/OUTLINE
This exhibit will provide a comprehensive insight into the impact of teleradiology on our day to day practice. Brief introduction to telemedicine Economic implications of telemedicine, with emphasis on teleradiology and reimbursement patterns that drive the market Models of teleradiology, including the controversial outsourcing model Pros and cons of teleradiology Legal intricacies surrounding the practice of teleradiology Confidentiality, licensing, credentialing, quality control and liability ACR white paper on teleradiology including practice guidelines based on ACR teleradiology task force recommendations Pointers on avoiding teleradiology related legal debacles. Means to utilize teleradiology to the best advantage in a radiological practice.

MSE135

Evolutionary Branching Patterns Hidden in Anatomical Structures of Sharks, Skates and Stingrays Elucidated by CT

Education Exhibits
Location: MS Community, Learning Center

Participants
Andrew Douglas McQuiston BS (Presenter): Nothing to Disclose
U. Joseph Schoepf MD: Research Grant, Bracco Group Research Grant, Bayer AG Research Grant, General Electric Company Research Grant, Siemens AG
Carlo Nicola de Cecco MD: Nothing to Disclose
Christian Canstein: Employee, Siemens AG
Callie Crawford: Nothing to Disclose
Gavin Naylor PhD: Nothing to Disclose

TEACHING POINTS
1. To gain information on the structural differences between various species of closely related sharks, skates and stingrays using
3rd generation dual-source CT. 2. To assess different acquisition parameters, including dual-energy CT, and reconstruction algorithms for producing optimal images of bony and cartilaginous structures in these species. 3. To gain insights into the evolutionary branching patterns of different species of sharks, skates, and stingrays via non-destructive, comparative CT assessment of species-specific morphology.

TABLE OF CONTENTS/OUTLINE
Background information on the evolutionary branching of sharks, skates and stingrays. Description of technical parameters used to image species of different shapes and sizes. Examples illustrating the application of various reconstruction algorithms and post-processing techniques to sharks, skates and stingrays and the unique images produced. Synthesis of theories and methods for deriving patterns of evolutionary branching from CT morphology.

MSE136

Going Down the Wrong Pathology

Education Exhibits
Location: MS Community, Learning Center

Participants
Amir J. Momtahen MD (Presenter): Nothing to Disclose
Christine G. Menias MD: Nothing to Disclose
Rana Fattahi MD: Nothing to Disclose
Perry J. Pickhardt MD: Co-founder, VirtuoCTC, LLC Stockholder, Cellectar Biosciences, Inc
Cary Lynn Siegel MD: Nothing to Disclose
Sanjeev Bhalla MD: Nothing to Disclose

TEACHING POINTS
1. To review the imaging findings of various malignant tumors arising from benign lesions and compare with imaging characteristics of underlying benign disease. 2. To discuss the differential diagnosis and pitfalls.

TABLE OF CONTENTS/OUTLINE
1. Introduction of malignant transformation of benign lesions. 2. Review the imaging findings of malignant tumors arising from benign lesions including but not limited to: Adenocarcinoma arising from pulmonary scar Hepatocellular carcinoma arising from Hepatic adenoma Carcinoma of the adrenal gland Leiomyosarcoma arising from uterine fibroid Clear cell carcinoma arising from abdominal wall scar Endometroid carcinoma arising from endometriosis Squamous cell carcinoma arising from benign teratoma Neurofibrosarcoma arising from neurofibroma Angiosarcoma arising from hemangioma Summery: Malignant transformation of benign lesions is a rare complication that may create a diagnostic challenge to the radiologists. This exhibit aims to display the imaging findings and enhance the radiologic evaluation of various benign lesions with malignant transformation.

MSE137

Harmful Bubbles: Decompression Illness—What The Radiologist Needs To Know

Education Exhibits
Location: MS Community, Learning Center

Certificate of Merit

Participants
Mario Gerardo Santamarina MD (Presenter): Nothing to Disclose
Carlos Ignacio Echeverria: Nothing to Disclose
Mirko Marra MD: Nothing to Disclose
Ignacio Beddings MD: Nothing to Disclose
Alejandro Ceriani: Nothing to Disclose
Mariano Volpacchio MD: Nothing to Disclose

TEACHING POINTS
1. To review the main physiopathological concepts and processes involved in decompression illness (DI). 2. To describe the main clinical manifestations, with a brief discussion of treatment options. 3. To review the main imaging findings in a patient with DI.

TABLE OF CONTENTS/OUTLINE
- Physiopathological bases of the development of DI.
- Review of factors that predispose to DI.
- Main clinical features.
- Treatment options and prognosis.
- Review of the main imaging findings in decompression illness. Pictorial review with sample cases.
- Summary. DI occurs when intravascular or tissue bubbles develop as a result of a decrease in the environmental pressure (decompression). Two different mechanisms explain bubble formation. Arterial gas embolism, where alveolar or venous gas emboli reach arterial circulation, and decompression sickness, in which bubbles arise from dissolved gas (nitrogen) in tissues. Both of these mechanisms affect specific occupational and recreational settings. Clinical presentation is variable ranging from pruritus and mild pain through neurologic symptoms, cardiac failure and even death in severe cases. Imaging plays a prominent role in patients with DD allowing to evaluate compromise severity, predict and avoid complications and, eventually, establishing a prognosis.

MSE138

Histiocytosis for the Radiologist: Extra-osseous Manifestations and Distinguishing Features of a Rare Group of Disorders
Participants

David Michael Valenzuela MD (Presenter): Nothing to Disclose
Sara Katherine Plett MD: Nothing to Disclose
Sandeep Singh Arora MBBS: Nothing to Disclose
Spencer Caton Behr MD: Research Grant, General Electric Company

TEACHING POINTS

1. Discuss the contemporary classification of the histiocytoses.
2. Review the imaging characteristics of common histiocytoses with an emphasis on extra-osseous manifestations.
3. Assist in formulating an appropriate differential diagnosis of histiocytoses relevant to radiology with multiple cross-sectional imaging examples.

TABLE OF CONTENTS/OUTLINE

Contemporary pathologic classification of the histiocytoses
Practical radiographic classification of common histiocytoses
Review of imaging findings of common histiocytoses
Sample cases (CT and MRI)

Histiocytic disorders have historically presented a diagnostic challenge. A number of histiocytoses have been described, but the radiologist may only encounter a few given their rarity. Familiarity with the imaging appearance of the more common entities such as Langerhans cell histiocytosis, Erdheim-Chester disease, Rosai-Dorfman, and juvenile xanthogranuloma will assist with formulating an appropriate differential diagnosis. We will present a concise schema depicting the currently accepted histopathological classification with an emphasis on the relevant distinguishing imaging characteristics. Cross-sectional images of the extra-osseous manifestations of Langerhans cell histiocytosis, Erdheim-Chester disease, juvenile xanthogranuloma and Rosai-Dorfman disease will be included.

MSE140

Iatrogenic Cardiovascular Injuries

Education Exhibits

Location: MS Community, Learning Center

Selected for RadioGraphics

Participants

Sina Tavakoli MD (Presenter): Nothing to Disclose
Carlos S. Restrepo MD: Nothing to Disclose
Ameya Jagadish Baxi MBBS, DMRD: Nothing to Disclose
Rajeev Suri MD: Nothing to Disclose
Daniel Vargas MD: Nothing to Disclose

TEACHING POINTS

Iatrogenic injuries may occur from either minimally to highly invasive procedures and are not always clinically apparent. Radiologists have a critical role in identifying these potentially devastating injuries. Due to their low incidence, some of these injuries are uncommonly encountered in daily clinical practice and the literature is limited to small case series or isolated case reports. The purpose of this exhibit is to provide a pictorial review of the most common iatrogenic a) cardiac, b) arterial, and c) venous injuries that may be seen with both vascular and non-vascular procedures.

TABLE OF CONTENTS/OUTLINE

1) Introduction to iatrogenic cardiovascular injury.
2) Imaging findings in cardiac and pericardial injuries: Although uncommon, these may be seen after cardiac and non-cardiac surgeries, diaphragmatic hernia repair, pacemaker placement, chest tube insertion, and lung biopsy.
3) Imaging findings in arterial injuries: These usually occur after catheter angiograms and pacemaker placement, endovascular procedures and spinal biopsies or surgeries.
4) Imaging findings in venous injuries: These are usually seen after central venous catheter placement and angioplasty in dialysis patients, but also include cement emboli in perivertebral venous plexus subsequent to vertebroplasty.
5) Conclusion.

MSE141

Imaging of Neuromodulation

Education Exhibits

Location: MS Community, Learning Center

Participants

Sangam Gurudas Shet Kanekar MD (Presenter): Nothing to Disclose
Evan Somers: Nothing to Disclose

TEACHING POINTS

1. To discuss with illustrations the indications, techniques, imaging appearance, and complications with commonly used stimulators. 2. To discuss the MR safety and guidelines for these devices.

TABLE OF CONTENTS/OUTLINE

Neuromodulation is the electrical or physical modulation of a nerve to influence the physiologic behavior of an organ. In this
exhibit we present with illustrations the indications, techniques, imaging appearance, and the complications of commonly used stimulators: 1. Deep brain stimulators: for treatment-refractory movement disorders such as Parkinson's disease, essential tremor, and dystonias. DBS applications are being explored for depression, Alzheimer's disease, and addictions. 2. Spinal cord stimulation: for failed back surgery syndrome, refractory angina, peripheral vascular disease, phantom limb pain, spinal lumbar stenosis, postthoracotomy pain syndrome, chronic head and neck pain, and chronic visceral abdominal pain. 3. Vagus nerve stimulation: is a well-established treatment of medically refractory epilepsy. 4. Sacral neuromodulation: Lower urinary tract dysfunction (overactive bladder and nonobstructive urinary retention). 5. We also discuss the various complications associated with neuromodulations. 6. Finally we discuss the MRI compatibility of these devices.

MSE142

It's Alive!!! How to Use a Simple Tissue Phantom to Teach Liver Biopsy, Abscess Drainage and Percutaneous Cholecystostomy Procedures

Education Exhibits
Location: MS Community, Learning Center

Magna Cum Laude

Participants
Maryellen Ruth Morris MD (Presenter): Investigator, Bracco Group Investigator, Glaxo SmithKline plc
Betina Siewert MD: Nothing to Disclose
Hannah Perry: Nothing to Disclose

TEACHING POINTS
- A simple and inexpensive tissue phantom is easily created for use in training residents and fellows to perform multiple procedures in the liver.
- Enhancements including respiratory motion and simulation of target lesions, abscesses and infected gallbladders customize the teaching experience.
- Method of phantom creation and application to teach targeted and nontargeted biopsies, percutaneous drainage of liver abscesses and percutaneous cholecystostomy are demonstrated.

TABLE OF CONTENTS/OUTLINE

MSE143

Make Time for the Spine! Neuropathology Imaged on Body CT

Education Exhibits
Location: MS Community, Learning Center

Magna Cum Laude

Participants
Alexander James Kieger MD: Nothing to Disclose
Pamela Tecce Johnson MD (Presenter): Research funded, Becton, Dickinson and Company

TEACHING POINTS
The spine is imaged on all CT examinations of the chest, abdomen and pelvis. Subtle pathology involving the neural foramen and spinal canal may be the cause of the patient's symptoms or an unsuspected finding. This exhibit reviews ~ The importance of multiplanar review to elucidate subtle findings affecting the spinal canal on CT examinations of the chest, abdomen and pelvis Illustration of range of pathology affecting the neural foramen, spinal canal and spinal cord through case review

TABLE OF CONTENTS/OUTLINE
CT TECHNIQUE Importance of inspecting spinal canal on axial, sagittal and coronal views Utility of IV contrast for delineating and characterizing pathology CASE SERIES Primary CNS tumors lower cervical spine meningoima on chest CT nerve root tumor Secondary involvement by tumor cancer invading spinal canal through neural foramen or from vertebral body metastatic disease to the spinal canal paraspinall Ewing sarcoma Vascular pathology vertebral artery dissection on chest CT epidural AVM on abdominal CT Infection epidural abscess discitis

MSE144

MR Neurographic Findings of Lumbrosacral Plexopathy Compared with Clinical and EMG Results

Education Exhibits
Location: MS Community, Learning Center

Cum Laude

Participants
Diego Pineda Ordonez MD (Presenter): Nothing to Disclose
Ines Tatiana Escobar: Nothing to Disclose
Romina Goni MD: Nothing to Disclose
Fabio Barroso: Nothing to Disclose
Hernan Chaves MD: Nothing to Disclose
Maria Mercedes Serra MD: Nothing to Disclose
Claudia Patricia Cejas MD: Nothing to Disclose
TEACHING POINTS

1. Lumbosacral plexopathy traditional diagnosis relies on clinical findings; and electrodiagnostic test results. 2. Electrodiagnostic tests provides only a limited evaluation due to deep location of target nerves and the variable innervation of the muscular groups. 3. Current role of MRN in plexopathy relies on the reliable recognition of normal and abnormal patterns based on: nerve root signal intensity, nerve root thickness, root course, perineural soft tissue appearance and dependent muscular groups appearance. 4. Nowadays, information provided by MRN offers a solid morphologic aid in clinical or pre-surgical evaluation and patient management.

TABLE OF CONTENTS/OUTLINE

1. Technique and Parameter and Post processing overview, 2. Magnetic resonance neurography (MRN) findings in a cohort of healthy volunteers 3. MRN features of (LSP) plexopathy in subjects with abnormal clinical features and EMG positive test. 4. Illustrative clinical examples showing clinical, EMG and MRN discrepancies. 5. Summary of key features for the interpretation of the pathological results of lumbosacral MRN.

MSE145

Multiple Endocrine Neoplasia Type 1: Imaging Solutions to Clinical Conundrums

Education Exhibits

Location: MS Community, Learning Center

Participants

Christopher M. Knaus MD : Nothing to Disclose
Nicholas John Patronas MD : Nothing to Disclose
James G. Smirniotopoulos MD (Presenter): Nothing to Disclose

TEACHING POINTS

The major presentations, clinical findings, and terminology associated with multiple endocrine neoplasia type 1 (MEN1) are discussed. These specific clinical questions in MEN1 are related to specific imaging strategies: 1. Elevated prolactin: Is it a macroadenoma (>10mm) or microadenoma (<10mm). Adenoma indings include a convex gland margin, stalk deviation, and sella floor erosion. Imaging with a small field of view (<14cm) and a rapid MRI sequence, such as FLASH, are best for identifying an adenoma. Therapy for macroadenoma is surgery versus medical management for microadenoma. 2. Hypercalcemia with elevated PTH: This indicates abnormal parathormone. 90% of parathyroid glands are found medial to the carotid sheath. Nuclear imaging imaging subtracts the Tc99m image from a MIBI showing adenomas. 3. GI Neuroendocrine tumors: Concern for a pancreatic islet cell tumor leads to an arterial phase CT. Pancreatico-duodeno-gastric carcinoids are found in the gastrinoma triangle, defined by junction of the common and cystic duct, junction of the neck and body of the pancreas, and junction of the second and third portions of the duodenum.

TABLE OF CONTENTS/OUTLINE

MEN 1 Background
Clinical questions
Pituitary imaging
Parathyroid imaging
Pancreatic islet cell / carcinoid imaging
Adrenal cortical adenoma imaging
Miscellaneous

MSE146

No Shades of Grey in Diffusion-weighted Imaging: Misinterpretations, Misses, & Mimics

Education Exhibits

Location: MS Community, Learning Center

Participants

Roberto Garcia Figueiras MD (Presenter): Nothing to Disclose
Sandra Baleato Gonzalez MD : Nothing to Disclose
Joan C. Vilanova MD, PhD : Nothing to Disclose
Antonio Luna MD : Nothing to Disclose
Maria Cruz Ageitos Casais MD : Nothing to Disclose
Javier Sanchez MD, PhD : Research Consultant, Koninklijke Philips NV
Laura Oleaga : Nothing to Disclose

TEACHING POINTS

Diffusion-weighted imaging (DWI) is a magnetic resonance sequence that gives us functional information of tissues based on the measurement of random movement of water molecules. DWI is actually a basic tool in clinical practice. The aim of this exhibit is: - To explain the fundamental principles of diffusion-weighted imaging (DWI). - To show the mechanism through different features may affect DWI quality and imaging findings. - To show key points for interpreting DW images. - To illustrate troublesome findings on DWI. - To explain advanced applications of DWI in clinical practice.

TABLE OF CONTENTS/OUTLINE

1. Principles of DWI. How they affect imaging: selecting b values and bandwith, improving signal/noise ratio, avoiding artifacts. 2. Interpretation of DW images in clinical practice: basic principles. 3. Troublesome findings on DWI: T2 black-out, T2 shine-through, T2 wash-out, normal structures that show a restricted diffusion, the influence of anisotropy. 4. Quantification of DWI a) ADC calculation. b) Biological meaning of ADC. 5. Advanced applications of DWI: a) Intravoxel incoherent motion. b) Whole-body DWI.

MSE147

No Strain, No Pain: A Guide to Reducing Musculoskeletal Strain and Eye Fatigue Among Radiologists
**MSE148**

**Non-conventional Uses of Diffusion-weighted MRI in Abdomen: Beyond Oncology**

**Education Exhibits**
Location: MS Community, Learning Center

**Participants**
Bernardo Canedo Bizzo MD (Presenter): Nothing to Disclose
Romulo Varella MD: Nothing to Disclose
Eduardo Neumann Cupolito MD: Nothing to Disclose
Carolina Canedo Bizzo: Nothing to Disclose
Leonardo Kayat Bittencourt MD, MSc: Nothing to Disclose
Emerson L. Gasparetto MD: Nothing to Disclose

**TEACHING POINTS**
Basic principles of abdominal diffusion-weighted MR imaging (DWI) that can aid radiologists in the qualitative and quantitative interpretation of DW images. Present the emerging applications of DWI for detection, characterization and distinguishing abdominal non-neoplastic pathologies. Discuss future perspectives of DWI role in abdominal MRI.

**TABLE OF CONTENTS/OUTLINE**
Diffusion-weighted MRI basic principles and protocols. Clinical applications of DWI on non-oncological abdominal conditions, including: 1. Acute and chronic inflammatory and infectious disorders, such as appendicitis, diverticulitis, nephritis, pancreatitis and tubovarian abscess; 2. Detection of infection or acute hemorrhage on cysts or fluid collections, such as autosomal dominant polycystic kidney disease, pancreatic pseudocyst, ovarian cyst, corpus luteum, urinoma, biloma, xeroma and Cesarean section related complications; 3. Vascular thrombosis and ischemic conditions; 4. Inflammatory bowel disease; 5. Evaluation of hepatic fibrosis; 6. Assessment of renal function, including post-transplant evaluation. Possible applications of DWI on non-oncological abdominal conditions in the future.

**MSE150**

**Paroxysmal Nocturnal Hemoglobinuria and Eculizumab Therapy Evaluated by Magnetic Resonance Imaging**

**Education Exhibits**
Location: MS Community, Learning Center

**Participants**
Miguel Pastrana MD (Presenter): Speakers bureau, Alexion Pharmaceuticals, Inc
Emilio Ojeda MD, PhD: Consultant, Alexion Pharmaceuticals, Inc Speakers Bureau, Alexion Pharmaceuticals, Inc
Carlota Perez MD: Nothing to Disclose
Beatriz Brea-Alvarez: Nothing to Disclose
Daniel Morillo MD: Nothing to Disclose
Concepcion Gonzalez MD, PhD: Nothing to Disclose

**TEACHING POINTS**
The purpose of this exhibit is: 1. To report the experience of our Center by presenting a review of radiological findings of 56 Paroxysmal Nocturnal Hemoglobinuria (PNH) patient cases. 2. To describe the main MR imaging findings in thrombotic complications of PNH patients. 3. To evaluate the iron overload that in some PNH cases could be underestimated and needs chelation therapy. 4. To describe the programmed protocolled evaluation previous to consider Eculizumab treatment.

**TABLE OF CONTENTS/OUTLINE**
- From 1970 to November 2013, 56 patients with the PNH clone have been evaluated in our hospital. In the last five years, MRI studies were performed in our PNH patients in acute complications (9 patients) or as a programmed protocol evaluation previous to considering and/or evaluating Eculizumab treatment (14 patients). - Different protocols designed for the study of this pathology. - Thrombosis was found in four cases. In three patients, these findings implied initiating Eculizumab therapy. - Minor ischemic brain changes were displayed by three patients. - We evaluate and quantify kidney and liver iron concentrations in seven patients with PNH, treated with Eculizumab, and to correlate the image with laboratory findings.
Pitfalls in Abdominal Duplex Sonography

**Participants**
David M. Paushter MD (Presenter): Advisory Panel, AIM Specialty Health

**TEACHING POINTS**
1. It is necessary to understand the basic principles of Doppler ultrasound that govern clinical applications to avoid errors and to recognize artifacts that suggest physiologic abnormalities and disease states. 2. Doppler pitfalls arise from physical principles, technique including ultrasound unit operator selectable parameters, scanning errors and misinterpretation. 3. Doppler ultrasound is a powerful tool for understanding the nature of blood flow, and therefore indirectly the health of organs within the abdomen.

**TABLE OF CONTENTS/OUTLINE**

MSE153
Preoperative Computed Tomographic Angiography for Deep Inferior Epigastric Artery Perforator Flap: Review of the Abdominal Wall Anatomy and Novel Evaluation Methods

**Participants**
  Kentaro Tamura MD (Presenter): Nothing to Disclose
  Yoshitake Yamada MD : Nothing to Disclose
  Noriko Aramaki-Hattori : Nothing to Disclose
  Yusuke Shimizu : Nothing to Disclose
  Kazuo Kishi : Nothing to Disclose
  Masahiro Jinzaki MD : Nothing to Disclose

**TEACHING POINTS**
The purpose of the exhibit is to 1. Review the anatomy of the abdominal wall 2. Present the novel display method of CT angiography for preoperative planning for deep inferior epigastric artery perforator (DIEP) flap

**TABLE OF CONTENTS/OUTLINE**

MSE154
Radiology in the Era of Integrated Advanced Imaging Visualization Tools – A Pictorial Review

**Participants**
  Sivasubramanian Srinivasan MD, FRCR (Presenter): Nothing to Disclose
  Hui Seong Teh MBBS : Nothing to Disclose
  Ashish Chawla MD, MBBS : Nothing to Disclose
  Tung Wei Choy BSC : Nothing to Disclose
  Marcus Yiwei Tan BSC : Nothing to Disclose

**TEACHING POINTS**
To review the technological advances in image data storage, retrieval and integration of advanced imaging tools(such as syngo.viaTM). To discuss the advantages of advanced imaging tools through case examples.

**TABLE OF CONTENTS/OUTLINE**
- Advancements in CT, MRI technology leading to large volume of image datasets. - Need for the integrated tools in the PACS station. - Dynamic manipulation of images with various reformations (such as multiplanar reformations, maximal intensity projections(MIP), volume rendering techniques and virtual endoscopy) Cases examples illustrating role of integrated advanced imaging tools in : Vascular and Intervention radiology: pre-procedural planning and interventional management. - Diagnostic Imaging : improvement in diagnostic accuracy, and more accurate staging of neoplasms. Summary: The new innovative technology of integration of advanced imaging tools with RIS-PACS improve the time of image interpretation and productivity, and thereby impacting the reporting turn-around-time in a busy radiology department.

MSE155
Rescanning an Egyptian Mummy Surrounded by Controversy Provides New Insights through Advances in Image Acquisition and Post-processing Analysis

**Participants**
  Sivasubramanian Srinivasan MD, FRCR (Presenter): Nothing to Disclose
  Hui Seong Teh MBBS : Nothing to Disclose
  Ashish Chawla MD, MBBS : Nothing to Disclose
  Tung Wei Choy BSC : Nothing to Disclose
  Marcus Yiwei Tan BSC : Nothing to Disclose

**TEACHING POINTS**
To review the technological advances in image data storage, retrieval and integration of advanced imaging tools(such as syngo.viaTM). To discuss the advantages of advanced imaging tools through case examples.

**TABLE OF CONTENTS/OUTLINE**
- Advancements in CT, MRI technology leading to large volume of image datasets. - Need for the integrated tools in the PACS station. - Dynamic manipulation of images with various reformations (such as multiplanar reformations, maximal intensity projections(MIP), volume rendering techniques and virtual endoscopy) Cases examples illustrating role of integrated advanced imaging tools in : Vascular and Intervention radiology: pre-procedural planning and interventional management. - Diagnostic Imaging : improvement in diagnostic accuracy, and more accurate staging of neoplasms. Summary: The new innovative technology of integration of advanced imaging tools with RIS-PACS improve the time of image interpretation and productivity, and thereby impacting the reporting turn-around-time in a busy radiology department.

**Participants**
  Sivasubramanian Srinivasan MD, FRCR (Presenter): Nothing to Disclose
  Hui Seong Teh MBBS : Nothing to Disclose
  Ashish Chawla MD, MBBS : Nothing to Disclose
  Tung Wei Choy BSC : Nothing to Disclose
  Marcus Yiwei Tan BSC : Nothing to Disclose

**TEACHING POINTS**
To review the technological advances in image data storage, retrieval and integration of advanced imaging tools(such as syngo.viaTM). To discuss the advantages of advanced imaging tools through case examples.

**TABLE OF CONTENTS/OUTLINE**
- Advancements in CT, MRI technology leading to large volume of image datasets. - Need for the integrated tools in the PACS station. - Dynamic manipulation of images with various reformations (such as multiplanar reformations, maximal intensity projections(MIP), volume rendering techniques and virtual endoscopy) Cases examples illustrating role of integrated advanced imaging tools in : Vascular and Intervention radiology: pre-procedural planning and interventional management. - Diagnostic Imaging : improvement in diagnostic accuracy, and more accurate staging of neoplasms. Summary: The new innovative technology of integration of advanced imaging tools with RIS-PACS improve the time of image interpretation and productivity, and thereby impacting the reporting turn-around-time in a busy radiology department.
Certificate of Merit

Participants

Charles William Westin MD (Presenter): Nothing to Disclose
Stephanie Maria McCann MD: Nothing to Disclose
David Jahangir MD: Nothing to Disclose
Emily Teeter PhD: Nothing to Disclose
Mary Greuel: Nothing to Disclose
Michael Walter Vannier MD: Nothing to Disclose

TEACHING POINTS

This exhibit focuses on CT scanning of "Wenuhotep" (AIC 1893.15, O.I. #17287), an Egyptian mummy that has been analyzed by CT twice before. However, the physical features and provenance raised questions that 1980s imaging technology could not resolve. We rescanned the mummy with a state-of-the-art clinical CT scanner, yielding observations that contradict prior reports and deepen our understanding of the relic. Computed tomography (CT) is commonly used to examine mummies; however, it is not clear what can be gained by rescanning mummies with state-of-the-art CT scanners, so we use this example to illustrate the potential benefits. Wenuhotep was examined by CT in 1982 and several publications [1,2,3] were written as a result of the imaging findings, which will be presented and compared with findings from our current exam. We will systematically review imaging of the head, neck, thorax, abdomen, pelvis and extremities, and present representative images. Finally, we will discuss the contribution of better imaging acquisition and post-processing analysis to our findings.

TABLE OF CONTENTS/OUTLINE

1. Background
   a. Mummification
   b. Wenuhopet information
2. Imaging
   a. Historical use of XR and CT
   b. Current Scanning Technique
   c. Analysis and comparison to prior results by anatomic division
3. Discussion

MSE156

Spectral Computed Tomography of Egyptian Mummies

Education Exhibits

Location: MS Community, Learning Center

Participants

David Jahangir MD: Nothing to Disclose
Stephanie Maria McCann MD: Nothing to Disclose
Charles William Westin MD: Nothing to Disclose
Emily Teeter PhD: Nothing to Disclose
Mary Greuel: Nothing to Disclose
Michael Walter Vannier MD (Presenter): Nothing to Disclose

TEACHING POINTS

Intact mummies are often examined with computed tomography, but many of the objects and materials found within the intact cartonnage or wrappings are unknown. We acquired CT scans of two Egyptian mummies (Third Intermediate Period, Dynasty 22 and Ptolemaic era) at 4 energies (80, 100, 120 and 140 kVp). These spectral data sets were calibrated using scans of ancient Egyptian objects with known composition and other reference materials to understand the mummified contents. We demonstrate how multi energy CT images can characterize the contents of Egyptian Mummy CT scans. Spectral CT allows visualization and analysis of materials used in the mumification process.

TABLE OF CONTENTS/OUTLINE

Introduction: • History of mummification processes used in ancient Egypt • CT scanning of mummies • Spectral CT technology Spectral CT Imaging of Egyptian mummies • Differences found at 80 vs 140 kVp • Pseudocolor visualization of mummy contents • Multispectral material analysis method • Calibration of multienergy CT using ancient Egyptian objects with known composition Results of spectral CT scans for two Egyptian mummies • Third Intermediate Period, Dynasty 22 mummy • Ptolemaic era mummy Recommendations for future CT scans of Egyptian mummies

MSE158

Surgical Implantable Devices and Other Foreign Bodies: Test Your Knowledge

Education Exhibits

Location: MS Community, Learning Center

Participants

Benjamin G. Northcutt MD (Presenter): Nothing to Disclose
Daniel P. Seeburg MD: Nothing to Disclose
Adeel Shahid MD: Nothing to Disclose

TEACHING POINTS

1) It is not uncommon to see a device on a patient and utter the words ‘What is that?’ Knowing some of these less common devices and their normal/anormal appearance can affect patient management. By the end of the presentation, the user should be able to identify less common medical implantable and non-implantable devices. 2) They should know how or why those devices are used. 3) They should know normal location and positioning of the device. 4) They should be aware of potential complications if applicable.

TABLE OF CONTENTS/OUTLINE

This presentation will be a quiz based format. The user will see images of a devices and have to identify what the device is, what the purpose of the device is, and lastly what what normal location/positioning is if necessary. The devices which will be shown are: Deep brain stimulators (neurostimulator located in the chest or abdomen) Antibiotic beads Bladder stimulator Endobronchial valves Sitz Markers Brachytherapy catheter Impella Spinal Cord Stimulator Vagal Nerve Stimulator Silastic Prosthesis Cochlear implant Gelfoam (can mistake for an abscess on CT if unaware of its presence)
The A to Z of OPGs

Education Exhibits
Location: MS Community, Learning Center

Participants
Sarah Constantine MBBS, FRANZC (Presenter): Nothing to Disclose

TEACHING POINTS
Each image has a focal plane where the structures are sharply projected, and outside this area the structures appear blurred. Double images are seen when an object or anatomical structure is between the x-ray tube and the film twice. Ghost images occur when an object or anatomic structure that is outside the focal plane, and is dense enough to attenuate the x-ray beam and project an image.

TABLE OF CONTENTS/OUTLINE
The orthopantomogram (OPG) is a commonly requested examination, referred by both medical practitioners and dentists. Despite its frequency in practice, there is a reluctance by many radiologists to provide a detailed radiological report, due to a lack of familiarity with the normal anatomy and artefacts seen on the OPG. This presentation demonstrates the normal anatomy seen on the OPG, as well as artefacts produced by the tomographic technique, and incorrect patient positioning. • Double images • Ghost images • Normal anatomy • Calcifications • Positioning errors - chin too low, chin too high, head too far forward, head too far back, head rotation, patient movement • False pathology

MSE160
The Cancer Imaging Radiology Report Template in the Era of Molecular-Targeted Therapy (MTT): What Should Be Included in the Radiology Interpretation and Why

Education Exhibits
Location: MS Community, Learning Center

Participants
Sreeharsha Tirumani MBBS, MD (Presenter): Nothing to Disclose
Akshay Baheti MBBS, MD : Nothing to Disclose
Mizuki Nishino MD : Consultant, Bristol-Myers Squibb Company
Katherine Margaret Krajewski MD : Research Grant, General Electric Company Spouse, Employee, Ironwood Pharmaceuticals, Inc
Michael Hayden Rosenthal MD, PhD : Nothing to Disclose
Nikhil H. Ramaiya MD : Nothing to Disclose

TEACHING POINTS
In the era of precision medicine, molecular targeted therapy (MTT)-specific personalized templates can aid radiologists in interpreting restaging scans 1. Anti-VEGF MTTs require knowledge of cancer-specific treatment response criteria (TRC) and class-specific toxicities 2. MTTs which act on targets beyond VEGF axis are associated with drug-specific toxicities. 3. Immunomodulators require familiarity with immune-related response criteria and immune-related adverse events 4. Checklist for chest imaging - subcutaneous edema (imatinib), pleural effusion (dasatinib), pneumonitis (m-TOR inhibitors), tumor cavitation (anti-VEGF MTT), pulmonary embolism (anti-VEGF MTT) 5. Checklist for abdominal imaging - decrease in tumor density (tyrosine kinase inhibitor (TKI)), pseudoprogression (immunotherapy), intratumoral hemorrhage (TKI), hepatic steatosis (TKI), hepatitis (ipilimumab), vascular thrombosis (TKI), cholecystitis (m-TOR inhibitors), pancreatitis (TKI), bowel complications (anti-VEGF MTT, ipilimumab)

TABLE OF CONTENTS/OUTLINE
1. Introduce the concept of personalized tumor reporting templates in cancer imaging 2. Discuss anti-VEGF MTTs, MTTs that act beyond VEGF axis and immunomodulators with emphasis on alternate TRC and drug toxicities 3. Illustrate findings which radiologists should look for response assessment in drug-specific patterns

MSE161
The Dying Art of Plain Film Radiography Interpretation: Top 100 Plain Film Tips for Residents by Residents

Education Exhibits
Location: MS Community, Learning Center

Certificate of Merit

Participants
Maria Twomey MBChB, FFR(RCSI) (Presenter): Nothing to Disclose
Fiachra Gerard Moloney MBCh, MRCP : Nothing to Disclose
Jennifer Murphy MBCh : Nothing to Disclose
Patrick Nicholson MBCh : Nothing to Disclose
Michael M. Maher MD, FRCP : Nothing to Disclose

TEACHING POINTS
Though plain film interpretation is a key skill in becoming a competent independent radiologist and features heavily in examinations it is often feared/neglected by radiology trainees To highlight diagnoses made on plain film that do not require further imaging The ongoing utility of plain film radiography and satisfaction at attaining diagnoses on conventional radiography Present key interpretation pearls and imaging findings through case presentation

TABLE OF CONTENTS/OUTLINE
• Cases and tips collated during our 4 year training program • Top 10 plain film findings not to be missed (eg pneumothorax on supine chest) • Heavy emphasis on CXR-top 30 CXR tips
MSE162
The Radiologist in the Role of Primary Care Physician: Highlighting the Need for Effective Communication

Education Exhibits
Location: MS Community, Learning Center

Participants
Amanda Lea Steinberger DO (Presenter): Nothing to Disclose
Aparna Srinivasa Babu MD: Nothing to Disclose
Michael Lee Brooks MD, JD: Nothing to Disclose

TEACHING POINTS
1. Radiologists should be familiar with several legal cases which have become case law, many recent, which place the radiologist as a primary care physician.

2. Review American College of Radiology (ACR) Practice Guideline for Communication of Diagnostic Imaging Findings in the context of legal cases.

3. Radiologists can reduce their legal risk by avoiding pitfalls in communication, such as failing to recommend the next appropriate procedure and by thorough documentation of their communication with other members of the medical care team.

TABLE OF CONTENTS/OUTLINE
Table of Contents/Outline: 1. Review causes of malpractice lawsuits. 2. Review landmark legal cases where the radiologist has been found to be responsible for a patient as a primary care physician. 3. Discuss failure of communication as a key error in diagnostic radiology. 4. Discuss ACR Practice Guidelines for communicating results. a. Describe and pictorially illustrate examples of "non-routine" imaging findings. b. Discuss how communication with referring clinicians should occur and be documented. 5. Review National Quality Forum's stance on communication and reportable events with respect to radiology practice. 6. Provide recommendations for communicating findings for radiologists in daily practice.

MSE163
Thinking Outside the Bone: A Pictorial Review of Extramedullary Hematopoiesis

Education Exhibits
Location: MS Community, Learning Center

Selected for RadioGraphics

Participants
Andrew S. Roberts MD (Presenter): Nothing to Disclose
Anup Shashindra Shetty MD: Nothing to Disclose
Vincent M. Melnick MD: Nothing to Disclose
Perry J. Pickhardt MD: Co-founder, VirtuoCTC, LLC Stockholder, Cellectar Biosciences, Inc
Sanjeev Bhalla MD: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose

TEACHING POINTS
- Hematopoiesis occurs in the bone marrow of the medullary cavity in long bones, vertebral bodies, and ribs of adults. In the fetus, hematopoiesis occurs in the liver, spleen, and bone marrow. Lack of appropriate hematopoiesis at normal sites can be caused by marrow-replacing processes, such as leukemia and myelofibrosis, and blood disorders, including sickle cell anemia and thalassemia. The body responds by creating sites of extramedullary hematopoiesis (EMH).

- Typical manifestations of EMH include hepatosplenomegaly and soft tissue attenuation masses in the paraspinal region which can mimic metastasis, sarcoma, neurofibroma, and lymphadenopathy.

- Less common presentations include pulmonary interstitial infiltrates, rib expansions, and soft tissue masses outside of the paraspinal region.

- EMH frequently occurs in multiple locations, rather than in isolation.

- When a soft tissue mass in a typical location for EMH is encountered, clinical history is crucial for suggesting this diagnosis.

- Biopsy is often required for definitive diagnosis, particularly for masses outside the paraspinal region.

TABLE OF CONTENTS/OUTLINE
Epidemiology and Pathophysiology of EMH Cases of typical presentations of EMH in the chest, abdomen and pelvis Atypical presentations of EMH Mimics and differential diagnosis of EMH Biopsy considerations

NME001-b
Molecular Imaging of Movement Disorders Using Ioflupane I-123 SPECT

Education Exhibits
Location: S503AB

Participants
Matthew Osher MD (Presenter): Nothing to Disclose
Alex P. Pallas DO: Nothing to Disclose
Xia Wang MD: Nothing to Disclose

TEACHING POINTS
1. To review indications for Ioflupane I-123 study (DaTscan) 2. To acquire basic image interpretation skills 3. To formulate differential diagnoses based on common imaging patterns

TABLE OF CONTENTS/OUTLINE


NME002-b
Response Evaluation of Lymphoma with FDG-PET/CT: How and When?

Education Exhibits
Location: S503AB

Participants
Masamichi Koyama MD, PhD (Presenter): Nothing to Disclose
Mitsuru Koizumi : Nothing to Disclose
Kenta Miwa RT : Nothing to Disclose
Kiyoishi Matsueda MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To review FDG-PET/CT images on response evaluation of lymphoma, especially in diffuse large B-cell lymphoma and Hodgkin lymphoma. To discuss FDG-PET/CT about timing of PET/CT referring 'early' or 'interim' PET/CT. To explain response criteria of lymphoma with emphasis on PET findings.

TABLE OF CONTENTS/OUTLINE
PET/CT imaging - when we perform 'true whole-body' imaging Response evaluation criteria (IWC-PET) Various parameters to evaluate response semiquantitatively on PET/CT Interim PET/CT Evaluation of antibody-based immunotherapy and radioimmunotherapy False positive or confusing cases Future directions and summary

NME003-b
Truncation Compensation in Prone PET/MR Breast Scans

Education Exhibits
Location: S503AB

Participants
Nelly Salem MD (Presenter): Nothing to Disclose
Kuan-Hao Dylan Su : Nothing to Disclose
Lingzhi Hu PhD : Employee, Koninklijke Philips NV
Peter F. Faulhaber MD : Speaker, Koninklijke Philips NV Grant, Koninklijke Philips NV Medical Advisor, MIM Software Inc
Donna M. Plecha MD : Advisory Board, Hologic, Inc Research Grant, SuperSonic Imagine
Raymond Muzic PhD : Research Grant, Koninklijke Philips NV

TEACHING POINTS
1. Alert readers to review attenuation maps to check for truncation artifacts. 2. Explain derivation of a PET attenuation map by using segmentation. 3. To describe a method for mitigating truncation artifacts.

TABLE OF CONTENTS/OUTLINE
Introduction: PET/MR offers many advantages to breast cancer patients. A pitfall in PET/MR breast scans is truncation artifact. With prone breast imaging, the MR signal intensity in the arms or the back could be reduced or missed due to the inhomogeneity of the magnetic field. The low or missing signal may result in severe underestimation of the Standard Uptake Value (SUV), directly affecting diagnosis. Purpose: To mitigate image artifacts, optimize diagnostic accuracy of PET/MR scans and reduce SUV error due to truncation utilizing a truncation compensation algorithm. Proper review of the attenuation correction map is crucial for identification of truncation artifact. Truncation Compensation Algorithm: We investigated a new truncation compensation method that uses time-of-flight-based non-attenuation corrected PET images to find the edge of the body and fills the body out to this edge assuming the attenuation coefficient of soft tissue (Blaftert et al., Proc SPIE, Medical Imaging 2012, Vol 8314). Conclusion: Application of this truncation compensation method allows reliable truncation compensation.

NME100
Advancements in Skeletal Scintigraphy in Prostate Cancer with SPECT/CT: A Pictorial Review of Equivocal Cases

Education Exhibits
Location: S503AB

Participants
Ali Malik MD (Presenter): Nothing to Disclose
Brian Weber MD : Nothing to Disclose
Lawrence Delasotta MD : Nothing to Disclose
Brandon P. Olivieri MD : Nothing to Disclose
Anjeza Chukus MD : Nothing to Disclose
Chetan D. Rajadhyaksha MD : Nothing to Disclose

TEACHING POINTS
1. Briefly describe the fundamentals of 99mTc-MDP skeletal scintigraphy and its utility in evaluation of prostate cancer metastasis. 2. Identify case examples of 99mTc-MDP bone scans where planar and SPECT images alone led to diagnostic uncertainty. 3. Observe how SPECT/CT imaging enhances diagnostic confidence through improved lesion characterization and
localization in equivocal cases.

**TABLE OF CONTENTS/OUTLINE**

Fundamentals of skeletal scintigraphy: - 99mTc-methylene diphosphonate (99mTc-MDP) bone scan is widely used for the assessment of osseous metastatic disease in prostate cancer patients. - Abnormal uptake could be due to benign etiologies such as osteoarthritis, Paget's or prior trauma as well as malignant causes such as metastatic disease. - The sensitivity and specificity of planar and single-photon emission computed tomography (SPECT) images often varies with lesion location. The Role of SPECT/CT: - The addition of fusion SPECT/CT imaging to skeletal scintigraphy can not only help improve the precision of lesion localization, but it can also increase diagnostic confidence in differentiating benign versus malignant sources of increased radiotracer activity, which may decrease the need for additional imaging studies. - Demonstrate examples of diagnostic uncertainty removed by obtaining SPECT/CT images.

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**NME101**

**Flipping the Script: Interactive Multiple Choice Question Writing Workshops in Nuclear Medicine for Radiology Resident Education**

*Education Exhibits*

*Location: S503AB*

**Participants**

- Lindsay E. Williams MD (Presenter): Nothing to Disclose
- Sally Ann Jones: Nothing to Disclose
- David Joseph Disantis MD: Nothing to Disclose
- M. Elizabeth Oates MD: Nothing to Disclose

**TEACHING POINTS**

Multiple Choice Questions (MCQ) are the standard means of evaluating residents' knowledge, exemplified by the ACR In-Service and the ABR Core Examinations. MCQ Writing Workshops are interactive exercises that enhance test-taking skills, while deepening understanding of nuclear medicine topics. MCQ Writing Workshops create a vibrant learning setting, with resident engagement beyond standard teaching methods, surpassing basic "audience response" technology. This educational strategy offers an innovative approach to preparing residents for the ACR In-Service and the ABR Core Examinations, while polishing analytical and teaching skills that will be useful regardless of career choice.

**TABLE OF CONTENTS/OUTLINE**

The targeted nuclear medicine concepts are presented in dual one-hour conferences. At the first session, learners are divided into teams, each assigned an image-based case. They create MCQs centered on four themes: radiopharmaceutical, diagnosis, management, and radioisotope safety. At the second session, each team presents their case and MCQs for analysis and critique by fellow residents and faculty facilitators. This exhibit highlights MCQ writing as a valuable tool in the teaching armamentarium. It broadens the traditional scope of resident learning, expanding knowledge and analytical skills beyond the typical "one right answer" constraint.

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**NME102**

**Flow and Function: Nuclear Evaluation of Renal Transplants**

*Education Exhibits*

*Location: S503AB*

*Selected for RadioGraphics*

**Participants**

- Sherlin Lavianli MD (Presenter): Nothing to Disclose
- Anju Dubey MD: Nothing to Disclose
- Emily Ann Dunn MD: Nothing to Disclose
- Brian James Magee DO: Nothing to Disclose

**TEACHING POINTS**

After viewing this exhibit the reviewer will know: 1. Technical considerations and limitations of nuclear scanning in renal transplant patients 2. Causes of early and late transplant failure 3. How to use nuclear imaging in conjunction with other imaging modalities and clinical information to diagnose post-transplant complications

**TABLE OF CONTENTS/OUTLINE**

After a review of the technical considerations and limitations of nuclear scan in post transplant patients, cases will be presented in a quiz format to illustrate the imaging and clinical finding of various complications. Cases presented will include: -Normal functioning renal transplant - Acute tubular necrosis - Transplant rejection - Urinary leak - Ureteral obstruction Correlation with other imaging modalities will be provided in some cases.

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**NME103**

**Hepatorenal Syndrome in Nuclear Renography: Characteristic Findings on MAG3 and DTPA Scans**

*Education Exhibits*

*Location: S503AB*

**Participants**

- Alan David Waxman MD: Research Grant, Gamma Medica, Inc
- Garrett Li Dejesus MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

1) To understand the unique findings on nuclear renography in patients with hepatorenal syndrome
2) To extrapolate how these findings bolster the leading theory on the pathophysiology of hepatorenal syndrome
3) Review of the indications for performing MAG3 and DTPA scans in patients with compromised renal function

TABLE OF CONTENTS/OUTLINE
A. Introduction 1) Clinical and radiographic importance of this topic B. Objectives 1) What the reader should take away from the presentation C. HRS background 1) What is hepatorenal syndrome? - Clinical/laboratory diagnosis D. Nuclear Renography background 1) What are MAG3 and DTPA scans? - How are they performed - What general clinical questions can be answered with these scans? - Why are these scans helpful in hepatorenal syndrome? E. Case Review 1) Clinical cases with accompanying charts demonstrating the characteristic findings of hepatorenal syndrome on MAG3 and DTPA scans F. Summary and Key points 1) Review basics of MAG3 and DTPA scans 2) Review characteristic findings seen in hepatorenal syndrome 3) Explain how these findings support the leading theory behind the mechanism of hepatorenal syndrome. G. References
1. SPECT/CT nuclear arthrograms have significant advantages over traditional planar arthrograms due to improved localization and anatomic correlation. 2. The clinical diagnosis of prosthetic loosening is challenging and nuclear arthrograms can aid the clinician by determining the presence of the radiotracer between bone-prosthetic interfaces. 3. SPECT/CT nuclear arthrograms can aid in the evaluation of periartricular fluid collections and draining sinus tracts by determining communication with the joint space.

**TABLE OF CONTENTS/OUTLINE**


**NME108**

**Under-recognized Pearls and Pitfalls of Tc-99m Labeled Red Blood Cell Scintigraphy In Acute Gastrointestinal Bleeding**

**Education Exhibits**

**Location:** S503AB

**Participants**

Neha Sunil Kwatra MBBS, MD (Presenter): Nothing to Disclose
Chun Ki Kim MD: Nothing to Disclose

**TEACHING POINTS**

1. Under-recognized consequences of suboptimal labeling and imaging protocol
2. Important pitfalls of tagged red blood cell (RBC) imaging in an interactive case-based format
3. Potential role of SPECT/CT

**TABLE OF CONTENTS/OUTLINE**

1. Gastrointestinal (GI) bleeding- classification and etiology 2. Technique of 99mTc labeled RBC scintigraphy a) Radiopharmaceuticals b) Labeling techniques c) Imaging technique 3. Illustrative case discussions a) True positive GI bleeding scans due to various etiologies with clinico-radiographic correlation b) False positive GI bleeding scans due to various etiologies with clinico-radiographic correlation c) Examples of incidental findings d) Use of SPECT/CT 4. Summary 99mTc labeled RBC scintigraphy has been widely used in evaluation of acute GI bleeding for more than three decades. Nonetheless, a few important technical and interpretive aspects of this examination are frequently overlooked. This educational exhibit emphasizes the need to recognize these imaging pitfalls via uncommon cases.

**NME109**

**When Things Get Hot: A Resident Primer on Instrumentation, Quality Assurance, and Safety Measures in Nuclear Medicine**

**Education Exhibits**

**Location:** S503AB

**Participants**

Dinushi S. Perera MD (Presenter): Nothing to Disclose
Tanya Weston: Nothing to Disclose
Gary Stuart Greene MD: Nothing to Disclose

**TEACHING POINTS**

1. To familiarize residents with the instrumentation encountered in a nuclear medicine practice through photographs taken in our department.
2. To review routine quality assurance measures for instrumentation.
3. To discuss safe handling and transportation of radioactive materials.

**TABLE OF CONTENTS/OUTLINE**


**NME112**

**3D Surface Rendered PET-CT in Suspected Osteomyelitis Post-Cranioplasty and Infected Craniofacial Myocutaneous Flaps**
**Education Exhibits**

**Location: S503AB**

### Participants

- Shanker Raja MD (Presenter): Nothing to Disclose
- Sharad P. George MD: Nothing to Disclose
- Sven G. Larsson MD: Nothing to Disclose
- Sergey Rumyantsev MD: Nothing to Disclose
- Yaser Ibrahim al Jadhai MD: Nothing to Disclose
- Orz Yasser MD, PhD: Nothing to Disclose

### TEACHING POINTS

1. Utilize PET in confirming underlying osteomyelitis (Uosteo) complicating cranioplasty/craniofacial reconstructive surgery (cranSURG).
2. Illustrate the role of correlative imaging (CT, bone scans and MRI), in evaluating Uosteo.
3. Illustrate the utility of 3D surface rendering of merged PET and CT.
4. Demonstrate techniques of coregistering PET to CT/MR datasets, creating fused PET-CT/MR 3D rendered composite images.

### TABLE OF CONTENTS/OUTLINE

Uosteo may complicate myocutaneous flaps. It is essential to determine Uosteo since management differs in complicated vs. uncomplicated grafts. Bone scan, labeled WBC/Ga-67 and MRI are limited in surgically traumatized bone. We explored the use of PET-CT in Uosteo complicating post cranial surgery. 9 PET in 7 pts for suspected Uosteo post cranSURG, were evaluated. CT/MRI/bone SPECT were coregistered with PET into a common 3D space, the merged data were surface rendered and fused. 4/7 pts were neg for Uosteo by PET and clinical f/u, 2/7 pts were pos for Uosteo, 1 pt. had an infected titanium mesh. Of 2 pts pos for Uosteo, f/u PET showed complete resolution in 1 pt, while the other had partial resolution. In an atlas format the multimodality image findings will be demonstrated, emphasizing the utility of 3D images as a tool for tracking the sinuous sinus tracts presurgically.

**NME114**

### C-11 Choline PET/CT: Everything with Uptake Is Not Prostate Cancer

**Education Exhibits**

- Certificate of Merit
- Selected for RadioGraphics

### Participants

- Ethany Lea Cullen MD (Presenter): Nothing to Disclose
- Geoffrey Bates Johnson MD, PhD: Nothing to Disclose
- Christopher Lawrence Welle MD: Nothing to Disclose
- Robert Charles Murphy MD, PhD: Nothing to Disclose
- Val John Lowe MD: Research Grant, General Electric Company Research Grant, Siemens AG Research Grant, Eli Lilly and Company Advisory Board, Bayer AG
- Larry Alan Binkovitz MD: Nothing to Disclose
- Patrick James Peller MD: Speakers Bureau, General Electric Company

### TEACHING POINTS

I. Teaching Points
A. Review of the normal distribution of C-11 choline
B. Brief review of the role of C-11 choline imaging in the evaluation of recurrent prostate cancer
C. Discussion of malignant and non-malignant processes that have C-11 choline uptake

Many processes other than prostate cancer can have choline uptake. Radiologists involved with the interpretation of C-11 choline imaging should be aware of these processes.

### TABLE OF CONTENTS/OUTLINE

A. Choline PET/CT
   i. Review of normal distribution of C-11 choline
   ii. Review of normal variants of C-11 choline uptake
   iii. Review of current approved uses of C-11 choline including examples of locally recurrent and metastatic prostate cancer
   B. Examples of choline avid processes other than prostate cancer
   i. Malignancies: Lung cancer, Lymphoma, Thymoma, Squamous cell carcinoma of the head and neck, Esophageal carcinoma, Breast cancer
   ii. Non-malignant processes: Meningioma, Parathyroid adenoma, Paget’s disease, Granulomatous disease, Adrenal myelolipoma

**NME115**

### Choline PET in Prostate Cancer—Who, When, What, How: Imaging Pearls and Pitfalls

**Education Exhibits**

**Location: S503AB**

### Participants

- Amy Elizabeth Eccles FRCR, MBBCHIR (Presenter): Nothing to Disclose
- Amarnath Chellapali MBBS, MD: Nothing to Disclose
- Sameer Khan MBBS: Nothing to Disclose
- Sairah Khan: Nothing to Disclose
- Tara Diane Barwick MBChB: Nothing to Disclose
- Stephen Mangar MBChB, MD: Nothing to Disclose

### TEACHING POINTS

Purpose of exhibit: 1. to understand the role of choline PET imaging in the multimodality pathway of prostate cancer
2. to describe the mechanism of action and technical aspects
3. to describe the physiological distribution of the tracer and pathological appearances in prostate cancer
4. to highlight the imaging pearls and pitfalls with case examples

### TABLE OF CONTENTS/OUTLINE

Who/When Post radical therapy with rising PSA where conventional imaging has failed to detect recurrent disease (CT, MRI, bone scan) PSA velocity more important than absolute levels
High risk staging with equivocal extra-prostatic disease on conventional imaging
What/How Why not FDG? Tracers: C-11 choline, F-18 fluoroethyl, F-18 fluoromethyl choline
Mechanism of action: Cell membrane metabolism
Technical aspects: Pearls and Pitfalls with case examples
Intraprostatic disease
multimodal MRI best- why? Good for nodal and distant disease (non enlarged nodes, sclerotic and non sclerotic bone metastases) Not specific for prostate cancer: examples of secondary incidental malignancy and reactive nodes

NME116

Criteria for Treatment Response on Interim PET/CT in Lymphoma: Update on What the Radiologist Needs to Know

Education Exhibits
Location: S503AB

Participants
Neil Hansen MD (Presenter): Nothing to Disclose
Ryan O’Malley MD: Nothing to Disclose
Carolyn Lee Wang MD: Nothing to Disclose
Jordan H. Hankins MD: Nothing to Disclose

TEACHING POINTS
The Learner will obtain the following from this exhibit: 1. Updated knowledge of current clinical and experimental response criteria used to evaluate therapeutic response on interim PET/CT obtained for lymphoma. 2. A review of the evidence supporting the use of these criteria in the clinical and research settings. 3. Experience in how implementing these criteria into clinical practice can better serve patients and referring oncologists.

TABLE OF CONTENTS/OUTLINE
Overview of the clinical need for interim PET response criteria in lymphoma patients in order to direct management. Discuss the technical aspects and limitations of quantitative and qualitative response assessment on PET. Literature update on selected response criteria assessments including: - Deauville / 5 Point scale qualitative assessment - Change in SUV max quantitative assessment - Metabolic Tumor Volume and Total Lesion Glycolysis quantitative assessment

NME117

F18-FDG PET/CT: An Indispensable Tool in Assessment of Primary Salivary Gland Neoplasms with Histopathological Correlation

Education Exhibits
Location: S503AB

Participants
Sajeev Rajan Ezhapilli MBBS (Presenter): Nothing to Disclose
Nelli Lakis MD: Nothing to Disclose
Mary McGrath MD: Nothing to Disclose

TEACHING POINTS
F18- FDG PET CT helps to distinguish between benign and malignant salivary gland tumors based on metabolic activity of lesions/lymph nodes. F18- FDG PET CT plays a vital role to accurately evaluate the primary site for possible recurrence, lymph nodes, and distant metastases which impacts patient management.

TABLE OF CONTENTS/OUTLINE
Neoplasm of salivary glands include metastasis as well as primary salivary gland tumors and the latter is relatively uncommon. Salivary gland tumors pose a diagnostic dilemma encountered in practice which can be resolved to a great extent by appropriate use of F18- FDG PETCT. The primary purpose of this exhibit is to identify the spectrum of salivary gland tumors and illustrate PET CT findings of diverse neoplastic salivary gland tumors such as adenocarcinoma, adenoid cystic carcinoma, acinar cell carcinoma and metastasis with histopathological correlations. In addition to high sensitivity for primary tumor as well as metastasis detection, PET-CT can detect recurrent/residual tumor, distinguish from postoperative changes and monitor therapy response. The association of high F-18 FDG uptake in high grade salivary gland tumors assists in differentiating aggressive tumors from benign tumors. Furthermore, PET CT offers detection of unsuspected lesions and metastases while imaging the whole body at a single time.

NME119

FDG PET/CT of Breast Cancer: Individualizing PET/CT Interpretations for Ductal versus Lobular Breast Cancer Patients

Education Exhibits
Location: S503AB

Participants
Brittany Dashevsky MD, DPhil: Nothing to Disclose
Sarah Stamler MD: Nothing to Disclose
Molly Parsons MD: Nothing to Disclose
Gary Allan Ulaner MD, PhD (Presenter): Research support, General Electric Company Research support, Seragon Pharmaceuticals, Inc

TEACHING POINTS
1. Invasive ductal cancer (IDC) and invasive lobular cancers (ILC) have different propensities for metastatic sites, as well as different conspicuity on FDG PET. 2. Knowledge of the histologic subtype of breast cancer helps improve accuracy of FDG PET/CT interpretations.

TABLE OF CONTENTS/OUTLINE
1. Primary tumor (T) FDG PET/CT has low sensitivity and specificity for the primary tumor in both IDC and ILC, compared to mammography/US/MRI. 2. Nodal metastases (N) A. Axillary - FDG PET has low sensitivity for axillary nodes in both IDC and ILC, compared to sentinel node surgery. B. Extra-axillary - Better sensitivity of FDG PET for detection of extra-axillary nodes in IDC than ILC. Some CT features (size, shape, loss of fatty hilum) increase suspicion for nodal metastases. 3. Distant Metastases (M)
A. Bone - Common with both IDC and ILC. PET has better sensitivity for detection of osseous metastases in IDC than ILC. A decrease in FDG avidity of bone metastases post treatment corresponds to treatment response, despite increased size or sclerosis on CT. B. Liver and Lung - Both more common with IDC than ILC. CT can help identify liver and lung metastases. C. Peritoneal - More common with ILC than IDC. CT can help identify peritoneal metastases. D. Other - pleural, adrenal, brain.

NME120
Fluorine-18 Sodium Fluoride: Resurgence and Clinical Utility

Education Exhibits
Location: S503AB
Certificate of Merit

Participants
Amy Ming-Chun Tsai Sevao MBChB (Presenter): Nothing to Disclose
Remy Chee Hong Lim MBChB: Nothing to Disclose

TEACHING POINTS
1. To review the historical background, radiosynthesis and pharmacokinetics of 18F-NaF 2. To showcase clinical applications of 18F-NaF 3. To compare the performances of 18F-NaF and Tc-MDP in functional musculoskeletal imaging

TABLE OF CONTENTS/OUTLINE
Renewed Interest Radiosynthesis and Pharmacokinetics Clinical Applications • Benign Bone Disease • Malignant Bone Disease Comparison with 99mTc-MDP Future Direction and Summary

NME121
Follow the Yellow Brick Road: PET-CT Demonstration of Pathways of Lymphatic Spread of Malignant Pelvis Neoplasms

Education Exhibits
Location: S503AB
Certificate of Merit

Participants
Kevin Patrick Banks MD (Presenter): Nothing to Disclose
Liem Thanh Mansfield MD: Nothing to Disclose

TEACHING POINTS
1. Understanding the anatomy of pelvic lymph nodes and the common and uncommon lymphatic pathways of metastasis will help detect disease spread 2. The common pathways of lymphatic spread are the superficial inguinal, pelvic, and paraaortic pathways. 3. The uncommon pathways of lymphatic spread are along the gonadal vessels, mesentery, mesocolon, and inferior phrenic node 4. Knowing the pathways of nodal metastasis may help to detect the source of an occult primary malignancy 5. Understanding the strengths and limitations of PET-CT in the N-staging/restaging of pelvic aides in the optimal utilization of these exams and their interpretation.

TABLE OF CONTENTS/OUTLINE

NME122
Incremental Value of PET and MRI in the Evaluation of Cardiovascular Abnormalities

Education Exhibits
Location: S503AB
Selected for RadioGraphics

Participants
Hamid Chalian MD: Nothing to Disclose
James K. O'Donnell MD: Research support, Koninklijke Philips NV Research support, Eli Lilly and Company Speakers Bureau, Astellas Group Speakers Bureau, Bayer AG Advisory Board, Eli Lilly and Company Advisory Board, Navidea Biopharmaceuticals, Inc
Prabhakar Rajiah MD, FRCR (Presenter): Institutional Research Grant, Koninklijke Philips NV

TEACHING POINTS
1. To understand the roles of PET and MRI in the evaluation of cardiovascular diseases. 2. To discuss the complementary information provided by PET and MRI 3. To recognize that MRI has high spatial and contrast resolution, whereas PET provides metabolic information 4. To illustrate the utility of PET and MRI in several cardiovascular diseases.

TABLE OF CONTENTS/OUTLINE
1) Myocardial infarction- Matched Rb/FDG PET defect; Delayed enhancement in MRI 2) Hibernating myocardium- Mismatched defect; No enhancement in MRI; Low function 3) Sarcoidosis- FDG uptake; Non ischemic enhancement 4) Non ischemic cardiomyopathy- FDG uptake; Non ischemic enhancement 5) Tumors- Metastasis, Sarcoma, lymphoma- FDG uptake in malignant tumors; MRI for tissue characterization, contrast enhancement 6) Arteritis- FDG uptake in wall; High signal, delayed enhancement in MRI 7) Abscess- FDG uptake; High signal in MRI 8) Plaque imaging- FDG uptake in inflamed plaque 9) ...
Multimodality Imaging and Pathophysiology of Tauopathies

**Education Exhibits**

**Location:** S503AB

**Certificate of Merit**

**Participants**

Christin A. Tiegs-Heiden MD : Nothing to Disclose  
Erica Leigh Martin-Macintosh MD (Presenter): Nothing to Disclose  
Christopher Harker Hunt MD : Nothing to Disclose  
Geoffrey Bates Johnson MD, PhD : Nothing to Disclose  
Patrick James Peller MD : Speakers Bureau, General Electric Company

**TEACHING POINTS**

Tau proteins play a central role in the pathogenesis of numerous neurodegenerative disorders, including Alzheimer's disease. Understanding the spectrum of Tau mediated disease on FDG PET/CT is critical for accurate interpretation of these brain studies. The purpose of this project is to: Review molecular structure and function of the microtubule associated protein tau  
Demonstrate imaging features of major tauopathies, including Alzheimer's disease, Pick's disease, progressive supranuclear palsy, and corticobasal degeneration  
Highlight key concepts by providing case examples and correlation with anatomic imaging

**TABLE OF CONTENTS/OUTLINE**

I. Tau  
   - Molecular structure  
   - Microtubule function  
   - Phosphorylation and deposition  
II. Diseases showing coexistence of tau and amyloid pathologies  
   - Alzheimer's disease  
   - Creutzfeldt-Jakob disease  
   - Dementia pugilistica  
   - Down's syndrome III. Diseases without distinct amyloid pathology  
   - Frontotemporal dementia with parkinsonism linked to chromosome 17  
   - Pick's disease  
   - Corticobasal degeneration  
   - Progressive supranuclear palsy IV. Direct tau imaging

Non-FDG Avid Malignancy on PET/CT: Pitfalls and Prognostic Significance

**Education Exhibits**

**Location:** S503AB

**Certificate of Merit**

**Selected for RadioGraphics**

**Participants**

Robert Richard Flavell MD, PhD (Presenter): Nothing to Disclose  
David Michael Naeger MD : Nothing to Disclose  
Carina Mari Aparici MD : Nothing to Disclose  
Randall A. Hawkins MD, PhD: Nothing to Disclose  
Spencer Caton Behr MD : Research Grant, General Electric Company

**TEACHING POINTS**

The purpose of this exhibit is:  
1. To review malignancies that do not demonstrate FDG uptake at PET/CT, a potential source of scan misinterpretation.  
2. To understand the association of FDG uptake with malignant transformation and aggressive phenotype in other cancers.

**TABLE OF CONTENTS/OUTLINE**

1. Common non-FDG avid malignancies  
   - Mucinous malignancies  
   - Renal cell carcinoma  
   - Low grade adenocarcinoma spectrum lesions of the lungs  
   - Lesions smaller than 0.5 – 1 cm  
2. Prognostic significance of FDG uptake in cancers that are frequently non-FDG avid  
   - Hepatocellular carcinoma (HCC)  
   - Lymphoma  
   - Neuroendocrine tumors  
   - Prostate cancer  
3. Lesions that exhibit the “flip-flop” phenomenon in which FDG uptake is inversely correlates with another radiotracer  
   - Neuroendocrine tumors  
   - Thyroid cancer

"Not so sweet": The FDG Negative Pulmonary Nodule Spectrum of Disease—Review of Radiological/histological Findings of 30 Non-avid Pulmonary Nodules with Neoplastic and Benign Etiologies

**Education Exhibits**

**Location:** S503AB

**Participants**

Senpei Jin FRANZCR : Nothing to Disclose  
Dee Nandurkar FRANZC (Presenter): Nothing to Disclose

**TEACHING POINTS**

1. Lung nodules are frequently encountered entities. FDG-PET has become the mainstay in non-invasive evaluation for suspected malignancy. If intensely avid, it is considered malignant until proven otherwise. However, substantial literature exists on malignant but non-avid nodules.  
2. Variety of neoplastic and non-neoplastic etiologies can manifest as a non-avid nodule. We identified malignant causes including adenocarcinoma, squamous cell carcinoma, well/poorly differentiated neuroendocrine tumour. Although it may be tempting to consider FDG-PET in a simple dichotomous manner, one must review temporal and radiological characteristics.  
3. By being familiar with common neoplastic and non-neoplastic etiologies, and some characteristic non-PET features, the reader
can be more confident in recommending either surveillance or invasive intervention.

**TABLE OF CONTENTS/OUTLINE**

FDG-PET principles and definition of a non-avid pulmonary nodule.

Review of literature on neoplastic non-avid nodules and discussion on possible mechanisms for lack of FDG uptake

Review of pathologically proven neoplastic and non-neoplastic cases, with discussion of helpful radiological features

Summary of key points.

**NME126**

**PET/CT Imaging of Cutaneous Diseases**

*Education Exhibits*

*Location: S503AB*

Certificate of Merit

**Participants**

Lara Walkoff MD (Presenter): Nothing to Disclose

Julia Lehman: Nothing to Disclose

Christopher Harker Hunt MD: Nothing to Disclose

Geoffrey Bates Johnson MD, PhD: Nothing to Disclose

Patrick James Peller MD: Speakers Bureau, General Electric Company

**TEACHING POINTS**

1. Review anatomy and microstructure of the skin with regard to function
2. Discuss optimization of PET/CT for detection of cutaneous pathology
3. Delineate the clinical roles of PET/CT in evaluating primary cutaneous malignancies and metastatic disease to the skin
4. Demonstrate the spectrum of both primary cutaneous diseases and those associated with underlying malignancies with respect to PET/CT imaging findings
5. Illustrate potential pitfalls associated with inflammatory and infectious skin disease
6. Provide radiologic-pathologic correlation for cutaneous malignancies and benign/inflammatory processes

**TABLE OF CONTENTS/OUTLINE**

I. Skin Anatomy
II. PET/CT optimization for detection of cutaneous processes
III. PET/CT imaging of cutaneous disease - radiologic/pathologic correlation
   b. Benign/Inflammatory: necrobiotic xanthogranuloma, urticarial vasculitis, Sweet syndrome

**NME128**

**PET/MRI and Children: A Match Made in Hybrid Heaven?**

*Education Exhibits*

*Location: S503AB*

**Participants**

Claudia M. Martinez Rios Arellano MD: Research Grant, Koninklijke Philips NV

Andrew Sher MD: Research Grant, Koninklijke Philips NV

Karin Anna Herrmann MD: Consultant, Koninklijke Philips NV

Peter F. Faulhaber MD: Speaker, Koninklijke Philips NV Grant, Koninklijke Philips NV Medical Advisor, MIM Software Inc

Barbara Ann Bangert MD (Presenter): Investigator, Koninklijke Philips NV

**TEACHING POINTS**

a) PET/MRI is a new hybrid modality that combines the functional diagnostics of PET with the soft tissue contrast and resolution of MRI.

b) PET/MRI includes a number of features that may be particularly beneficial for the pediatric patient.

c) There are inherent challenges to transitioning from PET/CT to PET/MRI, particularly for pediatric patients, but the benefits may outweigh the difficulties.

**TABLE OF CONTENTS/OUTLINE**

A. Design of sequential PET/MRI Philips Gemini Hybrid System
B. Benefits of PET/MRI for pediatric patients
   Reduction in ionizing radiation
   Potential for decreased number of total sedations
   Improved logistics for both family and department
   Improved diagnostic capabilities
C. Challenges of pediatric PET/MRI
   Attenuation Correction
   Artifacts
   Motion
   Sedation
   Streamlined Protocols
D. How we do it
   Acquisition Protocols
   Coding, Billing, Sharing
   E. Selected Cases

**NME129**

**Positron Emission Tomography (PET) Imaging of Lymphoproliferative Disorders: An Overview with Rad-path Correlation**

*Education Exhibits*

*Location: S503AB*

Certificate of Merit
Participants

Ashima Lyall MBBS (Presenter): Nothing to Disclose
Masanori Ichise MD: Consultant, Navidea Biopharmaceuticals, Inc Research support, Piramal Enterprises Limited Research support, Bayer AG

TEACHING POINTS

1. Discuss the pathophysiology and classification of lymphoma. 2. Discuss the value of molecular imaging, in particular FDG PET imaging in the detection, staging, assessment of response to therapy and detection of recurrence of lymphoma. 3. Discuss the differences in metabolic activity and FDG avidity of various lymphoma types with pathological correlation. 4. Discuss mimickers of lymphoma.

TABLE OF CONTENTS/OUTLINE

I. Classification of lymphomas. II. Relative incidence of lymphoma subtypes. III. Staging of lymphomas. IV. PET biomarkers in lymphoma imaging. V. Mechanism of FDG uptake by the tumor cell. VI. FDG avidity in lymphoma subtypes. VII. Early prediction of response to therapy of lymphomas with FDG PET. VIII. Mimickers of lymphoma. IX. Future directions in imaging of lymphoproliferative disorders.

NME130

Role of PET/CT in the Workup of Fever without a Source

Education Exhibits

Location: S503AB

Selected for RadioGraphics

Participants

Elizabeth H. Dibble MD (Presenter): Nothing to Disclose
Don C. Yoo MD: Consultant for Endocyte
Richard B. Noto MD: Stockholder, General Electric Company Research support, Molecular Insight Pharmaceuticals, Inc Research support, Eli Lilly

TEACHING POINTS

1. Review the epidemiology, etiologies, & workup of fever without a source (FWS) 2. Review the role of imaging, with a focus on PET/CT, in the diagnosis & management of FWS with representative images from multiple etiologies of FWS 3. Review imaging costs to radiology departments, with a focus on radiopharmaceutical costs, in the workup of FWS

TABLE OF CONTENTS/OUTLINE

I. FWS: definition, etiologies, standard workup II. Chest Imaging: radiographs, CT (pneumonia, lymphadenopathy (LAD), inflammation) III. Abdomen/Pelvis Imaging: CT, ultrasound, MRI (occult abscess, LAD, inflammation) IV. Whole Body Imaging: nuclear imaging A. Gallium-67: Inflammation/infection, especially spinal. Limitations: GI excretion limits abdomen/pelvis pathology evaluation B. Indium-111 tagged WBC: Detection/exclusion of abnormal granulocyte localization. Limitations: neutropenia, non-granulocytic processes (e.g. neoplasm, inflammation), low counts make SPECT difficult, expensive radiopharmaceutical C. Technetium-99m tagged WBC. Benefit: same-day study, SPECT feasible. Limitations: GI excretion, expensive radiopharmaceutical D. PET/CT: Useful in diagnosing infection, malignancy, & inflammatory conditions with high uptake in inflammatory cells, granulation tissues, tumors V. Departmental Costs: CMS reimbursement rates (inpatient vs. outpatient), radiopharmaceutical costs

NME131

Role of PET-MR in Assessment of Tumor Response in Gastrointestinal and Gynecological Malignancies

Education Exhibits

Location: S503AB

Participants

Raj Mohan Paspulati MD (Presenter): Research grant from Philips Healthcare
Nghi Co Nguyen MD, PhD: Research Grant, Koninklijke Philips NV
Karin Anna Herrmann MD: Consultant, Koninklijke Philips NV

TEACHING POINTS

Teaching points 1. PET MR technique and work flow in staging and follow up of patients with Gastrointestinal and Gynecological malignancies 2. Added value of PET MR compared to PET CT in assessment of tumor response to treatment 3. Challenges and pitfalls of PET MR in clinical practice

TABLE OF CONTENTS/OUTLINE

Table of contents/Outline: Chemotherapy and radiation treatment is effective in only a sub group of patients and it is difficult to predict accurately which patient will benefit from a therapeutic regimen. Assessment of response to a particular therapeutic regimen at an early stage of treatment is crucial. Diagnostic imaging plays a crucial role in the initial staging, treatment monitoring and follow up of Gastrointestinal and Gynecological malignancies. CT, MRI and FDG PET-CT are standard imaging techniques used in these patients. Hybrid PET-MR systems have been recently introduced into clinical practice and its potential role is not yet well established. In this exhibit, we illustrate the PET MR technique, work flow and interpretation challenges of this new imaging modality. On a case based approach, role of PETMR in treatment monitoring of colorectal cancer, pancreatic cancer, cervical, endometrial and ovarian cancer will be discussed.

NME132

Solving the Puzzle: Nuclear Medicine Patterns in Movement Disorders

Education Exhibits

Location: S503AB
TEACHING POINTS
Movement disorders include a spectrum of entities, differing in imaging, clinical course and treatment. However, differential diagnosis between them may be challenging. Because some of these entities share similar pre-synaptic dopaminergic imaging features, other radiopharmaceuticals can add in differential and precise diagnosis. Nuclear medicine provides radiotracers and techniques which, in addition to clinical features, may be additionally helpful. Teaching points: - List main entities known as Movement Disorders - Review the different radiopharmaceuticals and techniques in nuclear medicine, which may be potentially useful. - Illustrate the different imaging patterns of parkinsonisms on nuclear medicine, which can aid in differential diagnosis, together with clinical features.

TABLE OF CONTENTS/OUTLINE

NME133
Spectrum of Articular and Periarticular Findings on F18 FDG PET/CT

Education Exhibits
Location: SS03AB
Certificate of Merit
Selected for RadioGraphics

Participants
Mariah White MD (Presenter): Nothing to Disclose
Stephen Michael Broski MD : Nothing to Disclose
Benjamin Matthew Howe MD : Nothing to Disclose
Christopher Harker Hunt MD : Nothing to Disclose
Patrick James Peller MD : Nothing to Disclose
Geoffry Bates Johnson MD, PhD : Nothing to Disclose

TEACHING POINTS
1. Understand physiologic and pathologic mechanisms of musculoskeletal FDG accumulation on F-18 FDG PET/CT. 2. Recognize imaging features that distinguish metabolically active articular and periarticular processes from malignancy on PET/CT. 3. Highlight key concepts by reviewing case examples and correlation with anatomic imaging.

TABLE OF CONTENTS/OUTLINE

NME134
SUV: Everything You Wanted to Know but Afraid to Ask!

Education Exhibits
Location: SS03AB
Certificate of Merit
Selected for RadioGraphics

Participants
Pouya Ziai MD (Presenter): Nothing to Disclose
Mohammadreza Haveri MD : Nothing to Disclose
Oleg Teytelboym MD : Nothing to Disclose

TEACHING POINTS
1. Become familiar with quantitating FDG uptake on PET-CT, including SUV mean, max, peak, whole body, and lean body. 2. Understand factors that can influence SUV measurement reproducibility. 3. Understand SUV normalization approaches. 4. Become familiar with best practices in improving SUV measurement accuracy and minimizing the confounding factors.

TABLE OF CONTENTS/OUTLINE
Introduction Definitions PET-CT impact on modern oncologic practice Utilization of PET-CT for detection, staging, and treatment response assessment Methods for 18F-FDG PET data analysis Quantitative Semi quantitative? standardized uptake value (SUV) Quantitative Reporting SUV SUVmax SUVmean SUVpeak Confounding factors in measuring SUV Biologic factors Weight composition Body size calculation Blood glucose level Postinjection uptake time Respiratory motion Technologic factors Scanner variability Reconstruction parameter changes Calibration error between scanner and dose calibrator Timing mismatch between scanner and dose calibrator Use of contrast material for PET/CT Interobserver variability Standardization of quantitative 18F-FDG PET studies SUV normalization Normalization to weight Normalization to selected reference tissue Normalization to plasma glucose

NME135
The Latest Imaging Assessment for Anti-Tumor Therapy: Therapeutic Response for Various Tumors Using PET/CT or PET/MRI
**Tumors Using PET/CT or PET/MRI**

**Education Exhibits**

**Location:** S503AB

- **Certificate of Merit**

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**Participants**

- Masahiro Yanagawa MD, PhD (Presenter): Nothing to Disclose
- Tadashi Watabe: Nothing to Disclose
- Kayako Isohashi: Nothing to Disclose
- Osamu Honda MD, PhD: Nothing to Disclose
- Jun Hatazawa MD, PhD: Nothing to Disclose
- Noriyuki Tomiya MD, PhD: Nothing to Disclose
- Hiromitsu Sumikawa MD: Nothing to Disclose
- Ken Ueda MD: Nothing to Disclose
- Yukihisa Satoh: Nothing to Disclose
- Shojiro Hidaka: Nothing to Disclose
- Maki Masada MD: Nothing to Disclose

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**TEACHING POINTS**

Various treatment options for cancer including novel molecularly targeted cancer treatments are available. However, the appropriate selection of methods for evaluation of therapeutic efficiency is crucial for effective cancer treatment.

The purposes of this exhibit are:

1. To learn multi-tracer PET/CT or PET/MRI imaging for tumors.
2. To learn assessment of therapeutic response of various tumors.

The major teaching point of this exhibit are:

1. It is necessary to select a optimal tracer for the drug used, especially for molecular-targeted drugs.
2. The appropriate method for posttreatment PET evaluation can lead to better management of cancer patients for prolonged survival and for preserving quality of life.

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**TABLE OF CONTENTS/OUTLINE**

1. PET tracers used for the evaluation of anti-tumor therapy: 18F-flurodeoxyglucose (FDG), 18F-fluroethyltyrosine (FET), 18F-3'-deoxy-3'-18F-fluorothymidine (FLT), Glycosylated arginine-glycine-aspartic acid peptide (Galacto-RGD), 18F-fluciclatide, 11C-methionine, and Radioactive water (H\(_2\)\(^{15}\)O)
2. Therapeutic response imaging for various tumors: with reviewing clinical cases - Brain tumors, Lung cancer, Esophageal cancer, Breast cancer, and Lymphoma
3. Evaluation methods: Texture analysis, and PET Response Criteria in Solid Tumors (PERCIST)

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**NME136**

**The Utility of [F18]-Fluorodeoxyglucose PET/CT for Imaging Prostate Cancer: A Pictorial Guide**

**Education Exhibits**

**Location:** S503AB

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**Participants**

- Bhushan Desai MBBS, MS (Presenter): Nothing to Disclose
- Hossein Jadvar MD, PhD: Nothing to Disclose

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**TEACHING POINTS**

The primary objective of this educational exhibit is to provide an illustrative tutorial to highlight the utility and limitations of [F18]-FDG PET/CT for imaging evaluation of various phases of prostate cancer natural history. The major teaching points of this exhibit are:

1. FDG PET/CT is a powerful asset to the currently available imaging modalities for evaluating prostate cancer.
2. FDG PET/CT is useful in diagnosis and staging of high Gleason score primary tumors, in detection of locally recurrent and/or metastatic disease in a portion of men with PSA relapse, in monitoring response to androgen deprivation and chemotherapy, and in prognostication.

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**TABLE OF CONTENTS/OUTLINE**


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**NME137**

**The Utility of F-18 Sodium Fluoride PET/CT Imaging: Interesting Case Review**

**Education Exhibits**

**Location:** S503AB

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**Participants**

- Anjaly Belur Curley MD (Presenter): Nothing to Disclose
- Brendan Curley: Nothing to Disclose
- Badreddine Bencherif MD: Nothing to Disclose
- Danika Adria Hogan MD: Nothing to Disclose

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**TEACHING POINTS**
1. Provide background information regarding NaF PET/CT imaging.
2. Review indications for NaF PET/CT scan.
3. Display interesting cases of patients undergoing NaF PET/CT in addition to other imaging, such as nuclear medicine bone scans, MRI, F-18 FDG PET/CT, or skeletal radiographs, and to describe the additional benefits provided by NaF PET/CT.
4. Discuss prognostic relevance of NaF PET/CT imaging.
5. Discuss future of NaF PET/CT imaging.

**TABLE OF CONTENTS/OUTLINE**

1. Basics of NaF PET/CT Imaging  
2. Imaging Protocol  
3. Indications:  
   a. Initial treatment strategy (initial staging of newly diagnosed cancer or suspicion for skeletal metastasis in patients without pathologically proven disease)  
   b. Restaging (suspected new skeletal metastasis or progression of known osseous metastasis)  
   c. Monitoring treatment (following chemotherapy, radiation, or both)  
4. Benefits of F-18 NaF Imaging:  
   a. Comparison with other imaging  
   b. Increase sensitivity and specificity compared to bone scans, anatomic correlation with CT, C. Faster, convenient, radiopharmaceutical readily available  
5. Case review highlighting utility in clinical practice: several cases of patients with NaF PET/CT and other imaging at initial stage, restaging, and post-treatment stage  
6. Limitations:  
   a. Radiation exposure, cost and reimbursement, ordering clinician’s knowledge of indications of study

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**NME138**

**Value of FDG and FLT PET/CT in the Evaluation of Cervical Lymph Nodes in Head and Neck Cancer**

**Education Exhibits**  
**Location:** S503AB

**Participants**  
Charles Marcus MBBS (Presenter): Nothing to Disclose  
Alexander Antoniou MD, MA : Nothing to Disclose  
Esther Mena : Nothing to Disclose  
Rathan M. Subramaniam MD, PhD : Speakers Bureau, Eli Lilly and Company

**TEACHING POINTS**  
1. Discuss a systematic approach to examining and reporting cervical lymph nodes in patients with head and neck cancer.  
2. Discuss the anatomical and metabolic phenotypic adverse outcome features of nodal metastasis.  
3. Discuss the value and clinical context of FDG and FLT PET/CT in the evaluation of nodal metastases in head and neck cancer.  
4. Discuss the pitfalls of radiation induced inflammation, low FDG avid nodal metastasis, and necrotic nodal metastasis.

**TABLE OF CONTENTS/OUTLINE**  
1. Describe a systematic approach to identify and categorize abnormal cervical lymph nodes.  
2. Discuss the anatomical and metabolic phenotypic adverse outcome features of nodal metastasis.  
3. Advantages of PET combined with contrast-enhanced CT over conventional imaging.  
4. Impact of PET/CT in the staging, therapy assessment, follow-up and prognosis of patients with head and neck cancer.  
5. Role of different radiotracers, including FLT, in the evaluation of neck nodes.  
6. Pitfalls of PET/CT in the evaluation of cervical lymph nodes.

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**NME139**

**Various Adrenal Diseases Showing Positive Uptake of 18F-FDG: Comparison with CT/MRI and Other Scintigraphic Findings**

**Education Exhibits**  
**Location:** S503AB

**Participants**  
Takaharu Tsuda MD, PhD : Nothing to Disclose  
Gen Koiwahara (Presenter): Nothing to Disclose  
Masaaki Hirata MD : Nothing to Disclose  
Hiroaki Tanaka MD : Nothing to Disclose  
Teruhito Mochizuki MD : Nothing to Disclose

**TEACHING POINTS**  
Positive 18F-fluorodeoxyglucose (18F-FDG) uptake of adrenal gland on positron emission tomography/computed tomography (PET/CT) was frequently observed in routine workup of both adrenal lesions and other malignant tumors in PET/CT. Positive uptake of adrenal lesions does not necessarily mean malignancy. The purpose of this exhibit is:  
1. To show various adrenal diseases showing positive uptake of 18F-FDG.  
2. To compare images of positive 18F-FDG PET/CT with other image findings including CT, MRI and other scintigraphy.  
3. To discuss the pitfalls of positive uptake of various adrenal lesions may help the diagnosis of both benign and malignant adrenal lesions.

**TABLE OF CONTENTS/OUTLINE**  
1. Positive 18F-FDG uptake of malignant lesions adrenal carcinoma malignant pheochromacytoma malignant lymphoma metastasis  
2. Positive 18F-FDG uptake of benign lesions adrenal cortical adenoma benign pheochromocytoma adrenal hemorrhage  
3. Inflammatory lesions  
4. Pitfalls

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**NME140**

**What the Oncologist Wants to Know — Using the International Working Group Response Criteria for FDG PET/CT in Lymphoma**

**Education Exhibits**  
**Location:** S503AB

**Participants**  
Randy Yeh MD (Presenter): Nothing to Disclose  
Shifali Dumeer MD : Nothing to Disclose  
Masanori Ichise MD : Consultant, Navidea Biopharmaceuticals, Inc Research support, Piramal Enterprises Limited Research support, Bayer AG
TEACHING POINTS

The International Working Group (IWG) response criteria has been widely adopted as standardized response criteria for
assessment of lymphoma. Initially formulated by Cheson et al in 1999, the IWG response criteria was devised to address the
problem of variability amongst institutions with respect to the normal lymph node size, frequency of assessment, methods used
to assess response, amongst other factors. With the increasing role of FDG PET in lymphoma in staging, restaging, and response
assessment, the IWG revised the response criteria to include PET. The purpose of this exhibit is to: 1) Introduce the role of FDG
PET/CT in lymphoma assessment with respect to staging, restaging, and treatment response. 2) Familiarize the reader with the
IWG response criteria for CT and FDG PET/CT (3) Demonstrate how to apply the response criteria using clinical cases

TABLE OF CONTENTS/OUTLINE

A. Current Role of FDG PET/CT in Lymphoma B. Revised IWG Response Criteria In Lymphoma Assessment Recommendations for
FDG PET/CT for different lymphoma subtypes Definitions of a positive PET scan Revised Response Criteria - Complete remission,
partial remission, stable disease, and progression C. Clinical cases using response criteria D. Cased-based self assessment on
the application of IWG response criteria E. Summary

NME142

Bone Metastases in Prostate Cancer: From Diagnosis to Treatment

Education Exhibits
Location: S503AB

Participants
Aliaksei Salei MD (Presenter): Nothing to Disclose
Aparna Srinivasa Babu MD : Nothing to Disclose
Oleg Teytelboym MD : Nothing to Disclose

TEACHING POINTS

1. Become familiar with National Comprehensive Cancer Network (NCCN) guidelines for prostate cancer management
2. Understand impact of Gleason score and PSA level on diagnostic algorithm and detection of bone metastases
3. Understand accuracy, imaging pitfalls, and optimal use of available modalities for detection of bone metastasis: CT, MRI,
PET-CT, ProstaScint and Tc-99m MDP scans
4. Become familiar with radiopharmaceuticals used for bone metastases treatment
5. Identify challenges in follow up and treatment response evaluation in metastatic disease to the bone

TABLE OF CONTENTS/OUTLINE

Overview of epidemiology and clinical implications of bone metastases Review of NCCN algorithm for newly diagnosed prostate
cancer: Biopsy and staging PSA and Gleason score Risk stratification and indications for metastatic work up Pictorial illustration
of metastatic workup with standard and emerging modalities: CT and MRI Pet-CT, ProstaScint and Tc-99m MDP scans Nuclear
Medicine: Tc-99m MDP, ProstaScint Illustration of imaging pitfalls (‘superscan’, flare phenomenon, etc) and practical tips for
improving diagnostic accuracy Review of treatment options for bone metastases with emphasis on radiopharmaceuticals
(Radium-223, Samarium-153) Review challenges such as bone metastases treatment response assessment

NME143

Clinical Utility of the Radioisotope-labeled Fatty Acid Analog (I-123 BMIPP) Scintigraphy beyond Ischemic Heart Disease Evaluation

Education Exhibits
Location: S503AB

Participants
Kentaro Takanami MD, PhD (Presenter): Nothing to Disclose
Kei Takase MD, PhD : Nothing to Disclose
Keiichi Jingu MD : Nothing to Disclose

TEACHING POINTS

To know the mechanism, techniques and image interpretation of the radioisotope-labeled fatty acid analog, I-123
15-(p-iodophenyl)-3(R,S)-methylpentadecanoic acid (I-123 BMIPP), scintigraphy for purposes other than ischemic heart disease
evaluation. To discuss the clinical role of the unusual utilization of I-123 BMIPP scintigraphy.

TABLE OF CONTENTS/OUTLINE

A) Introduction B) Chemistry of I-123 BMIPP C) Mechanism, techniques, image interpretation and clinical utility of I-123 BMIPP
scintigraphy on Myocardial imaging for assessing non-ischemic cardiomyopathy Hepatic imaging for assessing the capacity of
hepatic fatty acid beta-oxidation in patients with steatohepatitis Thoracic duct imaging by orally administered I-123 BMIPP with
SPECT/CT for assessing or preventing chylothorax D) Summary

NME144

MIBG and Neuroblastoma: Everything You Need to Know

Education Exhibits
Location: S503AB

Participants
Susan Elizabeth Sharp MD : Nothing to Disclose
Andrew Timothy Trout MD (Presenter): Nothing to Disclose
Michael J. Gelfand MD : Nothing to Disclose
TEACHING POINTS
This exhibit will review key information related to the imaging of pediatric neuroblastoma with I-123 MIBG and the treatment of stage IV neuroblastoma with I-131 MIBG. Key teaching points will include:
1. Proper scan preparation and technique are critical for obtaining high quality MIBG images
2. Knowledge of the normal biodistribution of MIBG is essential for accurate scan interpretation
3. SPECT/CT imaging helps identify disease sites and aids in differentiating sites of physiologic uptake
4. Curie scoring can be used to quantitate disease extent and response
5. 1-131 MIBG therapy requires meticulous technique and specific imaging/follow-up protocols

TABLE OF CONTENTS/OUTLINE

NME145
Molecular Imaging of the Central Nervous System

Education Exhibits
Location: S503AB
Selected for RadioGraphics

Participants
Michele Wanner ARRT (Presenter): Nothing to Disclose
David H. Lewis MD : Research Consultant, Eli Lilly and Company
Hubert J. Vesselle MD, PhD : Consultant, MIM Software Inc

TEACHING POINTS
The purpose of this educational exhibit is to: 1. To provide an overview of common and uncommon clinical molecular imaging procedures used to diagnose central nervous system (CNS) conditions. 2. To educate on the variety of radiopharmaceuticals used in molecular imaging of the CNS, as well as routes of administration. 3. To demonstrate techniques used in molecular imaging of the CNS, as well as showcase imaging examples of each study.

TABLE OF CONTENTS/OUTLINE
Review of the following Nuclear Medicine CNS studies: - General Brain Perfusion Imaging - Ictal/Inter-ictal Brain Perfusion Imaging - Diamox (Rest/Stress) Brain Perfusion Imaging - Brain Death Imaging - Cisternography - CSF Leak Imaging and Quantification - Ommaya Shunt Imaging - VP/VA Shunt Imaging - I123 Dopamine Transporter Imaging Review of the following PET CNS studies: - FDG Cellular Metabolism Imaging - Amyloid Plaque Imaging Review of each study to include: - indications - patient preparation - radiopharmaceutical agents and dose - administration and imaging techniques - sample images - patient considerations (if applicable)

NME146
Radionuclide Imaging and Therapy of Neuroblastoma: A Pictorial Review

Education Exhibits
Location: S503AB

Participants
Neha Sunil Kwatra MBBS, MD (Presenter): Nothing to Disclose
Frederick Daniel Grant MD : Nothing to Disclose
S. Ted Treves MD : Nothing to Disclose

TEACHING POINTS
1. Learn appropriate imaging and post processing techniques of Iodine-123-metaiodobenzylguanidine (123I-MIBG) scintigraphy
2. Case-based discussion of 123I-MIBG scintigraphy with correlative radiographic imaging
3. Learn indications of 18F-FDG PET/CT imaging in neuroblastoma
4. Understand the logistic and radiation considerations of 131I-MIBG therapy program

TABLE OF CONTENTS/OUTLINE

NME148
Targeted Molecular Imaging and Therapy for Metastatic Prostate Cancer

Education Exhibits
Location: S503AB

Participants
Katie Suzanne Traylor DO (Presenter): Nothing to Disclose
Erin E. Grady MD : Nothing to Disclose
TEACHING POINTS

1) Review the clinical impact of prostate cancer. 2) Learn the value of bone scanning techniques in patients with prostate cancer. 3) Review palliative radionuclide therapies with Samarium-153 EDTMP and Strontium-89 chloride. 4) Learn about the newly FDA approved Radium-223 dichloride treatment for osseous metastatic disease with prostate cancer and how it improves overall survival.

TABLE OF CONTENTS/OUTLINE

• Prostate cancer demographics in the United States and world • Assessment of progression of disease with the utilization of whole body bone scanning with 99mTc MDP and whole body bone scanning with 18F sodium fluoride PET • ACR Appropriateness criteria • NCCN guidelines • NOPR • Palliative therapies with 153Sm EDTMP and 89Sr chloride discussing the indications, safe use of the therapy course of palliative radionuclides, as well as, the radiation safety consideration. • 223Ra dichloride alpha particle therapy, indications for the therapy and NCCN guidelines • NCCN guidelines including the ALSYMPCA trial results, safe use of 223Ra, the therapy course and radiation therapy considerations

NME149

The Role of Radium-223 in the Management of Osseous Metastasis in Castration-resistant Prostate Cancer (CRPC)

Education Exhibits
Location: S503AB

Participants

Charles Marcus MBBS (Presenter): Nothing to Disclose
Antoniou Alexander MD : Nothing to Disclose
John Crandall : Nothing to Disclose
Rathan M. Subramaniam MD, PhD : Speakers Bureau, Eli Lilly and Company

TEACHING POINTS

1. Review the value of the newly FDA-approved radium-223 in the management of osseous metastases in patients with CRPC. 2. Discuss the radiobiology, radiopharmaceutical administration protocol, efficacy, outcome benefits, drug interactions, and possible adverse effects. 3. Case illustration of patients treated with radium-223.

TABLE OF CONTENTS/OUTLINE

• Fundamentals of osseous metastasis and prevalence in prostate cancer • Current treatment options, prognostic factors and disease course in prostate cancer • The role of radium-223 in the management cascade of patients with prostate cancer • Radiobiology of radium-223 • Effect of radium-223 on the morbidity, disease progression, and survival in patients with prostate cancer • The approved administration protocol for radium-223 • The possible adverse effects to anticipate and measures to prevent them • The use of concurrent medications while administering radium-223 • Possible future potential uses of radium-223

NRE001-b

Bright Tongue Sign: A Potentially Intriguing "Neural Health" Biomarker in Neurodegenerative Disease

Education Exhibits
Location: NR Community, Learning Center

Participants

Karen Lynch : Nothing to Disclose
Peter G. Hildenbrand MD : Nothing to Disclose
James Russell DO : Nothing to Disclose
Adam Fang MD (Presenter): Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To bring to radiologists' attention the pathological changes of midline fatty infiltration of the tongue due to amyotrophic lateral sclerosis (ALS) that create the imaging appearances on T1-weighted MR imaging. 2. To demonstrate how the "bright tongue sign" and tongue metrics may assist in the diagnosis of neurodegenerative disease.

TABLE OF CONTENTS/OUTLINE

Anatomy of the tongue - Muscles - Nerve innervation Pathologic changes in the tongue in patients with Amyotrophic Lateral Sclerosis (ALS) - Denervation - Muscle atrophy of the tongue Appearance of the tongue in patients with ALS - Bright tongue - Tongue atrophy, dental gap Clinical Significance - The tongue is a large muscle frequently seen on MR imaging of the brain and cervical spine. - May indirectly aid in confirming the diagnosis of ALS.

NRE002-b

Status Epilepticus and Periictal MRI Imaging

Education Exhibits
Location: NR Community, Learning Center

Participants

Hana Malikova MD (Presenter): Nothing to Disclose
Jiri Weichet MD : Nothing to Disclose

TEACHING POINTS

Status epilepticus (SE) is a seizure that persists for a sufficient length of time or is repeated frequently enough that recovery
between attacks does not occur. It represents persistent neuronal firing and the release of excess glutamate, which activates postsynaptic NMDA receptors and triggers receptor-mediated calcium influx and initiates the vicious cycle of self-sustained seizure, which may result in cell death. Mortality of SE is up to 5-10%. SE might occur as a consequence of chronic known epilepsy (1/3) as a new onset of epilepsy (1/3) and as a complication of acute encephalopathy (1/3). MRI provides new opportunities for identifying early seizure neuronal damage (cytotoxic and vasogenic edema) often in typical localization (mesial temporal structures, thalamus and cerebral cortex) and it is a useful imaging technique to find out causes of SE.

### TABLE OF CONTENTS/OUTLINE

1. Etiology and pathophysiology of SE
2. Examples of MRI periictal reversible and irreversible damage in non-lethal and lethal cases
3. Mixed MRI detectable pathology - periictal damages and imaging of causes of SE
4. Irreversible late changes after SE in surviving cases on MRI
5. Conclusion: MRI plays an important role not only in diagnosis of periictal neuronal damage, but also in identifying of causes of SE especially potentially treatable ones

### NRE003-b

**Acquired Toxic and Metabolic Encephalopathies: Imaging Findings and Clinical Correlation**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Seul Kee Kim (Presenter): Nothing to Disclose
- Woong Yoon MD: Nothing to Disclose
- Heoung-Keun Kang MD: Nothing to Disclose
- Tae Wook Heo: Nothing to Disclose

**TEACHING POINTS**

1. To overview radiologic findings of toxic and metabolic encephalopathies
2. To explain the anatomy and physiology of the basal ganglia and thalami
3. To explain the utility of correlation between radiologic findings with clinical features, which will help in correctly indentifying the cause of encephalopathy

### NRE004-b

**Transcranial Ultrasound in Parkinson’s Disease: A Practical “How to” and “What to Do about It” Guide**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Griselda Teresa Romero Sanchez MD (Presenter): Nothing to Disclose
- Mariana Diaz-Zamudio MD: Nothing to Disclose
- Jesus Antonio Higuera-Calderon: Nothing to Disclose
- Johnatan Rubalcava Ortega MD: Nothing to Disclose
- Maria Alejandra Gonzalez Duarte B MD: Nothing to Disclose
- Erwin Chiquete Anaya MD: Nothing to Disclose
- Sergio Rangel MD: Nothing to Disclose
- Alejandro Gabutti: Nothing to Disclose
- David Butron Hernandez MD: Nothing to Disclose
- Jorge Vazquez-Lamadrid MD: Nothing to Disclose

**TEACHING POINTS**

1. To review the indications for Transcranial Ultrasound in Parkinson’s Disease (PD).
2. To describe the technique and imaging protocol of Transcranial ultrasound.
3. To illustrate the imaging findings in PD that support diagnosis and helps differentiating from other movement disorders.

### NRE005-b

**Focal Cortical Dysplasia in Pharmacoresistant Pediatric Epilepsy: A Review of Advanced Imaging Techniques within a Multimodality Approach**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Andrew Kenneth Nash MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

The exhibit's purposes are: 1. To review imaging findings of focal cortical dysplasia, with emphasis on subtle or MRI-occult cases in children. 2. To review best practices in working up pediatric epilepsy from an imaging standpoint. This includes emphasizing the importance of working closely with clinical colleagues to appropriately correlate imaging findings. 3. To review available advanced imaging techniques; examining when and how to use these tools properly. 4. To identify current treatment options and related imaging findings.
TABLE OF CONTENTS/OUTLINE
Imaging Findings  Cortical symmetry, thickness, signal  Transmantle sign
Best Practices  Correlating semiology, EEG;
communicating with clinicians
MRI-equipment, sequence protocols  Advanced Imaging Techniques
When and how to employ
MEG, fMRI, PET/MR, SPECT, ASL, DTI
Treatment  Resective and palliative surgery
Minimally invasive techniques, e.g. MRI guided laser ablation therapy

NRE006-b
Scan Reading Assisted by a 3D Atlas of the Brain, Head and Neck

Education Exhibits
Location: NR Community, Learning Center

Participants
Wieslaw Lucjan Nowinski PhD (Presenter): Nothing to Disclose
Beng Choon Chua: Nothing to Disclose
Vincent Wing Seng Ngi: Nothing to Disclose
Su Hnin Wut Yi: Nothing to Disclose
Thant Shoon Let Thaung: Nothing to Disclose
Yili Yang: Nothing to Disclose
Robert Maciej Chrzan MD: Nothing to Disclose
Andrzej Urbanik MD: Nothing to Disclose
Patrick James Peller MD: Speakers Bureau, General Electric Company

TEACHING POINTS
To demonstrate the use of a brain, head and neck atlas in scan reading for structure localization and naming.
To identify structures not visible in typical scans, such as deep and brainstem nuclei, tracts, vessels and cranial nerves.
To provide 2D-3D relationships.
To understand the brain, head and neck anatomy in 3D.

TABLE OF CONTENTS/OUTLINE
Despite tremendous advancements in diagnostic imaging, scan reading remains challenging because of data explosion and insufficient details in typical scans. To deal with these problems, we created an atlas with a virtual brain, head and neck parcellated into about 3,000 components. The virtual brain contains the cerebrum (with the cortex subdivided into lobes, gyri and sulci), cerebellum, brainstem, spinal cord, gray matter nuclei, ventricular system, white matter, arterial system, venous system, white matter tracts, cranial nerves with nuclei, and visual system. The virtual head comprises head muscles, glands, skull, extracranial vessels and skin. The virtual neck contains cervical vertebrae, neck vessels and pharyngeal muscles. An application is developed mapping the atlas on a scan, and providing functions for image interpretation as well as 3D display and exploration. The atlas is presented in 4 views: 3D with scan triplanar, and axial, coronal and sagittal views with the atlas superimposed as contours.

NRE007-b
High SI on DWI, Is It Really Acute Infarction?: High DWI Lesion, Mimicking Acute Cerebral Infarction (ACI)

Education Exhibits
Location: NR Community, Learning Center

Participants
Hee Kyung Kim (Presenter): Nothing to Disclose
In Kyu Yu: Nothing to Disclose
Youn Joo Lee MD: Nothing to Disclose
Sung Bum Cho MD: Nothing to Disclose

TEACHING POINTS
1. Diffusion-weighted imaging (DWI) has been used as a rapid and useful diagnostic tool for detection of acute cerebral infarction (ACI) which shows high signal intensity (SI). 2. But in some cases, high signal intensity on DWI does not always indicate the ACI. We will present many diseases that show high SI on DWI, mimics ACI and suggesting differential clues.

TABLE OF CONTENTS/OUTLINE

NRE008-b
Ocular Movements: More than Meets the Eye

Education Exhibits
Location: NR Community, Learning Center

Participants
Mohit Agarwal MD: Nothing to Disclose
John L. Ulmer MD: Stockholder, Prism Clinical Imaging, Inc Medical Advisory Board, General Electric Company
Andrew Paul Klein MD (Presenter): Nothing to Disclose
Tushar Chandra MD: Nothing to Disclose
Leighton P. Mark MD: Nothing to Disclose
TEACHING POINTS
1. Revisit the functional pathways that control eye movements
2. Identify them on cross sectional brain MR images
3. Discuss effects of lesion location, laterality and hemispheric dominance on deficits and recoverability

TABLE OF CONTENTS/OUTLINE
The precise, symmetric and synchronous movements of the eyes is accomplished by perfect coordination of six sets of extraocular muscles controlled by three pairs of cranial nerves. Voluntary focusing of the eye to search the environment and maintain clear view of stationary or moving objects, near or far, is meticulously controlled by centers in the frontal and parietal lobes, brainstem, cerebellum, and upper spinal cord. Maintenance of clear images during head movement brings about vestibular influences and ocular reflex pathways as well. The extent to which injury to nuclear and supranuclear structures can impair eye movements depends on lesion location, laterality, and hemispheric dominance. Knowledge of these substrates and their location on cross-sectional imaging can be useful in guiding search patterns and in clinico-radiological correlation. In this exhibit, functional pathways which control eye movements are identified on cross-sectional MRI and correlated with function, deficits, and recoverability.

NRE009-b
Pathology Enhanced MRI: Unveiling the Hidden Cranial Nerves

Education Exhibits
Location: NR Community, Learning Center

Participants
Marleine Tremblay MD, MSc (Presenter): Nothing to Disclose
Raffat Tahira Ahmad MD: Nothing to Disclose
Daniel Anthony Falco DO: Nothing to Disclose
Bimal Bharatkumar Patel DO: Nothing to Disclose
Dheeraj Reddy Gopireddy MD, MPH: Nothing to Disclose
Anastasia Frances Barron DO: Nothing to Disclose

TEACHING POINTS
1. Cranial nerve anatomy is complex. Proper evaluation of patients with cranial neuropathies requires good knowledge of the course of these small frequently indistinct structures
2. Etiologies of cranial neuropathies are diverse, and pathology often cause enhanced depiction of cranial nerve course on MRI
3. Cranial nerves can serve as tumoral dissemination routes (leukemia, metastatic disease)
4. Common primary malignancies of peripheral nerves include nerve sheath tumors, glomus jugulare tumors and meningiomas
5. Inflammatory/autoimmune/infectious processes involving cranial nerves include sarcoidosis, herpes simplex and multiple sclerosis

TABLE OF CONTENTS/OUTLINE
1. To review the course of cranial nerves using pathology to enhance depiction of their complex courses on MRI 2. To review multiple etiologies of cranial neuropathies a. Their MRI features b. Their management and follow up 3. To present a checklist of specific segments that must be scrutinized in the evaluation of each cranial nerve.

NRE010-b
Common and Uncommon MR Imaging Spectrum in Craniopharyngioma: Radiopathologic Correlation

Education Exhibits
Location: NR Community, Learning Center

Participants
Nidhin Hafeez MBBS (Presenter): Nothing to Disclose
Kanchan Gupta MD: Nothing to Disclose
Sunitha P Kumaran MBBS, MD: Nothing to Disclose
Sanjaya Viswamitra MD: Nothing to Disclose
Nandita Ghosal MD: Nothing to Disclose

TEACHING POINTS
• MRI - non-invasive, accurate modality to diagnose and assess craniopharyngioma • Differentiates histological subtypes of craniopharyngioma • Helps in deciding surgical approach • Preferred modality for post-op follow up

TABLE OF CONTENTS/OUTLINE
Retrospective study of MRI of 102 histologically proven craniopharyngiomas [Feb’10-Mar’12] revealed spectrum of imaging and histopathological findings, 89 adamantinomatous, 12 papillary and 1 melanotic - rare variant noted. Aged 4-60yrs: Mean±SD: 25±18. Adamantinomatous were large, lobulated, predominantly cystic with solid components, calcification, infiltrative, hyperintense T1, T2, FLAIR, peripheral/hetero/nodular enhancement; ADC(2.1-3.4x10⁻³mm/s); poor prognosis and recurrence. Fluid levels, bilateral ICA encasement, optic chiasmatic and hypothalamic compression seen. MRS lipid peak in 6 adamantinomatous with histopathologically proven cholesterol clefts, total tumor excision done. Papillary were well defined, noninfiltrative, predominantly solid, T1 hypo, T2 hyper, mixed enhancing with ADC(1.1-3.4x10⁻³mm/s); no recurrence and good prognosis. This exhibit illustrates spectrum of MRI features of craniopharyngioma which helps in correct radiological diagnosis of histological subtypes. Knowledge of clinical, MR imaging and histopathological spectrum aids in differentiation of this neoplasm since prognosis and therapeutic options differ.

NRE011-b
Unusual Meningeal Masses; MR and Pathologic Correlation

Education Exhibits
Location: NR Community, Learning Center
Participants
Sungwan Cho (Presenter): Nothing to Disclose
In Kyu Yu : Nothing to Disclose
Youn Joo Lee MD : Nothing to Disclose
Hee Kyung Kim : Nothing to Disclose

TEACHING POINTS
Sometimes there are intraaxial-looking masses, which are turned out to be meningeal mass, whereas there are conventional meningioma-looking mass, which are turned out to be unusual meningeal lesions. To discuss MR and pathological features of these intraaxial-looking meningeal masses and conventional meningioma-looking unusual meningeal lesions Unusual meningeal masses are often misdiagnosed as being malignant intraaxial masses or conventional meningioma or even extracerebral hematoma because of their various mimicking features. To understand the clinical, MR and pathological features of them help the accurate diagnosis and the appropriate treatment.

TABLE OF CONTENTS/OUTLINE
Review of clinical, MR and pathological features of Intraaxial-looking meningeal masses - Sylvian meningioma, Angiomatous meningioma, Microcystic meningioma, Hemangiopericytoma Meningioma-looking unusual meningeal lesions - Atypical meningioma, Chordoid meningioma, Clear cell meningioma, Rhabdoid meningioma, Anaplastic meningioma, Durai lymphoma, Idiopathic hypertrophic pachymeningitis and Meningeal melanosis

NRE012-b
Venous Anatomy of the Skull Base: What the Surgeon Needs to Know

Education Exhibits
Location: NR Community, Learning Center

Participants
Pattana Wangaryattawanich MD (Presenter): Nothing to Disclose
Lakshmi Chavali BS : Nothing to Disclose
Ashok J. Kumar MD : Nothing to Disclose
Jill Vanessa Hunter MD : Author with royalties, UpToDate, Inc
L. Anne Hayman MD : Founder, Anatom-e XRT Information Systems, Ltd

TEACHING POINTS
Skull base surgery which sacrifices a major venous pathway can result in postoperative venous infarction of the inferior temporal lobe and/or cerebellum. Preoperative planning can identify the venous structures at risk and prompt the surgeon to modify his approach.

TABLE OF CONTENTS/OUTLINE
A deformable anatomic template (DAT) of the venous pathways has been developed which can be embedded into the patient's preoperative thin section contrast images. It provides the expected normal location of the venous pathways. Each venous structure label can be activated to show text concerning the anatomic variations of all of the veins in the skull base region. If needed, the DAT can be deformed in 3 dimensions to simulate displacement by tumor. All of this information is available in standard axial planes and in conformal reconstructed views. Since the patient's images are labeled, it is possible to evaluate the tumor and the venous drainage in one data set. The relevant literature is summarized for each specific skull base surgery.

NRE013-b
Predicting the Spread of Glial Tumors: Insights from the Prefrontal Cortex (BA 10)

Education Exhibits
Location: NR Community, Learning Center

Participants
Lakshmi Chavali BS (Presenter): Nothing to Disclose
Pattana Wangaryattawanich MD : Nothing to Disclose
Mohammed R. Kaleel MD : Nothing to Disclose
Sujit Prabhu MD : Nothing to Disclose
Ashok J. Kumar MD : Nothing to Disclose
L. Anne Hayman MD : Founder, Anatom-e XRT Information Systems, Ltd

TEACHING POINTS
To describe the common spread pattern behavior of gliomas of the anterior prefrontal cortex using confocal reconstructions of MR images and Brodmann nomenclature.

TABLE OF CONTENTS/OUTLINE
Eighteen diffuse gliomas cases (Brodmann area [BA] 10) involving the prefrontal cortex and 4 cases involving the sub-genual cortex (BA 25) were retrospectively analyzed. The anterior prefrontal cortex spread pattern follows the white matter pathways. Also noted in latter, 5 cases presented with growth of a callosal tumor which caused herniation through the weak callosal isthmus. Prefrontal cortex can be reached by the spread from orbitofrontal, sub-genual, and through the septal veins causing a late tumor spread posterior into the ventricle. Each of these functional and neurosurgical importance will be discussed. In summary, anterior prefrontal cortex gliomas spread via white matter tracts in predictable patterns with clinical ramifications.

NRE014-b
MRI Findings of Secondary Neuronal Degeneration
Participants
Bo Young Jeong (Presenter): Nothing to Disclose
Eun Ja Lee: Nothing to Disclose
Eun Kyung Lee: Nothing to Disclose
Dae Bong Kim MD: Nothing to Disclose

TEACHING POINTS
1. To review classification of secondary neuronal degeneration
2. To review diagrams of neuronal pathway
3. To explain the utility of MRI and particularly diffusion-weighted imaging (DWI) in the diagnosis

TABLE OF CONTENTS/OUTLINE
1. General overview and classification of secondary neuronal degeneration
2. Review of neuronal pathway diagrams and MRI findings
   - Corticospinal tract
   - Corticopontocerebellar tract
   - Limbic system
   - Dento-rubro-olivary pathway (Guillain-Mollaret triangle)
   - Corticothalamic connection
   - Corpus callosum
3. Summary and conclusion

NRE015-b
Workup of Thyroid Nodules: A Practical Algorithm and Review of Guidelines

Participants
Adam Andrew Dmytriw MD, MSc (Presenter): Nothing to Disclose
Eugene Yu MD, FRCP: Nothing to Disclose
Reza Forghani MD, PhD: Nothing to Disclose
Colin S. Poon MD, PhD: Nothing to Disclose

TEACHING POINTS
The purpose of the exhibit is:
1. To review imaging features of thyroid nodules on different imaging modalities, with correlation to their predictive values for benignity and malignancy.
2. To review current evidence-based guidelines for initial workup and follow-up of thyroid nodules.
3. To present a practical diagnostic algorithm that summarizes the current guidelines from various organizations.

TABLE OF CONTENTS/OUTLINE
- Relevance of Clinical History and Endocrine Profile for Thyroid Nodule Workup - Key Features of Benign Nodules - Key Features of Malignant Nodules - Predictive Values of Imaging Characteristics - Algorithm for Radiological Management of Thyroid Nodules, Including Follow-Up and Fine Needle Aspiration and Decision Flow Chart Based on Summary of Recommendations from Various Guidelines

NRE017-b
Imaging Evaluation of Sensorineural Hearing Loss: Critical Aspects That Radiologists Should Know

Participants
Sun Huh MD (Presenter): Nothing to Disclose
Hyun-Sook Hong MD, PhD: Nothing to Disclose
Ji Sang Park: Nothing to Disclose
Sun Hye Jeong MD: Nothing to Disclose
Jae Myeong Lee: Nothing to Disclose
Heon Lee: Nothing to Disclose

TEACHING POINTS
- Review the embryology of the inner ear and understand the components of the auditory neural pathway.
- Review the imaging and clinical evaluation of children with sensorineural hearing loss (SNHL) with an emphasis on critical aspects that radiologists should know.
- Discuss the classification of congenital inner ear malformation and non-syndromic or syndromic causes of congenital SNHL, and acquired causes of SNHL.

TABLE OF CONTENTS/OUTLINE
Each topic below will be discussed and illustrated: 1. Introduction 2. Embryology of the inner ear and components of auditory neural pathways 3. Anomalies of the inner ear, IAC, and cochlear foramen 4. Syndromic sensorineural hearing loss A. Pendred syndrome B. Brachio-oto-renal (BOR) syndrome C. Waardenburg syndrome D. X-linked deafness with stapes gusher E. CHARGE syndrome F. Acquired SNHL A. Infectious labyrinthitis B. Autoimmune labyrinthitis C. Trauma

**NRE018-b**

**Diagnostic Value of Contrast-Enhanced Fluid Attenuated Inversion Recovery Imaging**

*Education Exhibits*

*Location: NR Community, Learning Center*

*Certificate of Merit*

**Participants**

- Eun Ja Lee (Presenter): Nothing to Disclose
- Bo Young Jeong: Nothing to Disclose
- Eun Kyung Lee: Nothing to Disclose
- Dae Bong Kim MD: Nothing to Disclose

**TEACHING POINTS**

To describe the normally enhancing structures on contrast-enhanced fluid attenuated inversion recovery imaging (CE-FLAIR). To investigate the clinical utility of CE-FLAIR in various pathologic conditions of the intra and extracerebral compartment. To show distinct advantages of CE-FLAIR over CE-T1 weighted imaging (WI).

**TABLE OF CONTENTS/OUTLINE**

1. General overview of MR contrast material enhancement 2. Understanding of difference between CE-T1WI and CE-FLAIR 3. Understanding of the normally enhancing structures on CE-FLAIR 4. Review of imaging findings in various intra and extracerebral pathologic conditions, to investigate advantages of CE-FLAIR over CE-T1WI - Intracerebral lesions - Meningeal lesions - Diabetic retinopathy - Hyperintense acute reperfusion marker (HARM) - Traumatic lesions - Seizures associated with hyperglycemia - Gadolinium encephalopathy related to renal failure. 5. Summary and conclusion

**NRE019-b**

**MRI of Myelin Water: Principles and Applications of an Emerging Technique**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Cornelia Laule PhD (Presenter): Nothing to Disclose
- Irene M. Vavasour PhD: Nothing to Disclose
- Shannon H. Kolind PhD: Nothing to Disclose
- Thorarin Albert Bjarnason PhD: Nothing to Disclose
- Jing Zhang PhD: Nothing to Disclose
- Lara Boyd PhD: Nothing to Disclose
- Alexander Rauscher PhD, MSc: Advisory Board, F. Hoffmann-La Roche Ltd
- G.R. Wayne Moore MD: Nothing to Disclose
- David Kwok Boon Li MD: Researcher, sanofi-aventis Group Researcher, F. Hoffmann-La Roche Ltd Researcher, Novartis AG Researcher, PAREXEL International Corporation Consultant, sanofi-aventis Group Consultant, F. Hoffmann-La Roche Ltd Scientific Advisory Board, sanofi-aventis Group Consultant, F. Hoffmann-La Roche Ltd Scientific Advisory Board

**TEACHING POINTS**

The purpose of this exhibit is: 1. To explain the anatomical basis of myelin water 2. To describe the MRI acquisition and analysis of multi-echo T2-relaxation based myelin water imaging 3. To summarize key myelin water imaging findings in healthy brain and spinal cord tissue 4. To review myelin water imaging abnormalities in different central nervous system pathological conditions including multiple sclerosis, stroke, schizophrenia, concussion and phenylketonuria 5. To learn how myelin water findings compare to other advanced neuroimaging MR techniques such as diffusion tensor and magnetization transfer imaging

**TABLE OF CONTENTS/OUTLINE**


**NRE020-b**

**DWI and DTI in Spinal Cord Imaging: Technical Challenges and Developed Recent Methods**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Jin Hwa Lee MD (Presenter): Nothing to Disclose
TEACHING POINTS
The educational objectives of this article are to describe the technical challenges and recent developed methods of DWI and DTI in spinal cord imaging.

TABLE OF CONTENTS/OUTLINE
1. To illustrate of technical challenging of DWI in spinal cord and vertebrae; sensitivity to magnetic field inhomogeneity, small diameter of spinal cord and lesion, lack of discernible pattern, partial volume averaging, bulk physiologic motion about the spinal cord 2. To illustrate technical consideration: proper image acquisition without distortion, high SNR, available scanning time, proper b-value, orientation of diffusion encoding directions, etc. 3. To describe advanced EPI based technique to overcome geometric distortion; multishot EPI, parallel imaging, reduced FOV method.

NRE021-b
Got Calcium? Advances in Imaging of the Parathyroid Glands—A Pictorial Review

Education Exhibits
Location: NR Community, Learning Center

Participants
Jonathan D. Kirsch MD (Presenter): Nothing to Disclose
Mahan Mathur MD: Nothing to Disclose
Thomas McCann MD: Nothing to Disclose

TEACHING POINTS
After viewing this presentation the learner should be able to: 1) Understand the embryology, anatomy, and physiology of the parathyroid glands. 2) Recognize the common pathologies involving the parathyroid glands (parathyroid adenomas, parathyroid hyperplasia, cystic parathyroid adenomas, parathyroid carcinoma, and expected findings in hyperparathyroidism and MEN syndromes). 3) Become familiar with the latest techniques used for parathyroid imaging and their interpretation: High-resolution US, 4D-CT, and Nuclear Medicine sestamibi scanning. 4) Understand the importance of preoperative imaging for hyperparathyroidism and other parathyroid disease and how it aids in the performance of minimally invasive parathyroidectomies.

TABLE OF CONTENTS/OUTLINE
1. Anatomy and embryology of the parathyroid glands 2. Pathophysiology of hyperparathyroidism (primary, secondary, tertiary) 3. Imaging of the parathyroids glands including techniques and pearls (Ultrasound, 4D CT, Nuc. Med) 4. Sample cases of pathology involving the parathyroid glands- what to look for and how to interpret the studies 5. Pitfalls and mimics in imaging 6. Importance of imaging in operative planning, especially in relation to minimally invasive parathyroidectomies performed for primary hyperparathyroidism

NRE022-b
A Brief Review of Parenchymal Hematoma MRI Imaging, Physics Included!

Education Exhibits
Location: NR Community, Learning Center

Participants
Ernest John Laney MD (Presenter): Nothing to Disclose
Arthur Thomas Maydell MD: Nothing to Disclose

TEACHING POINTS
1) Multi-sequence (including SWI and component magnitude and phase) MRI based illustration of the temporal evolution of parenchymal hematoma with a simultaneous description of the related MRI physics of hematoma evolution. A quick, easy to remember reference algorithm, aimed for use by the “on-call” radiologist will be detailed. 2) Illustrate differences between evolving hematoma on T2 FLAIR and standard T2 sequences (including a description of the underlying physics). Historically, textbooks teach only the standard T2 appearance of parenchymal hematoma yet many institutions current stroke protocol (including the stroke protocol at Rush) utilize T2 FLAIR as opposed to standard T2. 3) A pictorial and written description of the evolutionary changes of parenchymal hematoma including the underlying MRI physics as seen on SWI and its component phase and magnitude images.

TABLE OF CONTENTS/OUTLINE
Review of imaging findings T1, T2, FLAIR, SWI magnitude and phase images Supplemental CT images MRI physics review of each phase of hematoma evolution QR codes (online links) provided for key animations Discussion of T2 versus T2 FLAIR SWI with magnitude and phase components Imaging features at differing field strengths Discussion of current stroke MRI imaging protocols Unanswered questions and future research ideas

NRE023-b
Can You Hear Me Now? Congenital Aural Atresias and the CT Predictors of Surgical Success

Education Exhibits
Location: NR Community, Learning Center

Participants
Jerome Li-Yong Kao MD (Presenter): Nothing to Disclose
Matthew Buzzeo MD: Nothing to Disclose
Paul Dennis Campbell MD: Nothing to Disclose

TEACHING POINTS
1. To understand the spectrum and diagnostic workup of congenital aural atresias.
2. To appreciate temporal bone CT anatomy as it pertains to aural atresias and conductive hearing loss.
3. To recognize the importance of precise CT description of aural atresias for operative planning and prediction of surgical success, specifically emphasizing the Jahrsdoerfer predictive scoring system.
4. To briefly review the treatment options available for congenital aural atresias.

TABLE OF CONTENTS/OUTLINE
- Introduction to congenital aural atresias, including background and diagnostic workup
- Review of pertinent external and middle ear anatomy
- Description of the Jahrsdoerfer system and its ability to predict surgical success based on specific temporal bone CT findings
- Demonstration of representative CT findings from sample patient cases
- Brief review of treatment options, including external/middle ear reconstruction and Bone Anchored Hearing Aid implants (BAHA)

NRE024-b
Clinical Applications of Dual Energy CT in Head and Neck Imaging

Education Exhibits
Location: NR Community, Learning Center

Participants
Laleh Daftaribesheli MD (Presenter): Nothing to Disclose
Michael Steven Mayich MD, FRCP: Nothing to Disclose
Daniel Thomas Ginat MD: Nothing to Disclose
Rajiv Gupta PhD, MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: ? To review the physical basis of dual energy CT scan ? To discuss the clinical applications of dual energy CT for the head and neck imaging ? To explain the image quality and dose considerations of the dual energy CT for the head and neck imaging

TABLE OF CONTENTS/OUTLINE
Physical basis of dual energy CT scan (DECT) Clinical application of DECT scan for the head and neck imaging Application of DECT for metal artifact reduction Head and neck vascular assessment Tumor imaging Parathyroid lesions Paranasal sinus ventilation Image quality and dose considerations Conclusion and future prospective

NRE025-b
Benign Neck Masses Showing Restricted Diffusion: What Are We Missing Out?

Education Exhibits
Location: NR Community, Learning Center

Participants
Abanti Das MBBS, MD (Presenter): Nothing to Disclose
Ashu Seth Bhalla MBBS, MD: Nothing to Disclose
Raju Sharma MD: Nothing to Disclose
Alok Thakar: Nothing to Disclose
Atin Kumar MD: Nothing to Disclose
Sreenivas V: Nothing to Disclose
Suresh Sharma MBBS, MS: Nothing to Disclose

TEACHING POINTS
1. To briefly review the basic principles of diffusion weighted imaging (DWI).
2. To illustrate the conventional magnetic resonance imaging (MRI) and DWI of benign neck masses showing restricted diffusion.
3. To understand the implication of tumour histology on DWI.
4. To create awareness about these outlier entities to avoid possible errors in diagnosis.

TABLE OF CONTENTS/OUTLINE
1. Brief overview of DWI. 2. Imaging spectrum of benign neck masses showing restricted diffusion: conventional MRI and DWI. 3. Entities to be discussed: Benign nerve sheath tumour Paraganglioma Warthin tumour Meningioma Solitary fibrous tumour. 4. Histopathological correlation. 5. Conclusion

NRE026-b
Clinicoradiological Correlation of Extraocular Eye Movement Disorders: Seeing Beneath the Surface

Education Exhibits
Location: NR Community, Learning Center

Selected for RadioGraphics

Participants
Keegan Kristin Hovis BS (Presenter): Nothing to Disclose
Yu-Ming Chang MD, PhD: Nothing to Disclose
Joshua P. Thatcher MD: Nothing to Disclose
Rachel Sobel MD: Nothing to Disclose
Akifumi Fujita MD: Nothing to Disclose
Osamu Sakai MD, PhD: Speaker, Bracco Group Speaker, KYORIN Holdings, Inc Speaker, Eisai Co, Ltd
TEACHING POINTS

Eye movement disorders may result from a broad range of etiologies involving the brain, peripheral nerves, and orbit. Thus, radiologists should be aware of patterns of eye movement restriction that may indicate a specific etiology or imaging findings so that essential diagnoses are not missed. The purpose of this exhibit is to: 1. Review the anatomy of the oculomotor system and the physiology of eye movement 2. Review various pathologies that cause oculomotor dysfunction 3. Provide a clinical correlation between imaging and patient presentation of various eye movement disorders

TABLE OF CONTENTS/OUTLINE


NRE027-b

Imaging Considerations for Robotic Thyroidectomy: What the Thyroid Surgeon Wants to Know

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Semin Chong MD (Presenter): Nothing to Disclose
Kyungho Kang : Nothing to Disclose
Soo Jin Kim MD : Nothing to Disclose
Jae Seung Seo : Nothing to Disclose
Yang Soo Kim MD : Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To review the difference between conventional and robotic thyroidectomy 2. To suggest and discuss the imaging considerations which the thyroid surgeon wants to know before robotic thyroidectomy

TABLE OF CONTENTS/OUTLINE

What’s robotic thyroidectomy - The difference from conventional thyroidectomy New imaging considerations before robotic thyroidectomy - What the thyroid surgeon wants to know - General considerations 3D imaging view : thyroid (including common carotid artery, superior and inferior thyroid artery, thyroid veins) 3D volume measurement of thyroid gland and tumor: adding to 2D measurement Presence or absence of local invasion and central/lateral metastatic lymphadenopathy - Special considerations 3D imaging views corresponding to FOV of robotic thyroidectomy Future directions and summary

NRE028-b


Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Mariam Hanna MD (Presenter): Nothing to Disclose
Yang Tang MD, PhD : Nothing to Disclose

TEACHING POINTS

This pictorial essay presents an approach to the differential diagnosis of spinal cord lesions identified on MR imaging. We will discuss various etiologies of cord pathology and imaging features. Topics that will be covered in the following essay include vascular supply of the spinal cord and consequences of arterial and venous compromise, vascular malformations and vascular tumors.

TABLE OF CONTENTS/OUTLINE

This pictorial essay presents an approach to the differential diagnosis of spinal cord lesions identified on MR imaging. The purpose of this exhibit is: To review the anatomy and pathophysiology of spinal cord arterial and venous blood supply. To discuss various etiologies of cord pathology and imaging features. Table of Contents/Outline: Anatomy and pathophysiology of cord vasculature Spinal Cord Infarction- Arteriovenous Fistula (AVF)- Arteriovenous Malformation- Discuss pathology, etiology, imaging features and example MRI cases of each. Vascular tumors- Discuss pathology, etiology, imaging features and example MRI cases for each: Hemangioblastoma, Astrocytoma, Ependymomas, and Metastatic Renal Cell Carcinoma. The major teaching points of this exhibit are: Review of vascular anatomy and how it relates to cord pathology. Key imaging features of non-traumatic spinal cord pathology. Common imaging pitfalls.

NRE029-b

Where’s the Blood? A Pictorial Review of Spinal Hemorrhage on MRI

Education Exhibits
Location: NR Community, Learning Center

Participants
Jennifer Koay MD (Presenter): Nothing to Disclose
Jeffery Hogg MD: Nothing to Disclose

TEACHING POINTS

1. Review the anatomy and imaging features defining the intramedullary, epidural, subdural, and subarachnoid spaces and delineate landmarks which define these different locations. 2. Discuss the various etiologies and clinical contexts of spinal hemorrhages including trauma, postoperative complication, coagulopathy, vascular malformation, and secondary complications of hemorrhage. 3. Demonstrate the complementary nature of different imaging modalities and sequences used to analyze various spinal hemorrhages.

TABLE OF CONTENTS/OUTLINE

1. Anatomy: Review intramedullary, epidural, subdural, and subarachnoid anatomy. 2. Imaging and Clinical Context: Discuss and illustrate the various causes and clinical features of spinal hemorrhage including trauma, postoperative complication, coagulopathy, vascular malformation, and secondary complications of hemorrhage using CT and MR images. 3. Conclusion: The learner interacting with this educational exhibit will gain an understanding of the anatomic features which distinguish the compartmental locations of spinal hemorrhages. A solid understanding of spinal anatomy and imaging characteristics along with clinical history will help to narrow differential diagnoses, inform clinical management, and optimize patient outcomes.

NRE030-b

Manifestations of Spine Injuries in Firefighters on MRI

Education Exhibits
Location: NR Community, Learning Center

Participants

Vetana Sei MD: Nothing to Disclose
Susan Catherine Lee MD (Presenter): Nothing to Disclose
Kevin R. Math MD: Nothing to Disclose
James Eric Silverzweig MD: Nothing to Disclose

TEACHING POINTS

To demonstrate and characterize most common abnormalities of the spine in firefighters using primarily MRI examinations. To review the spectrum of imaging features and mechanisms of injuries sustained by urban firefighters.

TABLE OF CONTENTS/OUTLINE

We retrospectively evaluated 138 spine MRI examinations of urban firefighters who were referred for back pain, over the course of one year. The various injuries were tabulated. A total of 39.9% cervical, 5.0% thoracic, and 55.1% lumbar spine MRIs of firefighters from the ages of 29-65 (mean age 46.1 years) were reviewed. Of the 138 spine MRI examinations performed 95.6% demonstrated abnormalities. The most commonly seen spinal abnormalities included degenerative disc disease (disc herniation / bulge/ protrusion) in 94.2%, degenerative joint disease of the facet joints and uncovertebral joints 19.6%, and degenerative spondylolisthesis 10.1%. Degenerative changes were seen in firefighters as young as 30 and at least 9 individuals from the sample population had surgery for their symptoms. Reported mechanisms of injuries were related to carrying victims, lifting heavy fire-hoses and ladders, and occupational falls. Knowledge of early onset of degenerative change and spinal injuries in firefighters will aid in diagnosis and can offer information for management and prevention of injury in this high-risk population.

NRE031-b

Is This Cord Tumor or Non-tumorous Myelopathy?; Spinal Cord Tumor Mimicking Non-tumorous Myelopathy

Education Exhibits
Location: NR Community, Learning Center

Participants

Hee Kyung Kim (Presenter): Nothing to Disclose
In Kyu Yu: Nothing to Disclose
Youn Joo Lee MD: Nothing to Disclose
Sung Bum Cho MD: Nothing to Disclose

TEACHING POINTS

1. We occasionally encounter enhancing spinal cord lesions with difficulty for differentiation between tumorous or non-tumorous myelopathy. There are some imaging clues that can be helpful for differential diagnosis. Tumorous myelopathy usually show more cord expansion, syrinx formation, and more dense patchy enhancement, while non-tumorous myelopathy show as less cord expansion, multisegmental with skipped lesions, and usually vary or disappears on follow up MRI. With these points we may differentiate non-tumorous spinal cord lesions without invasive diagnostic biopsy.
2. In this exhibit, we will present various non-tumorous myelopathy, confirmed by clinical or surgical biopsy and suggest imaging clues, useful for differentiation from tumorous myelopathy

TABLE OF CONTENTS/OUTLINE


NRE032-b

The Use of Dual Energy CT Neck in Localizing Parathyroid Adenomas: Initial Experience

Education Exhibits
Location: NR Community, Learning Center
TEACHING POINTS

1. Review the current imaging findings in investigations of primary hyperparathyroidism caused by a parathyroid adenoma (ultrasound, MIBI and SPECT MIBI).
2. Review the enhancement and attenuation characteristics of parathyroid adenomas using IV enhanced dual energy CT Neck.
3. Illustrate the attenuation characteristics of pathology proven parathyroid adenoma at multiple different KeVs, and compare these differences with thyroid tissue, thyroid nodules and lymph nodes.

TABLE OF CONTENTS/OUTLINE

- Background on the radiological work-up for patients being investigated for primary hyperparathyroidism including pictorial examples of ultrasound findings and more advanced nuclear medicine imaging including MIBI studies and combined MIBI SPECT images CT contrast enhanced neck in parathyroid localisation - enhancement and attenuation patterns of adenomas and how they differ from thyroid tissue, thyroid nodules and lymph node
- Background on Dual Energy CT, it’s physics, it’s utility and application in parathyroid imaging
- The utility of Dual Energy CT neck in localizing parathyroid adenomas and where it may play a future role in localizing adenomas at acceptable or even reduced radiation dose.

NRE033-b

Parry-Romberg Syndrome – Six Cases of Progressive Facial Hemiatrophy

Education Exhibits
Location: NR Community, Learning Center

Participants

- Michael Wong MD (Presenter): Nothing to Disclose
- C. Douglas Phillips MD: Stockholder, MedSolutions, Inc Consultant, Guerbet SA
- Deborah Rachelle Shatzkes MD: Nothing to Disclose

TEACHING POINTS

- To present the current understanding of etiology, pathophysiology and clinical presentation of Parry Romberg Syndrome (PRS).
- To familiarize the viewer with the highly variable extracranial and intracranial imaging findings in PRS.

TABLE OF CONTENTS/OUTLINE

- Background Spectrum of clinical presentations
- Theories of underlying pathophysiology
- Reported extracranial and intracranial imaging findings Presentation of cross-sectional imaging findings in 6 cases

NRE034-b

Ophthalmoplegia, Various MR Imaging Features in Brainstem and Cavernous Sinus Levels

Education Exhibits
Location: NR Community, Learning Center

Participants

- Hee Kyung Kim (Presenter): Nothing to Disclose
- In Kyu Yu: Nothing to Disclose
- Youn Joo Lee MD: Nothing to Disclose
- Sung Bum Cho MD: Nothing to Disclose

TEACHING POINTS

1. Ophthalmoplegia is a paralysis or weakness of one or more extraocular muscles which are responsible eye movement. It may be neurogenic in brainstem, cavernous sinuses levels.
2. In this exhibit, we will classify and present various cases with ophthalmoplegia at cavernous sinus and brainstem level

TABLE OF CONTENTS/OUTLINE

1. Brainstem level
   a. Ischemic lesion - internuclear ophthalmoplegia
   b. Aneurysm - SCA aneurysm, PCA dissecting aneurysm
   c. Metabolic lesion - Wernicke encephalopathy
   d. Demyelinating disease - tumour - pineal tumor - parinaud’s syndrome
2. Cavernous sinus level
   a. Inflammatory, infectious lesions - Tolosa-hunt syndrome, infective thrombophlebitis, invasive fungal infection, idiopathic hypertrophic pachymeningitis
   b. Vascular lesions - carotid cavernous fistula, ruptured dissecting aneurysm with direct carotid cavernous sinus fistula
   c. Neoplastic lesions - schwannoma, meningioma, hemangioma, epidermoid, lymphoma, metastasis

NRE035-b

Obstructive Sleep Apnea/Hypopnea. Imaging Evaluation with CT Measurements. Are Cephalometric and Neck Measurements Useful or Useless?

Education Exhibits
Location: NR Community, Learning Center

Participants

- Jimena Ortiz MD: Nothing to Disclose
- Camilo Andres Barragan Leal MD (Presenter): Nothing to Disclose
- Julian Gutierrez MD, RT: Nothing to Disclose
- Sonia Bermudez MD: Nothing to Disclose
TEACHING POINTS
- To know the most common imaging identifiable abnormalities in the upper airway in Obstructive Sleep Apnea/Hypopnea (OSA/H).
- To know the different measurements in the upper airway CT for the evaluation of (OSA/H).
- To compare these measurements between patients referred for sleep apnea evaluation and asymptomatic subjects in Colombian population.

TABLE OF CONTENTS/OUTLINE
1. OSA/H Definition
2. Causes
3. CT findings
   a. Cephalometric and neck measurements
   b. Measurement differences between patients with OSA/H and asymptomatic subjects in our institution
4. Results
5. Conclusions

NRE036-b

4D Brain CT Perfusion Illustration of Early Spontaneous Thrombolysis and Recanalization of Complete Acute Internal Carotid Artery and Middle Cerebral Artery Occlusion: More than Just a Clinical Reminder

Education Exhibits
Location: NR Community, Learning Center

Participants
Gary Xin Gong MD, PhD (Presenter): Nothing to Disclose
Haiyan Wang MD: Nothing to Disclose
Martin Austr MD: Nothing to Disclose

TEACHING POINTS
1. Spontaneous recanalization of thromboembolic vascular occlusions is common in stroke patients. The rate of spontaneous recanalization is 5%-30% with most of the reports of intracranial vascular occlusion. Spontaneous thrombolysis after occlusion of the extracranial carotid may occur just as frequently. 4D CT perfusion exam offers fast and accurate hemodynamic evaluations of the vascular anatomy and possibly associated brain infarction or ischemic penumbra. This review adds help in recognizing this entity.
2. Little is known about the mechanism, natural course, and the long-term clinical outcome of the observed spontaneous recanalization of internal carotid artery occlusion. Such background literatures were reviewed through this case exhibit which can spike future interest in collecting and analyzing those cases for better stroke management.
3. This review illustrates the importance of routine imaging follow ups after the diagnosis of complete occlusion of internal carotid artery by using noninvasive carotid Doppler ultrasound or CTA, even after the spontaneous recanalization.

TABLE OF CONTENTS/OUTLINE
Pathophysiology of therapeutic and spontaneous thrombolysis. Review of imaging findings, diagnostic pitfalls, and 4D CT brain perfusion techniques. Literature review and proposed mechanism Future directions and summary

NRE037-b

The Vertebral Arteries: A Review of Embryology and Variant Anatomy

Education Exhibits
Location: NR Community, Learning Center

Participants
David Chiao MD, MPH (Presenter): Nothing to Disclose
Max Wintermark MD: Research Grant, General Electric Company Research Grant, Koninklijke Philips NV

TEACHING POINTS
After reviewing this educational exhibit, the learner will:
1. Have a basic knowledge of the embryology of the vertebral arteries
2. Understand the embryologic basis of variant anatomy
3. Recognize the imaging appearance of common anatomic variants as well as their clinical significance

TABLE OF CONTENTS/OUTLINE
Introduction
Embryology
Epidemiology of Variant Anatomy
Imaging Findings of Common Variants
- Persistent Trigeminal Artery
- Persistent Otic Artery
- Persistent Hypoglossal Artery
- Proatlantal Intersegmental Artery
- Vertebral Artery Fenestration
Conclusion

NRE038-b

The Cavernous Sinus and Its Tributaries: Demonstration of Imaging Anatomy and Clinical Implication for Endovascular Treatment

Education Exhibits
Location: NR Community, Learning Center
Participants
Shuichi Tanoue MD (Presenter): Nothing to Disclose
Hiro Kiyosue MD: Nothing to Disclose
Yuzo Hori MD: Nothing to Disclose
Mika Okahara MD: Nothing to Disclose
Yoshiko Sagara MD: Nothing to Disclose
Hiromu Mori MD: Nothing to Disclose

TEACHING POINTS
The teaching points of this exhibit are:
1. The functional and imaging anatomy of cavernous sinus and its tributaries
2. The angiographic findings of vascular lesions involving cavernous sinus
3. The endovascular treatments for vascular lesions involving cavernous sinus and its tributaries

TABLE OF CONTENTS/OUTLINE
Contents A. Functional anatomy of cavernous sinus (CS) and its tributaries including superficial middle cerebral vein, uncal vein and preponente bridging vein Normal anatomy and variations Embryology in reference to the anatomical variations B. Imaging appearance of CS and its tributaries in normal and pathologic conditions Normal angiarchitectures and variations in CT, MRI and angioarchiography Imaging findings of pathologic conditions C. Endovascular treatment Endovascular treatment for CS dural arteriovenous fistula or other arteriovenous fistula involving the tributaries of CS with focusing on the angiarchitectures Outline The knowledge and assessment of drainage patterns of CS and its tributaries, which have a variety of variations, is important for endovascular treatment as well as the surgery. The purpose of this exhibit is to demonstrate the functional and imaging anatomy, and endovascular treatment for vascular lesions in CS and its tributaries.

NRE040-b
Imaging of Strangulation in Forensic Cases

Education Exhibits
Location: NR Community, Learning Center

Participants
Dominic Gascho (Presenter): Nothing to Disclose
Sabine Franckenberg MD: Nothing to Disclose
Steffen Ross MD: Nothing to Disclose
Lukas Ebner MD: Nothing to Disclose
Garyalia Amanozi MD: Nothing to Disclose
Thomas D. Ruder MD: Nothing to Disclose
Wolf Schweitzer MD: Nothing to Disclose
Patrick Lamberke: Nothing to Disclose
Michael J. Thali MD: Nothing to Disclose
Patricia Mildred Flach MD: Nothing to Disclose

TEACHING POINTS
Teaching points: • Optimal magnetic resonance (MR) protocol for postmortem strangulation cases • The audience will learn about typical findings on computed tomography (CT) and MR in strangulation • Forensic aspects of strangulation will be elaborated • Pitfalls and pearls in imaging of strangulation cases

TABLE OF CONTENTS/OUTLINE
Table of content: • Introduction on postmortem imaging and state-of-the-art in forensic radiology • Review of literature on CT and MR in surviving victims and postmortem cases • Review of typical findings in younger and elderly deceased cases in strangulation • Methods - Potential postmortem neck MR protocol and CT imaging • Educational image based display of the pitfalls and pearls in strangulation cases • Discussion of the forensic relevance and implication for surviving victims and clinical imaging in assault victims • Case-based review of postmortem cases (scanned on a 3 T) displaying the above reviewed imaging features in correlation to autopsy with macroscopic specimen

NRE041-b
Contribution of F18-FDG-PET/CT and MRI to the Diagnosis of Perineural Extension in Head and Neck Malignancies

Education Exhibits
Location: NR Community, Learning Center

Participants
Samy Ammari (Presenter): Nothing to Disclose
Laurent Dercle MD: Nothing to Disclose
Stephane Temam: Nothing to Disclose
Pierre Blanchard: Nothing to Disclose
Martin Schlumberger: Nothing to Disclose
Clarisse Dromain MD: Nothing to Disclose
Jean Lumbroso MD: Nothing to Disclose
Francois Bidault: Nothing to Disclose

TEACHING POINTS
• Perineural spread is frequent • An optimal protocol is required

TABLE OF CONTENTS/OUTLINE
Introduction Head and neck cancer frequently spread along peripheral nerves. It most commonly involves the trigeminal (V) and the facial (VII) nerves, the rotondum (V2) and ovale (V3) foramen. Its frequency is variable (depending on tumor histologic type and location). Its diagnosis is crucial because it bears a poor prognosis (survival, local recurrence and metastasis) and warrants treatment adaptation. Teaching points The radiologic signs are an enlargement of the foramen or of cranial nerves associated with either a contrast enhancement asymmetry (MRI and CT-scan) or a hypermetabolism (FDG-PET/CT). Imaging and analysis must systematically include a coronal reconstruction (V2 and V3) and the imaging of the
cavernous sinus. On MRI, a T1-weighted sequence with gadolinium chelate injection and suppression of fat signal is required. The primary advantage of a dedicated Head and Neck PET/CT protocol over the whole body acquisition is in the detection of small lymph node metastases. A baseline imaging after surgery and/or radiotherapy is particularly useful for the follow-up. Conclusions In head and neck cancer, the presence or absence of « extra-cranial » perineural extension should always be reported and an optimal protocol is required.

NRE100

“Dual Energy CT” - A Boon to Clinical Advances in Neuroimaging

*Education Exhibits*

Location: NR Community, Learning Center

Certificate of Merit

**Participants**

Vrushali Dinesh Bachhav MBBS (Presenter): Nothing to Disclose
Abhijit Ashok Patil MBBS, MD: Nothing to Disclose
Sharon E. Byrd MD: Nothing to Disclose
Miral Dhanendra Jhaveri MD: Nothing to Disclose
Mark Patrick Supanich PhD: Research agreement, Siemens AG

**TEACHING POINTS**

• Dual energy CT can help in differentiation of Intraparenchymal hemorrhage from contrast enhancement. • Dual energy CT allows reliable differentiation between frequent blood brain barrier disruption and rare intracerebral hemorrhage immediately after endovascular recanalization therapy. • Dual energy CT helps in avoiding overestimation of SAH after peri-interventional re-bleeding. • Reduction of metallic streak artifacts arising from spinal hardware. • Reduction of radiation dose by 30-50% as compared to single energy CT.

**TABLE OF CONTENTS/OUTLINE**

• Siemens dual energy scanner (SOMATOM) was used for performing the dual energy scans. • Retrospective study of 50 patients with hemorrhages at different sites was performed from January 2012 to December 2013. • Patient age from 35-70 years and both sexes. • All patients underwent single energy non-contrast CT and contrast-enhanced dual-source DECT. • DECT images were post-processed with commercial software, applying a three-material decomposition algorithm for brain hemorrhage followed by obtaining iodine images and virtual non-contrast images and generating combined images that created the impression of 120 kvp images.

NRE101

4-dimensional Computerised Tomography of Larynx: Efficacy of an Automated Software Programs for Imaging and Diagnosis of Laryngeal Dysfunction

*Education Exhibits*

Location: NR Community, Learning Center

**Participants**

Kenneth K. Lau (Presenter): Nothing to Disclose
Jacqui Hislop-Jambrich PhD: Employee, Toshiba Corporation

**TEACHING POINTS**

Laryngeal dysfunction (LD) characterized by the inappropriate closure of vocal cords during breathing is often misdiagnosed as steroid-resistant asthma. 320-slice CT larynx permits real-time viewing of laryngeal movement and may replace laryngoscopy in the LD diagnosis. An analysis algorithm has been established for quantification of LD based on a Real Time ratio of vocal cord lateral diameter to tracheal diameter (RATIOS). Manual measurements have been tediously performed at 0.35 seconds intervals of the breathing cycle and can be subject to measurement error. The aim of this exhibit is to demonstrate the efficacy of a new computing automated measurement software programme (CAMSP) installed in the workstation that aids LD diagnosis.

**TABLE OF CONTENTS/OUTLINE**

1. 154 adult patients with asthmatic symptoms and 46 age-matched normal individuals were recruited for 4-D dynamic CT of larynx.
2. RATIOS were obtained over the breathing cycle both manually and by CAMSP that automatically defines a centre line through the airway lumen and obtains appropriate linear dimensions and area. Bland-Altman analysis confirmed the concordance and agreement between the CAMSP and manual results. Average time required for CAMSP is 72% less compared to manual.
3. CAMSP gives more objective and reproducible results that aids the prompt diagnosis of LD.

NRE102

Bright Ideas: The Physics, Advanced Techniques and Case-based Review of Restricted Diffusion

*Education Exhibits*

Location: NR Community, Learning Center

**Participants**

Dana Lin MD (Presenter): Nothing to Disclose
Daniel S. Chow MD: Nothing to Disclose
Keith Cauley MD, PhD: Nothing to Disclose
Pallavi Sai Utukuri MD: Nothing to Disclose
Christopher G. Filippi MD: Nothing to Disclose
Angela Lignelli-Dipple MD: Nothing to Disclose
**TEACHING POINTS**

Diffusion-weighted MRI has become an indispensable sequence for neuroimaging and is now in widespread use. Although principally used in the evaluation of ischemic injury, other pathologies, including neoplasms, infections, and inflammatory causes, also exhibit characteristic patterns on diffusion. Additionally, new applications including fiber tractography and ADC histogram analysis are now increasingly used clinically. To better utilize diffusion imaging, radiologists must be familiar with the fundamental principles and concepts behind the imaging technique and its limitations or potential pitfalls.

The purpose of this exhibit is to provide
1) a systematic review of the physics behind diffusion imaging
2) an introduction to advanced techniques
3) a case-based review of lesions with restricted diffusion and their differential diagnosis.

**TABLE OF CONTENTS/OUTLINE**

A. Background of diffusion imaging
B. Roadmap to diffusion physics
C. Description of different types of diffusion sequences
D. b-factor, ADC
E. Artifacts that can appear on diffusion imaging
F. Applications of advanced techniques (with emphasis on ADC histogram analysis and tractography)
G. Case-based review of lesions with restricted diffusion and their differential diagnosis

**NRE103**

**Challenges in Diffusion Tensor Tractography (DTT) of the 7-8th Cranial Nerve Complex (CNC) on High-Field MR**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Wen Qi Tan: Nothing to Disclose
- Helmut Rumpel (Presenter): Nothing to Disclose
- Jamie Ho: Nothing to Disclose
- Chooi Sum Yeoh: Nothing to Disclose
- Ling Ling Chan MBBS, FRCR: Nothing to Disclose

**TEACHING POINTS**

DTT of the 7-8th CNC has a potential role in surgical planning and neuro-navigation, and semi-quantitative monitoring of disease and treatment response in various 7-8th cranial nerve (CN) pathologies. Its diminutive size, oblique course, proximity to the skull base and susceptibility of its CSF envelope to vascular pulsations present daunting technical challenges in the DTT of the 7-8th CNC and further discrimination of the 7th from the 8th MN parametrics can be optimized for an appropriate balance of improved in-plane resolution and SNR against prolonged scan time and subject comfort to improve the quality of DTT of the 7-8th CNC.

**TABLE OF CONTENTS/OUTLINE**

Clinical utility of qualitative and quantitative DTT in 7-8th CNC pathologies
Anatomical challenges in DTT of the 7-8th CNC
Procedures to improve the quality of DTT of the 7-8th CNC and to optimize MR parameters will be illustrated, including:
- Matching scan angulation to the natural line of the 7-8th CNC to reduce "broken tract" phenomenon
- Increasing in-plane resolution and reducing slice thickness to improve spatial resolution and reduce partial volume effects
- Improving discrimination of the 7th from the 8th CN Use of diffusion-weighted read-out segmented EPI (DW-rs-EPI) to reduce geometric distortions and susceptibility artefacts inherent in the EPI sequence

**NRE104**

**Cine Phase Contrast CSF Flow Imaging: Basic Physics and Clinical Applications**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Daniel Ariel Krieger MD (Presenter): Nothing to Disclose
- Judah Burns MD: Nothing to Disclose
- Amit M. Saindane MD: Nothing to Disclose
- Nilesh Desai MD: Nothing to Disclose
- John N. Oshinski PhD: Nothing to Disclose
- Daniel Poliak BA: Nothing to Disclose

**TEACHING POINTS**

Cine Phase Contrast imaging is used for the evaluation of CSF flow in a number of pathological states. Compared with the Time-Of-Flight angiographic technique, many trainees and practicing radiologists are less familiar with the physics of Phase Contrast imaging. Understanding the basic physics will assist practitioners in interpreting and optimizing these studies. As CSF flow imaging is performed on a relatively infrequent basis, a review of some common clinical applications and pathological findings will aid practicing radiologists in providing meaningful image interpretation.

**TABLE OF CONTENTS/OUTLINE**

Basic Physics of cine Phase Contrast CSF Flow Imaging
Goals of PC CSF Flow imaging
Gradient effects on phase of flowing spins

**NRE105**

**Clinical Impact of Iterative Model Reconstruction for CT Brain Examinations: Usefulness of Thin-Slice Images for Emergency Neuroradiology**

*Education Exhibits*

*Location: NR Community, Learning Center*
Certificate of Merit

Participants

Takeshi Nakaura MD (Presenter): Nothing to Disclose
Masafumi Kidoh : Nothing to Disclose
Shinichi Tokuyasu RT : Employee, Koninklijke Philips NV
Shouzaburo Uemura : Nothing to Disclose
Kazunori Harada : Nothing to Disclose
Yasuuki Yamashita MD : Consultant, DAIICHI SANKYO Group
Yuji Iyama MD : Nothing to Disclose
Toshinori Hirai MD : Nothing to Disclose
Seitaro Oda MD : Nothing to Disclose

TEACHING POINTS

Image noise is a serious problem in brain CT because of the requirements for good low-contrast resolution. It is difficult to achieve the low-contrast resolution and high-quality brain CT images because general CT reconstruction techniques have a tradeoff between low-contrast detectability and spatial resolution. We aim to explain the utility of iterative model reconstruction (IMR) in brain examinations in emergency neuroradiology. The major teaching points of this exhibit are: 1. IMR reduced image noise and various artifacts, and improved low-contrast detectability in brain CT especially with thin slice images. 2. IMR is a promising technique that satisfies the high demands of low contrast resolution in brain CT at emergency neuroradiology.

TABLE OF CONTENTS/OUTLINE

1) Technical explanation of IMR as compared with filtered back projection (FBP) reconstruction and hybrid iterative reconstruction (HIR). 2) Advantages of virtually noise free images and improvement in low-contrast detectability by IMR for low-contrast examinations as compared with FBP and HIR especially with thin slice images. 3) Clinical images reconstructed with FBP, HIR and IMR from patients with various diseases (brain infarction, hemorrhage, and traumatic injury etc.) will be displayed.

NRE106

Clinical Utility of PET-MRI in Neuroradiology: Basics and Beyond

Education Exhibits
Location: NR Community, Learning Center

Participants

Ammar Ahmed Chaudhry MD (Presenter): Nothing to Disclose
Maryam Gul : Nothing to Disclose
Jared Dunkin MD : Nothing to Disclose
Robert George Peyster MD : Nothing to Disclose
Dinko Franceschi MD : Nothing to Disclose
Robert Matthews MD : Nothing to Disclose
 Lev Bangiyev DO : Nothing to Disclose
Jung Hwoon Edward Yoon MD : Nothing to Disclose

TEACHING POINTS

1- Review physical principles and techniques of PET-MRI (positron emission tomography-magnetic resonance imaging). 2- Discuss clinical utility of using functional information obtained from a PET scan and structural information obtained from MR imaging.

TABLE OF CONTENTS/OUTLINE

Outline: 1. Physical principles and techniques of PET-MRI: review image acquisition and postprocessing 2. Utility of PET-MRI in neuro-oncology: role in initial tumor diagnosis, treatment planning and post-treatment follow-up 3. Role of PET-MRI in evaluation of neurodegenerative and inflammatory conditions (such as Alzheimer’s, MS) 4. Pearls and Pitfalls: Common pitfalls and controversies regarding PET-MRI in neuroradiology. 5. Future of PET-MRI: Discuss current challenges facing PET-MRI in neuroradiology Conclusion: PET-MRI is an emerging hybrid imaging modality offering detailed functional and structural imaging with promising clinical applications especially in the field of neuro-oncology, neurodegenerative and inflammatory CNS conditions. Familiarity with the technical and clinical aspects of PET-MRI along with knowledge of common pearls and pitfalls of PET-MRI will aid in better integration and relevant usage of this modality in clinical practice.

NRE108

Get on Board with the ‘Zapping Neurosurgeon’: Case Based Review of MR –guided Laser Ablation Neurosurgery with Attention to Pre-, Intra- and Post Operative Imaging Appearance

Education Exhibits
Location: NR Community, Learning Center

Participants

Elitsa Clark MD (Presenter): Nothing to Disclose
Steven Kohn MD : Nothing to Disclose
Karen S. Black MD : Nothing to Disclose
Shital Ghandi : Nothing to Disclose
Ashesh Mehta : Nothing to Disclose

TEACHING POINTS

1. To describe the technique of minimally invasive MR-guided laser ablation therapy for brain lesions performed by Neurosurgeons at our institution with emphasis on MR technique used during the procedure. These lesions would have otherwise been treated with open surgery. 2. To describe the various indications for laser ablation at our institution and in the literature. 3. To describe the expected MRI findings during and after treatment. 4. To describe potential complications that the radiologist must be aware of.

TABLE OF CONTENTS/OUTLINE
1. Technique of MR-guided laser ablation with emphasis on role of imaging, including CTA head and MRI. 2. Case Presentations from our institution each describing clinical presentation, rationale for laser ablation therapy, MR findings before, during and after therapy, patient outcome after treatment. Cases include - Epilepsy including Mesial Temporal Sclerosis - Neoplasms including Metastatic disease and Glial Neoplasms - Hypothalamic Hamartoma 3. Summary of institutional experience and literature review with respect to clinical outcomes and complications.

**NRE109**

**Gray Matter Atrophy in Mild Cognitive Impairment (MCI) and Alzheimer's Disease: A Voxel-based Morphometry Study**

_Education Exhibits_
_Location: NR Community, Learning Center_

**Participants**

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<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Naoki Kodama PhD</td>
<td>Presenter</td>
</tr>
<tr>
<td>Yasuhiro Kawase MD</td>
<td>Nothing to Disclose</td>
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**TEACHING POINTS**

The purpose of this exhibit is: 1. To describe cognitive function in patients with mild cognitive impairment (MCI). 2. To explain the voxel-based MR imaging of patients with MCI. 3. To explain the difference in gray matter atrophy of the conversion and non-conversion from MCI to Alzheimer's disease based on 63 cases found in our hospital.

**TABLE OF CONTENTS/OUTLINE**


**NRE110**

**Imaging of Salivary Gland with Novel MR Sequence: Does Double Echo Steady State with Water Excitation (DESSWE) Sequence Improve Diagnostic Interpretations?**

_Education Exhibits_
_Location: NR Community, Learning Center_

**Participants**

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Akifumi Fujita MD</td>
<td>Presenter</td>
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<tr>
<td>Hiroyuki Fuji MD</td>
<td>Nothing to Disclose</td>
</tr>
<tr>
<td>Karen Buch MD</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Anna Yang</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Yukio Kimura MD</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Osamu Sakai MD, PhD</td>
<td>Speaker, Bracco Group Speaker, KORIN Holdings, Inc Speaker, Eisai Co, Ltd</td>
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<tr>
<td>Hideharu Sugimoto MD</td>
<td>Nothing to Disclose</td>
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**TEACHING POINTS**

It is often difficult to visualize peripheral cranial nerves in the head and neck on conventional MRI. Furthermore, MR sialography can only depict T2 high intensity structures. The DESSWE sequence is a new MR imaging technique which can delineate the course of both peripheral cranial nerves and salivary ducts as high intensity structures in the salivary gland regions.

The purpose of this exhibit is:

1. To illustrate the normal anatomy and various pathologies of the salivary glands on a DESSWE sequence.
2. To discuss whether DESSWE sequence will provide us quality diagnostic images for augmentation of diagnostic confidence in salivary gland imaging.

**TABLE OF CONTENTS/OUTLINE**

1. Review the technique and utilization of DESSWE sequence in the head and neck 2. Review of imaging findings of salivary gland pathology using DESSWE - Normal anatomy of intraparotid facial nerve and salivary ducts - Inflammatory conditions: parotitis, Sjogren syndrome, sialodochitis fibrosa, sialolithiasis, etc - Tumors: benign tumors, malignant tumors, facial nerve schwannoma, lymphoepithelial cyst, etc 3. Illustrate the relationship of the intraparotid facial nerve to parotid lesions for preoperative assessment and pre-surgical planning 4. Potential future applications for additional head and neck imaging: trigeminal nerve, perineural spread

**NRE111**

**Integrated PET-MRI for Clinical Epilepsy Patients: How We Do It**

_Education Exhibits_
_Location: NR Community, Learning Center_

**Certificate of Merit**

**Participants**

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Timothy Michael Shepherd MD, PhD</td>
<td>Presenter: Nothing to Disclose</td>
</tr>
<tr>
<td>Kent P. Friedman MD</td>
<td>Speaker, Bayer AG Spreaker, Spectrum Pharmaceuticals, Inc</td>
</tr>
<tr>
<td>Christopher Glielmi PhD</td>
<td>Employee, Siemens AG</td>
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<td>David Duane Faul PhD</td>
<td>Employee, Siemens AG</td>
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<tr>
<td>Kimberly Jackson</td>
<td>Nothing to Disclose</td>
</tr>
<tr>
<td>Yu-Shin Ding PhD</td>
<td>Nothing to Disclose</td>
</tr>
<tr>
<td>Fernando Boada</td>
<td>Nothing to Disclose</td>
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**PURPOSE**

PET-MRI is a recent technologic innovation that has multiple practical advantages for patients and clinicians to obtain rapid, synergistic diagnostic workup of localization-related epilepsy, dementias and other neurologic disorders. PET-MRI also has enormous research potential. We describe our initial experiences integrating this technology into routine clinical care for patients with epilepsy.

**METHOD AND MATERIALS**

Over the past 18 months, we have used a 3-T PET-MRI scanner (Biograph mMR, Siemens Healthcare) for imaging 49 patients with localization-related epilepsy (mean age 34 +/- 18 yrs, range 8-70 yrs). 18F-FDG was administered at the start of the MRI protocol (mean dose 8.6 +/- 2.2 mCi) for dynamic list-mode data acquisition and posthoc creation of static images. Attenuation correction maps are derived from a Dixon MRI sequence. The MRI protocol includes multiplanar diffusion, FLAIR, T2, 3D T1 and double-inversion recovery sequences.

**RESULTS**

Combining PET with MRI for epilepsy workup can benefit patients, referring physicians and diagnostic radiologists. We will show multiple examples where integrated PET-MRI studies has altered diagnosis, prognosis or redirected further workup. Subtle MRI findings often have been ruled in or out based on PET concordance, with several patients going on to surgery based on new PET-MRI findings. Conversely reader PET sensitivity is increased with MRI-directed searches, particularly in the coronal plane.

**CONCLUSION**

Integrated PET-MRI is now the imaging modality of choice for our epilepsy program and exerts a significant impact on patient care. Due to its enormous potential, we stopped using PET-CT in September 2013 and are now using this technology in 6-10 new patients per month.

**CLINICAL RELEVANCE/APPLICATION**

Our initial experiences demonstrate that PET-MRI has enormous potential for clinical workup in patients with localization-related epilepsy.

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**NRE112**

**Many Faces of Intracranial Tuberculoma on 3.0 T MR Spectroscopy: A Pictorial Review**

**Education Exhibits**

Location: NR Community, Learning Center

**Participants**

Ankur Shah MD (Presenter): Nothing to Disclose

Hemant Tribhovandas Patel MD : Nothing to Disclose

Drushi Vatsal Patel MBBS, MD : Nothing to Disclose

Megha Sanghvi MD : Nothing to Disclose

Mrugesh Doctor : Nothing to Disclose

Pooja Chandrakant Manavadaria MBBS : Nothing to Disclose

**TEACHING POINTS**

1. To know the basics of MR Spectroscopy
2. To highlight the techniques of MR spectroscopy
3. To discuss changes in the spectra in intracranial tuberculoma and their differentiation from neoplastic lesions
4. To explain the usefulness of MR spectroscopy in diagnosis, follow-up and management of tuberculoma

**TABLE OF CONTENTS/OUTLINE**

- Background of MR spectroscopy
- Normal MR spectrum and importance of different metabolite peak
- Technique of MR spectroscopy on 3.0 T MR
- Importance of short TE and long TE for demonstration of lipid peak
- Spectroscopy findings in intracranial tuberculoma
- Sample cases with diagnostic queries
- Differentiation of pyogenic abscess and neoplastic lesions from tuberculoma using MR spectroscopy

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**NRE113**

**Multimodal Neuroimaging of Intractable Epilepsy: A Primer and Update**

**Education Exhibits**

Location: NR Community, Learning Center

Certificate of Merit

**Participants**

Tomokazu Nishiguchi MD, PhD (Presenter): Nothing to Disclose

Michiharu Morino MD, PhD : Nothing to Disclose

**TEACHING POINTS**

In the current ILAE classification (2010), epilepsies are not only categorized as dichotomized concepts of 'focal' or 'generalized' seizures. It is recommended that epilepsy and epilepsy syndromes are described accurately according to their semilogic features. Therefore, multimodal neuroimaging plays a pivotal role in the comprehensive evaluation of epilepsy patients. Advances enabling higher spatial resolution, tissue contrast, multiplanar imaging capability, 3D-visualization of neuronal pathways, and fusion imaging can assist with microstructural lesion detection and determination of surgical candidates. Radiologists contribute to patient care through both acknowledging the role of imaging and multidisciplinary communication, with consensus.

**TABLE OF CONTENTS/OUTLINE**

- An algorithmic approach to the evaluation and management of epilepsy patients.
- Illustrations of epileptogenic pathologies and syndromes: (1) hippocampal sclerosis, (2) malformations of cortical development, (3) neoplasms, (4) vascular lesions, (5) ion-channel disorders, (6) metabolic disorders, etc.
- Systematic imaging approach with STIR, 3D-T1WI, DTI, fMRI, FDG-PET, 123I-Iomazenil and 99mTc-ECD SPECT, and magnetic source (MS) imaging.
- Post-processing techniques; pros/cons and diagnostic capabilities of imaging.
- Contributions of imaging to surgery.

**NRE114**

**Multimodality Imaging Assessment of Common Neuropsychiatric Conditions**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

Eduardo Jose Ortiz MD *(Presenter): Nothing to Disclose*
Ana Maria Granados MD : Nothing to Disclose
Juan Felipe Oreguela Zapata BEng : Nothing to Disclose
Cesar Augusto Arango MD : Nothing to Disclose

**TEACHING POINTS**

- Specific findings for every psychiatric condition assessed with RS-fMRI, MRS, DTI and volumetry increase our knowledge and improve characterization of these pathologies.
- Specific patterns of activation of the DMN at rest in different neuropsychiatric conditions and healthy subjects can help us in the diagnosis and understanding of the mechanisms of disease.
- Differences in volumetric brain analysis between psychiatric patients are a reflex of the variable effects according to the pathology and regions affected.

**TABLE OF CONTENTS/OUTLINE**

- Introduction to multimodality imaging: fMRI, MRS, DTI and Volumetry
- Materials and methods
- Findings Schizophrenia Alzheimer’s disease Bipolar disorder Morbid personality Affective Disorder

**NRE115**

**Neuroradiology Applications of Dual Energy CT (DECT)**

*Education Exhibits*

*Location: NR Community, Learning Center*

👑 Cum Laude

**Participants**

Norbert Gilles Joseph Campeau MD *(Presenter): Nothing to Disclose*
Christopher J. Stevens MD : Nothing to Disclose
Alice Cheung Patton MD : Nothing to Disclose
Amy Louise Kotsenas MD : Nothing to Disclose
David R. De Lone MD : Nothing to Disclose
E. Paul Lindell MD : Nothing to Disclose
Shuai Leng PhD : Nothing to Disclose
Cynthia H. McCollough PhD : Research Grant, Siemens AG
Joel Garland Fletcher MD : Grant, Siemens AG

**TEACHING POINTS**

- To review the basic physical principles of DECT techniques and how these can be used to perform material decomposition and pseudo/virtual monochromatic imaging which are the principle tools used for manipulating DECT source images into clinically useful information.
- To illustrate the clinical utility of DECT in neuroradiology with current clinical examples, including virtual non-contrast imaging, bone subtracted CTA of the head/neck and CTV of the brain, evaluation of gout in the cervical spine, and depiction of edema in acute vertebral compression fractures.

**TABLE OF CONTENTS/OUTLINE**

- Physics of Dual Energy CT (DECT)
- Radiologic behavior of materials at different x-ray energies
- Methods for performing DECT
  - Material Decomposition/Differentiation
  - Illustrate how DECT information is processed for specific identification of material
  - Pseudo/Virtual Monochromatic Imaging (P/VM1)
    - May be performed with image-based post processing or raw-data based processing. Can be useful to reduce metal artifacts, and accentuate tissue contrast/iodine contrast enhancement.
  - Clinical Examples
    - Virtual Non Contrast Imaging (hemorrhage, post-angiogram, lipiodol embolus)
    - Bone subtracted head/neck CTA
    - Bone subtracted dual-energy CTV of the brain
    - Evaluation of cervical spine involvement by gout
    - Bone edema associated with acute compression fracture

**NRE116**

**Read out, Segmented, Multi Shot Echo Planar Imaging in Spinal Cord - White Matter Tracts Better "Read out"?**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

Sanjitha Sivasubramanian MBBS, DMRD *(Presenter): Nothing to Disclose*
TEACHING POINTS
1. Read out segmented multi shot Echo Planar Imaging is a high resolution, diffusion weighted imaging protocol which significantly reduces susceptibility and blurring artefacts. 2. Specially suited for smaller regions like spinal cord where the susceptibility artefacts tend to render the images nonreadable. 3. The white matter tracts can be clearly delineated, thus avoiding gray matter inclusion in analysing the diffusion metrics in conditions like cord compression. 4. Exact involvement of the column of the white matter tract (anterior, posterior, central or lateral) can be ascertained, making clinical correlation feasible.

TABLE OF CONTENTS/OUTLINE
Diffusion weighted imaging of spinal cord using 3T MRI - Pearls and pitfalls
Axial vs sagittal Diffusion Tensor Imaging
Susceptibility artefacts Read out , segmented , multi shot Echo Planar Imaging - does it help? Single shot vs Read out multi shot EPI White matter tracts 'read out' - analysis of diffusion tensor metrics more accurate
TEACHING POINTS

1. This pictorial essay focuses on atypical MR imaging features of central nervous system lymphoma, to help radiologists to avoid a delay in the final diagnosis 2. Newer advanced imaging techniques (perfusion, spectroscopy or PET) may potentially aid in the differential diagnosis.

TABLE OF CONTENTS/OUTLINE

Definition of primary central nervous system lymphoma Review of conventional MR-findings: - Common and uncommon features Atypical presentation of primary CNS lymphoma: - angiocentric lymphoma - diffuse leucoecephalopathy - spinal cord lymphoma - meningeal lymphoma Contributions of advanced imaging: perfusion-MR; MR-spectroscopy and PET imaging. Advanced imaging can aid in the early diagnosis of central nervous system lymphoma with atypical features. The high hypermetabolism on FDG-PET, the low cerebral volume on perfusion maps or the intermediate Choline and the high lipids peaks on spectroscopy curves of these lesions are findings that support the suspected clinical diagnosis.

NRE122

The Role of Heavily T2 Weighted 3D Sequences in CNS MR Imaging

Education Exhibits
Location: NR Community, Learning Center

Participants
Rahul Ganapati Hegde MBBS, MD (Presenter): Nothing to Disclose
Chinmay Nagesh MBBS, MD: Nothing to Disclose
Devendra Kulkarni: Nothing to Disclose
Anagha Rajeev Joshi MD, MBBS: Nothing to Disclose
Suleman Adam Merchant MD: Nothing to Disclose

TEACHING POINTS

T2 weighted 3D MRI sequences such as DRIVE, CISS produce maximal contrast between CSF and soft tissue and a three dimensional data set thereby enabling detection of fine structures. They are widely used for imaging cranial nerves in the posterior fossa but they can also be used for diagnosis of many other entities that require a high CSF to soft tissue contrast.

Awareness of the utility of this sequence and its addition to the routine MRI protocol in certain clinical scenarios that we have discussed can be highly rewarding.

TABLE OF CONTENTS/OUTLINE

Briefly discuss the physics behind the acquisition of sequences like CISS and DRIVE. We demonstrate the utility of this sequence with a few cases covering a spectrum of etiologies- extra-axial cystic lesions like arachnoid cysts and epidermoid cysts, intra-axial cystic lesions, trigeminal neuralgia, hemifacial spasm, intraventricular lesions, aqueductal stenosis, traumatic brachial plexus injury and spontaneous CSF rhinorrhea. These cases highlight how the DRIVE/CISS sequence trumps the routine imaging sequences and aids in reaching the diagnosis. We discuss the clinical scenarios in which addition of this sequence to the MRI protocol is advisable.

NRE124

"Little Brain": Evaluation of Sporadic Cerebellar Atrophy

Education Exhibits
Location: NR Community, Learning Center
Certificate of Merit
Selected for RadioGraphics

Participants
Dasha Pechersky MD: Nothing to Disclose
Jamel D. Reid MD (Presenter): Nothing to Disclose
Deborah L. Reede MD: Nothing to Disclose
Steven Pulitzer MD: Nothing to Disclose
Wendy R. K. Smoker MD: Nothing to Disclose

TEACHING POINTS

1. Review the function and normal cerebellar anatomy (gross and imaging) 2. Learn the sporadic causes of cerebellar atrophy and their clinical manifestations 3. Discuss etiologies based on the location of findings in the cerebellum and other associated imaging findings

TABLE OF CONTENTS/OUTLINE

Cerebellar atrophy is often encountered on imaging incidentally or in the evaluation of ataxia. After a discussion of the normal anatomy and function of the cerebellum, cases are presented in a quiz format. Common sporadic causes of cerebellar atrophy, as well as their relevant clinical histories are discussed. Etiologies include alcoholic degeneration, toxicity from medications, paraneoplasia, multiple system atrophy-cerebellar predominant (MSA-C), radiation induced atrophy, gluten sensitivity, crossed cerebellar atrophy and age related atrophy. Cases are organized based on the location of cerebellar atrophy (focal vs. global) and presence of additional associated imaging findings (midbrain, cerebral hemisphere, basal ganglia, and calvarium).

NRE125

Anatomy of Intracranial Arteries and Vascular Territories: Schematic 3D Illustrations and Correlation between CT, MRI and DSA (Cerebral Angiography)

Education Exhibits
Location: NR Community, Learning Center
Participants

Francesco D'Argento MD (Presenter): Nothing to Disclose
Emilano Visconti MD: Nothing to Disclose
Andrea Maria Alexandre MD: Nothing to Disclose
Alessandro Pedicelli MD: Nothing to Disclose
Simona Gualdi MD: Nothing to Disclose
Fabio Pilato: Nothing to Disclose
Emilio Lozupone MD: Nothing to Disclose
Cesare Colosimo MD: Nothing to Disclose

TEACHING POINTS

1) To review the normal anatomy of vascular territories of intracranial arteries with schematic 3D illustrations. 2) To improve the fundamental knowledge about radiologic vascular anatomy of the brain. 3) To improve the CT and MRI diagnostic report of ischemic lesions with a correct cerebral vascular anatomy correlation.

1. To review the normal anatomy of vascular territories of intracranial arteries with schematic 3D illustrations.
2. To improve the fundamental knowledge about radiologic vascular anatomy of the brain.
3. To improve the CT and MRI diagnostic report of ischemic lesions with a correct cerebral vascular anatomy correlation.

TABLE OF CONTENTS/OUTLINE

Normal anatomy of vascular territories and intracranial arteries: schematic 3D pictures compared to DSA, CT, MRI findings. Describe correct vascular territories in ischemic lesions. The cases will be presented in a quiz format. For each case imaging and typical clinical neurological symptoms will be presented. The list of cases includes acute ischemic lesions of: - Internal carotid and Anterior Choroidal artery. - Anterior cerebral artery (proximal and distal branches). - Middle cerebral artery (proximal and distal branches). - Basilar trunk. - Cerebral posterior artery.

NRE126

Are You for Real? Normal Variants That Mimic Pathology on Brain CT and MR

Education Exhibits
Location: NR Community, Learning Center

Participants

Dasha Pechersky MD: Nothing to Disclose
Andrew Cortes MD (Presenter): Nothing to Disclose
Deborah L. Reede MD: Nothing to Disclose
Steven Pulitzer MD: Nothing to Disclose
Wendy R. K. Smoker MD: Nothing to Disclose

TEACHING POINTS

1. After viewing this module the user will be familiar with:
   1. Common normal variants encountered on brain CT and MR
   2. Pathologic entities that mimic these normal variants
   3. Imaging features and clinical history that aid in the differential diagnosis

TABLE OF CONTENTS/OUTLINE

Normal variants encountered on cross sectional imaging of the brain are presented in a quiz format. Variants in the following categories and their pathologic mimics are presented: Parenchymal Variants: Virchow robin spaces (infarction; cystic tumor) and terminal myelination zones (delayed myelination; dysmyelination); Vascular Variants: Arachnoid granulations (dural venous thrombus) and jugular bulb pseudolesions including high riding jugular bulb (paraganglioma, cholesteral granuloma, schwannoma) and Osseous Variants: Asymmetric petrous apex pneumatization (cholesterol granuloma) and venous lakes/transcranial emissary veins (lytic metastasis and multiple myeloma). Imaging and relevant clinical findings that facilitate accurate interpretation are discussed.

NRE127

High Resolution Imaging in Vivo of the Brainstem and Cerebellum at 7T, Focusing on Identification of Normal Anatomy, White Matter Tracts, and Nuclei

Education Exhibits
Location: NR Community, Learning Center

Participants

Bernd Friedrich Daeubler MD (Presenter): Nothing to Disclose
Val Murray Runge MD: Speaker, Bayer AG Speaker, Bracco Group
Michael Wyss: Nothing to Disclose
Mike Bruegger: Nothing to Disclose
Daniel Nanz PhD: Nothing to Disclose
Pinar Oezbay: Nothing to Disclose
Klaas P. Pruessmann: nothing to Disclose
Spyros Sotiros Kollas MD: Nothing to Disclose

TEACHING POINTS

1. High resolution, heavily T1- and T2*-weighted images at 7T provide anatomic recognition of structures in the brainstem and cerebellum not previously possible on MR. 2. Illustration of anatomical detail at 7T facilitates translation of this knowledge to 3T, with potential improvements in diagnosis and correlation of clinical symptoms.

TABLE OF CONTENTS/OUTLINE

Two high-resolution 3D sequences were acquired at 7T (Philips Healthcare), in the axial plane, of the brainstem and cerebellum in each of 24 volunteers, with voxel dimensions of (0.65 mm)x(2.65 mm)x3. The first was a T1-weighted IR MP-RAGE scan, with TI selected to further improve gray-white matter differentiation, TR/TE/TI/flip angle = 120/5/850/7°, iPAT=1.5, 126 Hz BW, 2 NSA, and 15:34 min:sec scan time (this was also acquired in the sagittal plane in 8 volunteers). The second was a T2*-weighted multiecho GRE scan, with subsequent reconstruction of an R2* map. 10 echoes were acquired (TE of 5 to 50), with TR/flip angle = 60/18°, iPAT=2, 580 Hz BW, 1 NSA, and 12:52 min:sec scan time. These data sets were correlated with two anatomic atlases, Duvernoy's Atlas of the Human Brain Stem and Cerebellum and An Atlas of the Basal Ganglia, Brain Stem and Spinal Cord, Based on Myelin-Stained Material. The presentation focuses on identification of brainstem and cerebellar structures thus visualized.
NRE128

Sensori-motor Functional Brain Anatomy Quiz: Test Your Knowledge

Education Exhibits
Location: NR Community, Learning Center
Magna Cum Laude

Participants
John L. Ulmer : Nothing to Disclose
Andrew Paul Klein MD (Presenter): Nothing to Disclose
Leighton P. Mark MD : Nothing to Disclose
Malgorzata Franczak MD : Nothing to Disclose

TEACHING POINTS
1. Identify sulcal landmarks and compare the same across hemispheres to localize functional gyral anatomy of primary sensori-motor, pre-motor, supplementary motor, and secondary somato-sensory systems. 2. Localize functional deficits including basic contralateral weakness and sensory dysfunctions as well as higher order dysfunctions such as apraxia, mutism, acquired stuttering, alien hand syndrome, impaired discriminative sensations, and tactile agnosia.

TABLE OF CONTENTS/OUTLINE
An interactive quiz and discussion format is used to teach localization of sensori-motor functional anatomy. Multiple questions provide choices for the location functional brain substrates and associated deficits, followed by discussions of relevant brain functions and dysfunctions. Cadaver brain images and overlaid illustrations foster a 3-dimensional understanding of cortical functional anatomy and deficit localization. Correlative normal brain MRI promotes a 2-D understanding of sensori-motor functional brain anatomy. Imaging of selected brain lesions illustrates applications in clinical practice.

NRE129

The Cerebellum

Education Exhibits
Location: NR Community, Learning Center

Participants
Mariko Fitzgibbons MD (Presenter): Nothing to Disclose
Noriko Salamon MD : Nothing to Disclose

TEACHING POINTS
1) A review of cerebellar anatomy and function
2) An exploration of cerebellar pathology including congenital malformations, neurodegenerative processes, and neoplasms.

TABLE OF CONTENTS/OUTLINE
Cerebellar anatomy Cerebellar function Cerebellar pathology Congenital malformations--Chiari I malformation, Chiari II malformation, Dandy Walker malformation, Encephalocele Neurodegenerative process--pontocerebellar hypoplasia, multisystem atrophy, spino cerebellar ataxia Neoplasm--hemangioma, vermis metastasis

NRE131

Tracing the Temporoparietal Connections of the Human Brain Using High Resolution Diffusion Tensor Tractography

Education Exhibits
Location: NR Community, Learning Center

Participants
Arash Kamali MD (Presenter): Nothing to Disclose
Siva Prasad Jasti : Nothing to Disclose
ranjitha kancherla MD : Nothing to Disclose
Pavani Adapa MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the anatomy of the temporoparietal white matter pathways. 2. To discuss the relationship of these connections to major adjacent fiber tracts. 3. To explain the utility of MRI and particularly diffusion tensor tractography in visualizing delicate white matter pathways of the brain.

TABLE OF CONTENTS/OUTLINE
Anatomy of the major temporo-parietal fiber bundles. Cortical connections of the temporoparietal white matter tracts and relationship with adjacent major fiber tracts. Review of imaging findings - Diffusion tensor imaging Future directions and summary.

NRE132

Acquired Diseases of the Pons: MRI Appearance, Anatomy, and Differential Considerations

Education Exhibits
Participants

Henry Chow  Chow  DO (Presenter): Nothing to Disclose
Thomas Michael  Cullen  MD : Nothing to Disclose
Jason K.  Lempel  MD : Nothing to Disclose
Jason S.  Vergnani  MD : Nothing to Disclose
Ryan  Crawford  MD : Nothing to Disclose

TEACHING POINTS

- Review the anatomy and vascular supply of the pons
- Elucidate the clinical presentation and features of acquired diseases affecting the pons
- Illustrate and describe the features of pontine pathology on MRI

TABLE OF CONTENTS/OUTLINE

1. Review of pontine histology, structure, and function.

NRE133

Acquired Toxic-metabolic Disorders Affecting the Central Nervous System

Education Exhibits

Location: NR Community, Learning Center

Participants

Diego Jose Leao de  Oliveira  MD : Nothing to Disclose
Rodrigo Sanford  Damasco MO (Presenter): Nothing to Disclose
Tatiana Goyanna  Lyra  MD : Nothing to Disclose
Luis Filipe de Souza  Godoy  MD : Nothing to Disclose
Marcos Fernando de Lima  Docena  MD : Nothing to Disclose
Daniel  Delgado : Nothing to Disclose
Hae W.  Lee  MD : Nothing to Disclose
Maria Martin : Nothing to Disclose
Claudia Da Costa  Leite  MD, PhD : Researcher, Guerbet SA
Giovanni Guido  Cerri  MD, PhD : Nothing to Disclose

TEACHING POINTS

The reader should be able to: List the most common acquired toxic-metabolic conditions that manifest as central nervous system disturbance; Recognize the clinical, laboratory, and imaging findings of these conditions; Perform adequate differential diagnosis for these disorders.

TABLE OF CONTENTS/OUTLINE

Introducing the most common acquired toxic-metabolic disorder and the symptoms and signs that point to a specific disease or narrow the differential diagnosis Presentation of pathophysiology, clinical features, imaging findings and differential diagnosis of specific disorders: Wernicke’s encephalopathy Subacute combined degeneration Osmotic demyelination syndrome Hepatic encephalopathy Hypoglycemia in adults and children Hyperosmolar hyperglycemic state Uremic encephalopathy Drug toxicity: methotrexate Diagnostic algorithm Summary

NRE135

Clinical and Imaging Spectrum of Neonatal Encephalopathy

Education Exhibits

Location: NR Community, Learning Center

Participants

Ruchir  Chaudhari  MD (Presenter): Nothing to Disclose
Peter  Shen  MD : Nothing to Disclose

TEACHING POINTS

1. Review the clinical presentations, risk factors, epidemiology, and diagnostic work-up for the different causes of neonatal encephalopathy . 2. Present normal neonatal brain development especially in regards to the expected sulcation and myelination patterns. 3. Demonstrate the imaging patterns that assist in the diagnosis and future management of these patients.

TABLE OF CONTENTS/OUTLINE

Epidemiology, risk factors, and clinical presentations of different neonatal encephalopathies Neonatal developmental anatomy with emphasis on sulcation and myelination patterns MRI acquisition techniques utilized at our institution to optimize detection of pathology in neonatal encephalopathy Different categories and specific causes of neonatal encephalopathy - Hypoxic ischemic encephalopathy (HIE) o Full term neonatal HIE patterns o Pre-term neonatal HIE patterns - Metabolic encephalopathy o Inborn error metabolism o Acquired metabolic disorders - Infectious encephalitis o Herpes simplex virus encephalitis o Group B streptococci encephalitis - Stroke o Arterial o Venous Review of a series of cases from our institution, which demonstrate the imaging patterns characteristic to the aforementioned categories and specific causes of neonatal encephalopathy Summary

NRE136

Clinical and Radiological Spectrum of Treatment-related Lesions of the Brain: Differentiation and Practical Assessment Using Current Imaging Modalities

Education Exhibits

Location: NR Community, Learning Center
Participants
Matakazu Furukawa MD (Presenter): Nothing to Disclose
Etsushi Iida MD : Nothing to Disclose
Yuko Harada MD : Nothing to Disclose
Takaaki Ueda : Nothing to Disclose
Naofumi Matsunaga MD, PhD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review imaging findings of various spectrum of treatment-related lesions of the brain. 2. To demonstrate the role of current imaging modalities such as MRI and PET-CT in assessing such treatment-related disorders. 3. To highlight the practical imaging assessment, in particular, for the differentiation between post-treatment change from tumor recurrence.

TABLE OF CONTENTS/OUTLINE
This exhibit includes various spectrums of treatment-related disorders. 1. Radiation or chemotherapy to the brain induced disorders such as radiation necrosis, pseudoprogression, secondary tumor, chronic expanding hematoma or cystic formation, and radiation-induced vascular lesion. 2. Operation or intervention related disorders such as hyperperfusion and sinus thrombosis. 3. Treatment to other organs or systemic therapy related disorders such as central pontine myelinolysis, posterior reversible encephalopathy syndrome, and drug-induced leukoencephalopathy. We are presenting: 1. Summary of those clinical symptoms, etiology and outcome 2. Characteristic findings of diagnostic imaging and key points for practical imaging assessments and follow up.

NRE137
Cystic Sellar Lesions: A Case-based Review

Education Exhibits
Location: NR Community, Learning Center

Participants
Hussan Mohammed MD (Presenter): Nothing to Disclose
Sara Elizabeth Kingston BA : Nothing to Disclose
Daniel Scott Treister BS : Nothing to Disclose
Kristina Elizabeth Hoque MD, PhD : Nothing to Disclose
Francesco D'amore MD : Nothing to Disclose
Maryam Mohammadzadeh MD : Nothing to Disclose
Alexander Lerner MD : Nothing to Disclose
Chia-Shang Jason Liu MD, PhD : Nothing to Disclose
Paul E. Kim MD : Nothing to Disclose
Orest Bohdan Boyko MD, PhD : Nothing to Disclose
Eu-Meng Law MBBS : Speakers Bureau, Toshiba Corporation Medical Advisory Board, Bayer AG Medical Advisory Board, Bracco Group Medical Advisory Board, FUJIFILM Holdings Corporation
Mark S. Shiromishi MD : Nothing to Disclose

TEACHING POINTS
Evaluation of the pituitary gland is a frequently faced request. Accurate and thorough scrutiny of the sellar region is critical in neuroradiology practice, as detecting even the tiniest lesion can have a profound clinical impact. The purpose of our exhibit is to expand upon one commonly encountered category of sellar abnormality, the cystic pituitary lesion. We will discuss the defining clinical and imaging characteristics of each of the differential diagnoses using authentic cases from our institution.

TABLE OF CONTENTS/OUTLINE
Review of the anatomy of the sellar region as well as the relevant embryology and physiology of the pituitary gland.
Description of the normal pituitary MRI signal characteristics and the differences that must be kept in mind when special populations, such as newborns and pregnant patients, are imaged.
An illustrative discussion of the differential for cystic/partially cystic pituitary lesions will be presented, including pituitary adenoma, Rathke cleft cyst, craniopharyngioma, arachnoid cyst, epidermoid cyst, and empty sella. The clinical presentations, unique imaging findings, and management options will be highlighted for each diagnosis.
The typical sequences included in a sella MRI protocol, the role of dynamic contrast MRI, and other protocolling pearls will also be discussed.

NRE138
Diagnosis of Dementia with Lewy Bodies (DLB) with Neuroimaging Techniques

Education Exhibits
Location: NR Community, Learning Center

Participants
Kazunari Ishii MD (Presenter): Nothing to Disclose
Chisa Hosokawa MD : Nothing to Disclose
Tomoko Hyodo MD : Nothing to Disclose
Hiroto Takahashi : Nothing to Disclose
Nobuo Kashihagi : Nothing to Disclose
Takamichi Murakami MD, PhD : Nothing to Disclose
Mitsuru Matsuji : Nothing to Disclose
Ryuichiro Ashikaga MD : Nothing to Disclose

TEACHING POINTS
1. To review the pathophysiology of dementia with Lewy bodies (DLB). 2. To learn the characteristic structural and functional image findings of DLB. Structural and functional imaging biomarkers: brain MRI and SPECT/PET functional imaging have an important role in diagnosing DLB. 3. To show representative MRI, Brain perfusion SPECT, MIBG myocardial scintigraphy, dopamine transporter imaging, FDG-PET and PiB PET images of DLB comparing with those of Alzheimer disease (AD). 4. To show interpretation pitfalls in diagnosing DLB by MR, and SPECT/PET images.

TABLE OF CONTENTS/OUTLINE
Review of the anatomy of the brain and the gray and white matter of the cerebral cortex.
Description of the normal brain MRI signal characteristics and the differences that must be kept in mind when special populations, such as newborns and pregnant patients, are imaged.
An illustrative discussion of the differential for dementia with Lewy bodies (DLB) will be presented, including Alzheimer disease (AD), vascular dementia, depression and delirium. The clinical presentations, unique imaging findings, and management options will be highlighted for each diagnosis.
The typical sequences included in a brain MRI protocol, the role of dynamic contrast MRI, and other protocolling pearls will also be discussed.
Pathophysiology of DLB: DLB is the second most common neurodegenerative dementia accompanying Lewy bodies in the brainstem and cerebral cortices, though it is not well recognized by general radiologists. Characteristic findings of DLB: relative preservation of medial temporal lobe structures, occipital hypoperfusion/hypometabolism associated with panietemporal and posterior cingulated hypoperfusion/hypometabolism, low dopamine transporter uptake in the basal ganglia, unnecessary neocortical amyloid deposit and low uptake of MIBG myocardial scintigraphy. Characteristic findings of Alzheimer disease (AD) for discrimination. Present a pictorial essay of DLB and AD on MRI and SPECT/PET images. Illustrate imaging pitfalls resulting from misdiagnosis of DLB and AD.

NRE141

MR Imaging Findings in Young-Onset Dementia (YOD): A Pictorial Review

Education Exhibits
Location: NR Community, Learning Center

Participants
Minako Azuma (Presenter): Nothing to Disclose
Toshinori Hirai MD: Nothing to Disclose
Yasuhiro Iryo: Nothing to Disclose
Mika Kitajima MD: Nothing to Disclose
Yasuyuki Yamashita MD: Consultant, DAIICHI SANKYO Group

TEACHING POINTS
1. Young-onset dementia (YOD), that is dementia diagnosed before 65 years of age, includes a wide variety of diseases. 2. The new entities of YOD including hereditary diffuse leukoencephalopathy with spheroids (HDLS) and neuronal intranuclear inclusion disease (NIID) have been reported. 3. To know the MR imaging characteristics of the brain in patients with YOD is useful for the accurate diagnosis.

TABLE OF CONTENTS/OUTLINE

NRE142

MR Imaging of Autoimmune-mediated Encephalitis and Its Mimickers: A Pictorial Review

Education Exhibits
Location: NR Community, Learning Center

Selected for RadioGraphics

Participants
Akira Higashiyama MD (Presenter): Nothing to Disclose
Yuki Inada: Nothing to Disclose
Seishi Kumano MD: Nothing to Disclose
Mitsuru Matsuki: Nothing to Disclose
Yoshifumi Narumi MD: Nothing to Disclose

TEACHING POINTS
This exhibit will teach attendees about:
1. A variety of autoimmune disorders that cause encephalitis
2. The clinical manifestation, etiology, pathophysiology, and MR imaging features of autoimmune-mediated encephalitis
3. The differential diagnosis of diseases that can mimic autoimmune-mediated encephalitis on MR images

Radiologists should be familiar with the MR imaging findings, clinical manifestations, etiology, and pathophysiology of autoimmune-mediated encephalitis, as timely and correct diagnosis can ensure prompt, appropriate treatment and a better clinical course.

TABLE OF CONTENTS/OUTLINE
We will present the following types of autoimmune-mediated encephalitis in a quiz format, interpret their characteristics, discuss the differential diagnosis of mimickers. Autoimmune-Mediated Encephalitis -Neoplasms: Lung cancer (anti-Hu, anti-VGKC), ovarian cancer (anti-Yo), teratoma (anti-NMDA receptor) -Autoimmune diseases: Type I DM (anti-GAD), Hashimoto's thyroiditis (anti-NAE), relapsing polychondritis (anti-neutral glycosphingolipids), Sjogren's syndrome, SLE -Others: NMO (anti-AQ4), Rasmussen's encephalitis Mimickers -Herpes virus, enterovirus, germinoma, multiple system atrophy, and others

NRE143

MR Imaging of Cranial Nerves in Congenital, Infectious, Neoplastic, Demyelinating and Vascular Pathologies: Iconographic Essay

Education Exhibits
Location: NR Community, Learning Center

Participants
Larissa Kaori Miura MD (Presenter): Nothing to Disclose
Felipe Barbud Pereira do Nascimento MD: Nothing to Disclose
Mariana Dalauca MD: Nothing to Disclose
Marcio Ricardo Taveira Garcia MD: Nothing to Disclose
Mauro Miguel Daniel MD: Nothing to Disclose
Fabiano Reis: Nothing to Disclose
TEACHING POINTS
1. To review anatomy of cranial nerves 2. To correlate clinical and MRI findings in congenital, infectious, neoplastic, demyelinating and vascular pathologies associated to cranial nerves abnormalities.

TABLE OF CONTENTS/OUTLINE

NRE144

MR Imaging of Parkinson's Disease and Atypical Parkinsonian Disorders: A Pictorial Review

Education Exhibits
Location: NR Community, Learning Center

Participants
Biao Huang MD (Presenter): Nothing to Disclose
Wanqun Yang MD : Nothing to Disclose
Hongjun Liu MD : Nothing to Disclose

TEACHING POINTS
1. To review the typical MR imaging appearance of Parkinson's disease(PD) and atypical Parkinsonian disorders(APD). 2. To review the putaminal MR imaging features at various magnetic field strengths in PD and APD. 3. To illustrate the applications of diffusion tensor imaging(DTI) and resting state fMRI in patients with PD and APD.

TABLE OF CONTENTS/OUTLINE
1. Brief overview of conventional MR imaging of PD. 2. Pictorial review of typical MR findings of APD, including multiple system atrophy, progressive supranuclear palsy and corticobasal degeneration .3. Overview of the different diagnostic value of putaminal imaging features on 1.5T and 3.0T MRI for discriminating patients with Parkinsonism-predominant multiple system atrophy(MSA-P) from those with PD. 4. Overview of brain functional connectivity in PD patients measured by resting state fMRI; Pictorial review of the module-specific topological organization, combing with the global topological attributes and regional features of the brain in PD patients. 5. The imaging diagnostic role of diffusion tensor imaging on PD and APD is discussed.

NRE145

MR Spectrum of Corpus Callosal Lesions: A Pictorial Essay

Education Exhibits
Location: NR Community, Learning Center

Participants
Raja Sekaran Kattumannarkudi Ramalingam MBBS (Presenter): Nothing to Disclose
Sravanthi Mantripragada MBBS : Nothing to Disclose
Natesan Chidambaramanathan MD : Nothing to Disclose

TEACHING POINTS
To illustrate the MR features which help in characterisation of corpus callosal lesions
To depict the lesions unique to corpus callosum

TABLE OF CONTENTS/OUTLINE
The corpus callosum is susceptible to a variety of pathological processes, either primary pathologies or lesions arising from adjacent structures. MRI is the modality of choice for evaluation of corpus callosal lesions and on most occasions is specific and obviates the need for any invasive procedures. Here, we present salient MR features of a collection of common and uncommon conditions.Salient MR features like location, extent, signal intensity and contrast enhancement patterns are useful to reach a specific pathological diagnosis . • Lesions occur in specific locations (as illustrated by primary demyelination occurring at the calloso-septal interface, focal edema as a transient splenial lesion, drug toxicity at the posterior body and splenium and changes due to rapid decompression of longstanding hydrocephalus sparing the splenium and lipoma in the pericallosal area) • Lesions exhibit specific signal intensity, extent and contrast enhancement patterns (butterfly pattern of high grade tumors with necrosis or homogenous enhancement, fat signal intensity of lipoma) • Volume of the corpus callosum (reduction in perinatal insult or demyelination), or association with developmental anomalies

NRE147

Neurons under Attack: Autoimmune Mediated Encephalopathy

Education Exhibits
Location: NR Community, Learning Center

Participants
Jay Starkey MD (Presenter): Nothing to Disclose
John Kim MD : Nothing to Disclose
Toshio Moritani MD, PhD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the pathophysiology of Autoimmune Mediated Encephalopathy (AME) 2. To illustrate and discuss the MR imaging findings of various pathological CNS conditions associated with paraneoplastic and nonparaneoplastic disorders 3. To present a systematic approach to aid the radiologist in diagnosis

TABLE OF CONTENTS/OUTLINE
Organize the various imaging presentations of AME into 5 major categories: limbic encephalitis, cerebellar degeneration, striatal encephalitis, brainstem encephalitis, and leukoencephalopathy Show AME cases of commonly associated paraneoplastic antibodies: anti-NMDAR, anti-Yo, and anti-Tr Show cases of non-paraneoplastic encephalopathy: anti-VGKC and Hashimoto's encephalopathy Demonstrate the pathophysiology of different immune mediated diseases Discuss the differential diagnoses of imaging presentations Future directions and summary

NRE148
Neuropsychiatric Systemic Lupus Erythematosus: Spectrum of Imaging Findings

Education Exhibits
Location: NR Community, Learning Center

Participants
Ahmed Abdel Razek MD (Presenter): Nothing to Disclose
Seif Eldein Farag: Nothing to Disclose
Sherif El bassiony: Nothing to Disclose
Reham Shaat: Nothing to Disclose
Marwa Zaky: Nothing to Disclose

TEACHING POINTS
1. To review basic background about neuropsychiatric systemic lupus erythematosus (NPSLE) 2. To review typical and atypical imaging appearance of NPSLE at routine and advanced MR and CT imaging 3. To discuss impact on imaging findings upon patient prognosis, disease activity and response to therapy

TABLE OF CONTENTS/OUTLINE
1-Basic background about NPSLE 2-Methods of examination included routine and advanced MR imaging 3-White matter ischemic changes 4-Imaging appearance of post reversible encephalopathy syndrome in NPSLE 5-Different imaging pattern of Hemorrhagic lesions in NPSLE 6-Imaging of deep venous sinus thrombosis in NPSLE 7-Imaging of rhombencephalitis and Lupoid sclerosis 8-Imaging of intra and extracranial vasculopathy 9-Imaging findings suggestive of antiphospholipid syndrome in SLE 10-Imaging findings suggestive of associated atypical infection and lymphoma 11-MR imaging suggestive of NPSLE in children 12-Diffusion MR imaging findings in NPSLE 13-Metabolic changes at MRS in patients with NPSLE 14-Impact of imaging findings upon patient management 15-Imaging biomarkers denoting disease activity and detect changes in normal appearing white matter. 16-Imaging features helps to differentiate NPSLE of from simulating lesions 17-Conclusion and future directions

NRE149
Neurosarcoidosis: A Great Mimicker!

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Anagha Rajeev Joshi MD, MBBS (Presenter): Nothing to Disclose
Sneha Deshpande MBBS: Nothing to Disclose
Devendra Kulkarni: Nothing to Disclose
Tilak Dedhia: Nothing to Disclose
Jernail Singh Bava: Nothing to Disclose

TEACHING POINTS
• Sarcoidosis is an idiopathic granulomatous disease which affects various organ systems like the Central Nervous System, lungs, bones etc. It can clinically manifest as acute fulminant disorder or as a chronic smouldering disease. Also, it can have subclinical lesions which may later aggravate leading to significant morbidity and even mortality. • Neurosarcoidosis has diverse clinical and radiological manifestations; mimicking various other pathologies. • Hence, every radiologist should have a high index of suspicion and adequate knowledge to accurately diagnose neurosarcoidosis and hence aid in early institution of treatment.

TABLE OF CONTENTS/OUTLINE
• The various clinical and radiological presentations of neurosarcoidosis would be discussed. • Radiological manifestations that would be elaborated are as follows- 1. Dural thickening or mass 2. Leptomeningeal involvement 3. Cranial nerve involvement 4. Enhancing parenchymal lesions 5. Non-enhancing parenchymal lesions 6. Spinal cord and nerve root involvement 7. Hypothalamic-pituitary sarcoidosis • The radiological differentials of neurosarcoidosis would be illustrated with a case-based approach. Clues to differentiate these closely mimicking pathologies would be described.

NRE150
Normal Physiology of Cerebrospinal Fluid and Diseases That Disrupt It: A Case Based Review

Education Exhibits
Location: NR Community, Learning Center

Participants
Garima Agrawal MD (Presenter): Nothing to Disclose
Hilary L. Purdy MD: Nothing to Disclose
Aseem Sharma MBBS: Stockholder, General Electric Company

TEACHING POINTS
The goal of the exhibit is to: 1. Understand the normal physiology of CSF production, absorption and flow dynamics. 2. Discuss pathophysiology of altered CSF dynamics in various pathologies. 3. Understand imaging characteristics that aid in diagnosis and management of various pathologies of altered CSF dynamics.

TABLE OF CONTENTS/OUTLINE

1. CSF production: Normal physiology and case based discussion of CSF over production
2. CSF absorption: Normal physiology, understand Benign extraaxial fluid collection of infancy and case based discussion of dysfunction of absorptive mechanism in processes such as meningitis, subarachnoid hemorrhage, leptomeningeal carcinomatosis and venous hypertension.
3. CSF flow: Physiology, Munro Kelly doctrine, Imaging of flow and case based discussion of pathologies that will include obstructive hydrocephalus which could be intraventricular, fourth ventricular outlet, craniospinal junction (Chiari I and others) or intraspinal obstruction (arachnoid adhesions etc.).
4. CSF leaks and hypovolemia: Case based discussion of various causes of CSF leaks and spectrum of imaging findings that lead to establishing the diagnosis and cause of hypovolemia and guide further management based on imaging findings.

NRE151

Novel Imaging Findings in Two Cases of Biotinidase Deficiency- A Treatable Metabolic Disorder

Education Exhibits
Location: NR Community, Learning Center

Participants
Maya Dattatraya Bhat MD (Presenter): Nothing to Disclose
Chandragil Prasad MBBS, MD : Nothing to Disclose
Parayil Sankaran Bindu MBBS, MD : Nothing to Disclose

TEACHING POINTS

Biotinidase deficiency is an inborn error of metabolism. Many of the clinical and neuroradiological features are reversible with early detection and simple treatment. We report novel MRI features in two patients with profound biotinidase deficiency that have not been reported previously on imaging

TABLE OF CONTENTS/OUTLINE

Two patients aged 8 months and 15 years respectively presented with features suggestive of biotinidase deficiency. Plasma levels of enzymes were low in both patients. MRI brain in first case revealed T2 and FLAIR hyperintensities in both hippocampi (H), parahippocampal gyrus (PHG), posterior limbs of internal capsules and corticospinal tract. Diffusion restriction was seen in the above mentioned areas along with brachium of inferior colliculus (IC), central tegmental tracts (CTT), middle cerebellar peduncles and cerebellar grey and white matter. Brain imaging findings of hyperintensities of H and PHG have not been reported previously. Diffusion restriction of CTT, crus cerebri, cerebellum, H, PHG and IC is a novel observation. MRI spine in second case revealed bilateral symmetrical involvement of anterior, lateral and posterior columns. Selective tract involvement has never been described. Both the patients were treated with oral biotin supplements and recovered considerably. This report emphasizes the importance of imaging in metabolic disorders.

NRE152

Perivascular Space Enhancement: Key Points for Diagnosis

Education Exhibits
Location: NR Community, Learning Center

Participants
Fatma Fatma Ouamer MD (Presenter): Nothing to Disclose
Anne Bertrand MD, PhD : Nothing to Disclose
Delphine Leclercq MD : Nothing to Disclose
Damien Pierre Galanaud MD, PhD : Research Consultant, Olea Medical
Peggy Bienvenot MD : Nothing to Disclose
Sophie Beranger-Gibert : Nothing to Disclose
Didier Dormont MD : Nothing to Disclose

TEACHING POINTS

To recognize an abnormal enhancement of perivascular spaces on MR imaging. To list the different diagnoses related to perivascular space enhancement on MR imaging. To characterize the specific MR appearance of each of these diagnoses.

TABLE OF CONTENTS/OUTLINE

Anatomical and neuropathological considerations Imaging findings and key points Perivascular space enhancement can be recognized as punctate and linear enhancement located along the perforating arteries: within the pons, the basal ganglia and the centrum semi ovale. Possible diagnoses included: Inflammation: Neurosarcoidosis : granulomatous leptomeningitis with predilection for the basal meninges and basal midline structures. Lymphomatoid granulomatosis : multifocal angiocentric lymphoreticular proliferative and granulomatous lesions perivascular space enhancements are associated with patchy hyperintense lesions on T2WI. Erdheim-Chester disease causing osteosclerosis of the facial bone, orbital masses and perilaterial masses. C.I. P.E.R.S. Chronic Lymphocytic Inflammation with Pontine Perivascular Enhancement Responsive to Steroids. CNS vasculitis, angitis granulomatosis. Tumors: CNS lymphoma and glioma. Infections: PML-IRIS and Cryptococcal meningitis-IRIS in the setting of HIV-related immunosuppression: perivascular spaces enhancement suggest inflammatory response, a hallmark of CNS-IRIS.

NRE153

Pituitary Stalk Transection Syndrome: Comparison of Clinico-radiological Features in Adults and Children

Education Exhibits
Location: NR Community, Learning Center

Participants
Chinmay Bhimaji Kulkarni MBBS, MD (Presenter): Nothing to Disclose
TEACHING POINTS

What is pituitary stalk transection syndrome?
To understand the aetio-pathogenesis.
Characteristic MRI features of pituitary stalk transection syndrome.
How does the clinical and MRI feature differ in adults and children?
Impact of newer MRI sequences on pituitary stalk transection syndrome.

TABLE OF CONTENTS/OUTLINE


NRE154

Reversible Cerebral Vasconstriction Syndrome: Etiology, Pathophysiology and Radiographic Review of a Spectrum of Diseases and Their Complications

Education Exhibits
Location: NR Community, Learning Center

Participants
Sana Ali MD (Presenter): Nothing to Disclose
Leah H. Portnow MD : Nothing to Disclose
Anna Derman MD : Nothing to Disclose
Evan Gary Stein MD, PhD : Nothing to Disclose

TEACHING POINTS

1. Review the spectrum of vasoconstrictive diseases which fall under the umbrella of Reversible Cerebral Vasconstriction Syndrome (RCVS) with a discussion of the most common etiologies, the currently understood pathophysiology and the potential complications with a particular focus on Posterior Reversible Encephalopathy Syndrome (PRES). 2. Pictorial case review of RCVS from our collection and a review from the literature. 3. Review of the complications associated with RCVS, including PRES, hemorrhage, and infarction. 4. Recognizing the radiographic appearance and complications of RCVS on anatomic imaging can suggest underlying vascular pathology and lead to angiographic imaging necessary for the diagnosis of RCVS. 5. One explanation for the general etiology of RCVS is failure of the central nervous system vascular autoregulatory system, which may explain its frequent co-existence with PRES.

TABLE OF CONTENTS/OUTLINE

Reversible Cerebral Vasconstriction Syndrome (RCVS)
a. Diagnostic Criteria
b. Etiologies (e.g. pregnancy, substance abuse, catecholamines, etc)
c. Pathophysiology
d. Imaging Appearance
i. CT and CT Angiography
ii. MRI and MR Angiography
iii. Digital substraction angiography
e. Complications and the corresponding imaging appearance
i. Hemorrhage
ii. PRES
iii. Infarct

NRE155

Thunderclap Headache: Imaging of Subarachnoid Hemorrhage and Imitators

Education Exhibits
Location: NR Community, Learning Center

Participants
Elizabeth H. Y. Du BA, BSc (Presenter): Nothing to Disclose
Luck Jan-Luck Louis MD : Nothing to Disclose
Patrick McLaughlin FFR(RCSI) : Nothing to Disclose
Savvas Nicolaou MD : Nothing to Disclose

TEACHING POINTS

-Noncontrast head CT is the initial test of choice within the first 12-24 hours
-DSA remains the gold standard for identifying bleeding source in aneurysmal SAH
-MRI with T2* or FLAIR sequences may distinguish pseudo-SAH from true SAH; timely use of MRI may avoid unnecessary angiographic studies

TABLE OF CONTENTS/OUTLINE

- DDx of thunderclap headache; pathophysiology, clinical presentation (incl. clinical grading scale), DDx of traumatic and nontraumatic true subarachnoid hemorrhage (SAH); sensitivity/specificity of imaging modalities for detection of SAH
- Indications, spectrum of imaging findings with examples, relative utility and practical considerations of imaging modalities used for assessment of traumatic and nontraumatic SAH - Grading system for CT appearance predicting likelihood of SAH-related vasospasm; CT angiography vs. digital substraction angiography (DSA) in evaluating aneurysm location -Imaging approach to and imaging examples of SAH imitators: diffuse cerebral edema, mass lesions e.g. subdural hematoma, severe obstructive hydrocephalus, axonic encephalopathy, infections, unrecognized IV contrast; reversible cerebral vasconstriction syndromes, venous sinus thrombosis, cervical artery dissection, intracranial hypotension, pituitary apoplexy, retroclival hematoma,
**NRE156**

**X-Linked Adrenoleukodystrophy MRI: A Pictorial Essay to Emphasize Unusual Patterns**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Heitor Castelo Branco Rodrigues Alves MD (Presenter): Nothing to Disclose
- Renato Hoffmann Nunes MD: Nothing to Disclose
- Antonio Rocha: Nothing to Disclose
- Lazaro F. Amaral MD: Nothing to Disclose

**TEACHING POINTS**

To review the pathophysiology of X-Linked adrenoleukodystrophy (X-ALD) To review recognizable neuroimaging patterns of X-ALD Emphasizing atypical brain patterns in X-ALD using conventional MRI. Reviewing the role of advanced MR techniques to better comprehend in vivo X-ALD pathophysiology.

**TABLE OF CONTENTS/OUTLINE**

X-Linked adrenoleukodystrophy (X-ALD) is a peroximal disorder that has a wide range of clinical manifestations. Usually, X-ALD presents with bilateral symmetric involvement of the parieto-occipital white matter (WM). However, different MR imaging patterns have been described that do not conform to the typical pattern. Our current aim was to study a selected series of X-ALD patients (n=12) with unusual MR findings to didactically list recognizable features, including topography and Gd-enhancement patterns. Frontal lobe (anterior pattern), exclusive unilateral (infra or supratentorial disease) and also, either diffuse bilateral, posterior or anterior asymmetrical WM lesions were all scrutinized. Advanced MR techniques, including DTI, MTC and MRS, were useful to show involved structures and to detect early T2/FLAIR unsuspected WM involvement. Radiologists must be aware to recognize X-ALD based on both conventional and advanced MR techniques, in its typical or atypical presentations of this rare disease.

**NRE157**

**Brain Asymmetry in Newborns: Radiological Items for a Rational Diagnostic Evaluation. Case Series and Literature Review**

*Education Exhibits*

*Location: NR Community, Learning Center*

*Certificate of Merit*

**Participants**

- Rosalinda Calandrelli (Presenter): Nothing to Disclose
- Gabriella D'Apolito MD: Nothing to Disclose
- Marco Panfili: Nothing to Disclose
- Giuseppe M. Di Lella MD: Nothing to Disclose
- Alessandro Pedicelli MD: Nothing to Disclose
- Tommaso Verdolotti: Nothing to Disclose
- Cesare Colosimo MD: Nothing to Disclose

**TEACHING POINTS**

- To propose a systematic step-by-step approach to guide the correct diagnostic process in children with brain asymmetry, due to atrophy or hyper-growth of one hemisphere compared to the contralateral one.
- To offer some key findings to differentiate the hamartomatous malformations (hemimicroencephaly/ hemimacroencephaly) from the cerebral hemiatrophies (congenital versus acquired), underlying the complementary role of MRI and CT.

**TABLE OF CONTENTS/OUTLINE**

- Introduction to hamartomatous malformations, congenital (Sturge Weber syndrome, Encephalocraniocutaneous Lipomatosis...) and acquired hemiatrophies (trauma, infection, vascular abnormality, ischemic/hemorrhagic insults).
- To illustrate a comprehensive set of MRI and CT key features to help in the diagnosis: 1) Asymmetry of head circumference (hemimacrocrania) or hemimicrocrania); bone abnormalities of the skull. 2) Hemispheres asymmetry. 3) Parenchymal abnormalities: alterations of the cortical development, atrophy of white and gray matter, gyral/ subcortical white matter calcifications. 4) Falx position: midline, shifted. 5) Ventricles size: enlarged, normal, dysmorphic. 6)Choroid plexus: enlarged, normal. 7) Post-contrast enhancement: absent, leptomeningeal, dural. 8) Deep venous occlusion: present, absent. 9) Associated findings: "arachnoid cyst", lipomas.

**NRE158**

**Chronology in Embryology: Review of the Timeline of the Congenital Malformations of Brain**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Siddaroodha Mahantappa Sajjan MBBS (Presenter): Nothing to Disclose
- Zarina Abdul Assis MBBS, MD: Nothing to Disclose
- Sunitha P. Kumaran MBBS, MD: Nothing to Disclose
- Sanjaya Viswamitra MD: Nothing to Disclose

**TEACHING POINTS**

- To educate the reader about embryological development of brain and MRI findings of congenital malformations of the brain.
- To understand the correlation between the stage of development and resultant malformation.

**TABLE OF CONTENTS/OUTLINE**
• Introduction: Congenital anomalies of the brain are extremely complex and are best studied by correlating with embryological development. • Methods: 91 patients scanned between 2008 to 2013 on 1.5T MRI who had congenital malformations of the brain (other than neuro cutaneous syndromes) are presented under the following subheadings based on the stage of developmental defect: 1) Defective dorsal induction (3 - 4 weeks): Chiari I, II and III malformations, cephaloceles. 2) Defective ventral induction (2 - 3 months): Corpus callosum agenesis/dysgenesis, holoprosencephaly, septo optic dysplasia, complete commissural agenesis, Joubert’s syndrome, Dandy Walker complex and cerebellar hypoplasia/dysplasia. 3) Defective cellular migration (3 - 5 months): Agyria--pachygyria complex, heterotopia, polymicrogyria, schizencephaly, Lhermitte - Duclos disease, coronal cleft in the pons.

NRE160
Genetics, Clinical and Neuroimaging Findings in Patients with Mucopolysaccharidoses: What You Really Need to Know

Education Exhibits
Location: NR Community, Learning Center

Participants
Roberta Reichert MD (Presenter): Nothing to Disclose
Lillian Goncalves Campos: Nothing to Disclose
Filippo Vairo: Nothing to Disclose
Carolina Fachinger Moura de Souza: Nothing to Disclose
Juliano Adams Perez MD: Nothing to Disclose
Juliana Duarte: Nothing to Disclose
Fernando Araujo Leina MD: Nothing to Disclose
Leonardo Vedolin MD, PhD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To review the pathophysiology and genetics of mucopolysaccharidoses (MPS) To describe the typical imaging features of different types of MPS, particularly in brain and spine To show illustrative neuroimaging findings in magnetic resonance imaging (MRI),computed tomography (CT) and X-ray of confirmed cases from the Radiology and Genetic Divisions of our hospital

TABLE OF CONTENTS/OUTLINE
• Introduction • Genetics and pathophysiology of MPS • Neuroimaging findings in MPS, particularly in brain and spine - MRI - CT - X-ray • Clinical correlation with imaging features and discussion of physiopathologic mechanisms • Summary and key teaching points

NRE161
Imaging in Medication Refractory Epilepsy: Pearls and Pitfalls

Education Exhibits
Location: NR Community, Learning Center

Participants
Yingming Amy Chen MD (Presenter): Nothing to Disclose
Timo Krings MD, PhD: Nothing to Disclose

TEACHING POINTS
• To review the epidemiology, clinical classification and typical causes for seizures, epilepsy and medication refractory epilepsy (MRE) • To discuss the role of dedicated MRI protocol in the MRE, with useful information on sequence selection and quality factors • To review the common and rare clinical etiologies of MRE, and present imaging pearls differentiating their diagnoses

TABLE OF CONTENTS/OUTLINE
• Definition and Epidemiology of Seizures, Epilepsy, and Medical Refractory Epilepsy (MRE) • Clinical classification of Epilepsy • How to Perform MRI in Epilepsy • Pearls and pitfalls in the imaging of epileptogenic pathologies: - Part 1: mesial temporal sclerosis and malformations of cortical development [ - Part 2: epilepsy-associated neoplasms, neurocutaneous diseases, and other miscellaneous entities (vascular malformations, trauma, infection and inflammation) ] [ • Overview of the role of post-treatment MRI ]

NRE163
Posterior Periventricular Heterotopia: Description and Spectrum of Associate Defects

Education Exhibits
Location: NR Community, Learning Center

Participants
Chawar Hayoun (Presenter): Nothing to Disclose
Ana Alvarez Vazquez: Nothing to Disclose
Mar Jimenez De La Pena: Nothing to Disclose
Manuel Recio Rodriguez: Nothing to Disclose
Ana Fernandez Alfonso: Nothing to Disclose
Vicente Martinez de Vega: Nothing to Disclose

TEACHING POINTS
1- Posterior periventricular heterotopia usually is not an isolated impaired neuronal migration, but it is a distinct complex entity and it is part of a continuous spectrum of cortical malformations, disordered infra-Sylvian development and posterior fossa abnormalities. 2- High-field MRI with specific sequences is essential for a correct diagnosis of these entities.
NRE164

Structural Brain Anomalies Associated with Inborn Errors of Metabolism

Participants
Matt Whitehead MD (Presenter): Nothing to Disclose
Audrey Pichair McCarron : Nothing to Disclose
Andrea Gropman : Nothing to Disclose

TEACHING POINTS
Major teaching points include: 1. Developmental brain defects and inborn errors of metabolism may coexist. Detection of either on imaging studies should prompt a detailed search for the other. 2. Common congenital metabolic disorders with associated structural defects include peroxisomal disease, fatty oxidation defects, dystroglycanopathies, mitochondrial disorders, and amino acidopathies.

NRE166

“The Many Faces of Central Nervous System Tuberculosis: A Great Mimic”

Participants
Jaime Isern MD (Presenter): Nothing to Disclose
Elisenda Grive MD : Nothing to Disclose
Ana Maria Olarte MD : Nothing to Disclose
Anna Maria Gallart Ortuno MD : Nothing to Disclose
Silvia Llaverias MD : Nothing to Disclose
Vicenc Querol Borras : Nothing to Disclose
Sara Grossi : Nothing to Disclose

TEACHING POINTS
1. To illustrate TC and MR imaging spectrum of CNS Tuberculosis. 2. To present a review of magnetic resonance features with special emphasis on the pathogenesis and the relevant clinical settings. 3. To discuss about the differential diagnosis.

NRE167

“Neuromyelitis Optica” Evokes Merely Optic Neuritis and Transverse Myelitis, but Are We Ignoring Brain Lesions?

Participants
Gunes Orman MD (Presenter): Nothing to Disclose
Izlem Izbudak MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the pathophysiology and history of neuromyelitis optica (NMO) 2. To emphasize that majority of NMO patients have brain lesions over the course of the disease and approximately 70% of brain lesions are characteristic for NMO 3. To demonstrate multiple types of brain lesions shown to be characteristic for NMO on brain MRI

NRE168

A Pattern Based Approach to Intracranial Contrast Enhancement on MRI with Clinical and
A Pattern Based Approach to Intracranial Contrast Enhancement on MRI with Clinical and Pathological Correlation: Differentials, Discussion and Diagnostic Challenges

**Education Exhibits**

**Location:** NR Community, Learning Center

**Participants**

Sunitha P Kumaran MBBS, MD (Presenter): Nothing to Disclose  
Zarina Abdul Assis MBBS, MD : Nothing to Disclose  
Sanjaya Viswamitra MD : Nothing to Disclose

**TEACHING POINTS**

To review and categorize the various patterns of intracranial enhancement on MRI with illustrative examples. Learn a pattern recognition algorithm to give appropriate differentials. Learn to correlate the imaging features with clinical and histopathological findings.

**TABLE OF CONTENTS/OUTLINE**

Introduction: Appropriate radiological diagnosis of brain lesions can be made with knowledge of location (cortical, grey-white matter, deep white matter, periventricular or ependymal) and pattern of contrast enhancement. Methods: 15 different contrast enhancement patterns of common and rare pathologies are categorized under the following broad headings: meningeal, parenchymal, cranial nerve and vessel wall enhancement. Meningeal includes lepto and pachymeningeal enhancement. Parenchymal includes gyral, nodular, ring, open ring, onion ring, cyst with mural nodule, diffuse lesional enhancement, satellite lesional enhancement, ependymal enhancement, ependymal enhancement, Swiss-cheese, tree-in-bud and folia pattern of enhancement. Cranial nerve and vessel wall enhancement patterns. We present our institution experience of the above mentioned patterns in a case based algorithm with relevant differentials with supporting clinical findings and histological correlation when available.

NRE169

Central Nervous System Infections in Patients Not Infected with HIV

**Education Exhibits**

**Location:** NR Community, Learning Center

**Participants**

Tomoaki Sasaki (Presenter): Nothing to Disclose  
Keigo Kobayashi : Nothing to Disclose  
Yasuomi Fujimoto : Nothing to Disclose  
Shunta Ishitoya : Nothing to Disclose  
Rie Murata : Nothing to Disclose  
Naofumi Watanabe : Nothing to Disclose  
Toshihiro Yamaki : Nothing to Disclose  
Koji Takahashi MD : Nothing to Disclose  
Masayuki Mineta MD : Nothing to Disclose

**TEACHING POINTS**

A delay of diagnosis for central nervous system (CNS) infection could become fatal. Although CNS infections associated with human immunodeficiency virus (HIV) have been widely reported, diagnosis of CNS infections in patients without HIV, healthy population or immunocompromised host after chemotherapy, might be difficult. The purpose of this exhibit is: 1. To understand pathophysiology of CNS infections 2. To review radiological findings of CNS infections in patients without HIV

**TABLE OF CONTENTS/OUTLINE**

Herpes simplex virus type 1, Cytomegalovirus, Human herpesvirus-6, Subacute sclerosing panencephalitis, Rasmussen encephalitis, Human T-cell lymphotropic virus type 1, Acute disseminated encephalitis, Aspergillosis, Zygomycosis, Cryptococcosis, Creutzfeldt-Jakob disease, Difference with the HIV infected patients, Summary.

NRE170

Central Nervous System Vasculitis and Vasculopathy: Imaging Clues to Differentiate From Demyelinating Disease

**Education Exhibits**

**Location:** NR Community, Learning Center

**Participants**

Javier Villanueva Meyer MD (Presenter): Nothing to Disclose  
Marc Christopher Mabray MD : Nothing to Disclose  
Soonmee Cha MD : Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: To review the etiologies of CNS vasculitis and vasculopathy To illustrate the imaging findings in a variety of CNS vasculitides and vasculopathies To explain the utility of MRI and particularly susceptibility imaging in the diagnosis and differentiation of CNS vasculitis and vasculopathy from demyelinating disease

**TABLE OF CONTENTS/OUTLINE**

- Pathophysiology of CNS vasculitis and vasculopathy
- Review of imaging findings in CNS vasculitis and vasculopathy: Pattern of distribution Susceptibility-weighted imaging Diffusion-weighted imaging Post-contrast enhancement Associated findings related to underlying disease Sample cases and demyelinating disease mimics Summary

NRE171

Diagnostic Criteria of Neurobehcet’s Disease: A Prerequisite for a Proper Management
Education Exhibits
Location: NR Community, Learning Center

Participants
Sahar Saleem MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. To identify neuro-behçet’s disease (NBD) as a preferential target of Behçet’s disease and recognize its vascular and parenchymal sub-types. 2. To review the latest international consensus of the diagnostic criteria of NBD. 3. To discuss the role of MRI (particularly special sequences) in diagnosis and differential diagnosis of NBD.

TABLE OF CONTENTS/OUTLINE
1. Review the pathophysiology, classification, clinical presentations and mimics of NBD. 2. Discuss the latest international consensus criteria for clinical, laboratory, and imaging diagnosis of NBD. 3. Discuss the specificity of the used imaging modalities in diagnosis and follow up of vascular and parenchymal NBD (CT, MRI, conventional angiography, venography) 4. Discuss the common MRI findings in NBD using conventional sequences and the role of advanced sequences such as Diffusion Tensor Imaging, Susceptibility imaging, 3D-FFE, MRA, MRV, and MR spectroscopy. 5. Discuss the differential diagnosis and mimics of NBD including Multiple sclerosis, systemic lupus vasculitis, primary CNS vasculitis, and others.

NRE174
From Tuberculous Meningitis to Localised CNS Tuberculomas-No Boundary to Multifaceted Involvement by Mycobacterium Tuberculosis

Education Exhibits
Location: NR Community, Learning Center

Participants
Shumaila Arooj MBBS (Presenter): Nothing to Disclose
Fatima Mubarak MBBS: Nothing to Disclose
Shayan S.M. Anwar MBBS: Nothing to Disclose

TEACHING POINTS
Caseating granulomas have hypointense T2W solid centre and hypointense T2W rim with ring enhancement on post contrast images. Basilar meningitis most often seen. At times there is enhancement of leptomeninges along superficial sulci. Contrast T1WI show pachymeningitis with dural thickening and enhancement and ventriculitis, vasculitis, choroid plexitis. DWI may show complications including infarct or cerebritis/abscess. Others can be hydrocephalus.

TABLE OF CONTENTS/OUTLINE
Multiple ring enhancing lesions-tuberculomas vs metastasis FLAIR hyperintense signals with Leptomeningeal enhancement-Subarachnoid hemorrhage vs meningitis Basilar Meningeal enhancement in a patient with nonspecific fever-Tuberculosis vs Neurosarcoidosis dural based ring enhancing lesions in an immunocompromised patient-tuberculous involvement vs dural based metastasis Pachymeningitis with dilated ventricular system-complicated tubeculous meningitis vs post hemorrhagic hydrocephalus

NRE175
Imaging Findings in Patients with Natalizumab-related Progressive Multifocal Leukoencephalopathy

Education Exhibits
Location: NR Community, Learning Center

Participants
Jerome Hodel (Presenter): Nothing to Disclose
Olivier Outteryck: Nothing to Disclose
Anne-Laure Bocher toledano MD: Nothing to Disclose
Helene Zephir: Nothing to Disclose
Celine Dubron: Nothing to Disclose
Marc Zins MD: Nothing to Disclose
Jean-Pierre Pruvot: Nothing to Disclose
Patrick Vermersch: Nothing to Disclose
Xavier Leclerc MD, PhD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To describe the key imaging features of Natalizumab associated PML. 2. To explain the utility of brain MRI in the early diagnosis Summary: Natalizumab, an effective treatment in multiple sclerosis, is associated with a risk of PML. Brain MRI plays a major role for the early diagnosis of PML. FLAIR is considered as a reference standard for detecting supratentorial PML lesions while T2w images improve the detection of intra-tentorial lesions and intralesional microcysts. Diffusion may suggest acute demyelination. 3D TSE MR sequences (Cube, GE; SPACE, Siemens; Brainview, Philips) may improve the detection of small PML lesions due to better image contrast and spatial resolution. Specific imaging findings for early PML include: - subcortical location involving U-fibers; - ill defined border toward the white matter; - increased signal intensity on both T2 and diffusion weighted images. Key imaging features of natalizumab-associated PML are: - subcortical U-fibers involvement, - extension to adjacent gray matter, - peripheral small punctuate hyperintense lesions and intra-lesional microcysts (« milky way appearance »)

TABLE OF CONTENTS/OUTLINE
1) MR protocol 2) Pictorial review: imaging features of natalizumab-associated PML 3) Pitfalls and mimics 4) Take home messages

NRE177
Imaging Spectrum of Neurocysterciosis

**Education Exhibits**

Location: NR Community, Learning Center

**Participants**
- Melissa Mei Chen MD (Presenter): Nothing to Disclose
- Wilson Altmeier MD: Nothing to Disclose
- Carlos Bazan MD: Nothing to Disclose
- Erin Flaherty MD: Nothing to Disclose
- David F. Jimenez MD: Nothing to Disclose
- James Henry MD: Nothing to Disclose
- Ameya Jagadish Baxi MBBS, DMRD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is to:
1. To review the pathophysiology of the infection of neurocysterciosis.
2. To discuss the four pathologic stages including vesicular, colloidal vascular, granular nodular and nodular calcified.
3. To demonstrate the wide imaging spectrum and gross appearance of neurocysterciosis, including typical and atypical presentations.

**TABLE OF CONTENTS/OUTLINE**

1. Life cycle of cysterciosis infection with different hosts leading to neurocysterciosis in the human.
2. Overview of the four pathologic stages of the infection with imaging correlation, including a review of the typical, including subarachnoid and ventricular cysts, and atypical imaging findings, which can mimic malignancy.
3. Discussion of the clinical diagnostic criteria for neurocysterciosis, which includes imaging and pathologic findings.
4. Multimodality imaging with pathologic correlation, including intra-operative videos of neurocysterciosis.

NRE178

MR Imaging Spectrum of CNS Manifestations in Dengue

**Education Exhibits**

Location: NR Community, Learning Center

**Participants**
- Tejas Harish Kapadia MBBS (Presenter): Nothing to Disclose
- Yogini Nilkantha Sawant MBBS: Nothing to Disclose
- Darshana Sanghvi MD, MBBS: Nothing to Disclose
- Abhijit A. Raut MD: Nothing to Disclose
- Mihir Munshi: Nothing to Disclose
- Prashant Sadashiv Naphade MBBS, MD: Nothing to Disclose

**TEACHING POINTS**

- Dengue encephalitis is a rare fatal condition caused by flavivirus that is common in endemic areas. • CNS involvement is known complication of dengue fever and shows imaging features of meningoencephalitis, few of them present as stroke or intraparenchymal hemorrhage. • In this exhibit we present complete spectrum of various imaging patterns of CNS involvement in Dengue encephalitis. • MRI features include: Meningeal /parenchymal enhancement, intraparenchymal hemorrhages, chorioretinal hemorrhage etc.

**TABLE OF CONTENTS/OUTLINE**

Clinically verified patients suspected to have dengue encephalitis were subjected for MRI examination with post contrast evaluation.

- Etiopathogenesis of CNS involvement in dengue haemorrhagic fever and dengue shock syndrome.
- Review of imaging features listed in literature.
- Atypical presentations of dengue encephalitis with emphasis on imaging findings of spinal cord involvement

NRE179

Neurocysticercosis of the Spine

**Education Exhibits**

Location: NR Community, Learning Center

**Participants**
- Sara Elizabeth Kingston BA (Presenter): Nothing to Disclose
- Daniel Scott Treister BS: Nothing to Disclose
- Hussan Mohammed MD: Nothing to Disclose
- Kristina Elizabeth Hoque MD, PhD: Nothing to Disclose
- Eu-Meng Law MBBS: Speakers Bureau, Toshiba Corporation Medical Advisory Board, Bayer AG Medical Advisory Board, Bracco Group Medical Advisory Board, FUJIFILM Holdings Corporation
- Francesco D'Amore MD: Nothing to Disclose
- Maryam Mohammadzadeh MD: Nothing to Disclose
- Alexander Lerner MD: Nothing to Disclose
- Chia-Shang Jason Liu MD, PhD: Nothing to Disclose
- John L. Go MD: Nothing to Disclose
- Mark S. Shiroishi MD: Nothing to Disclose

**TEACHING POINTS**
1. To provide an overview of pathophysiology of spinal neurocysticercosis
2. To use imaging modalities to identify various stages of disease progression and to guide management

TABLE OF CONTENTS/OUTLINE
- Epidemiology - Isolated spinal NCC vs. spinal with intracranial NCC - Anatomic locations - Cervical, thoracic, lumbar, lumbosacral - vertebral, extradural, intradural, and intramedullary regions - Migration routes: - Hemopoietic venous route - Ventriculoependymal route - Subarachnoid route - Direct extension from intestinal mucosa to intradural space - Differential diagnosis - Symptomatology - Diagnosis - MRI - CSF ELISA - Biopsy • Complications • Treatment: - Curative vs. Preventative of re-infection/dissemination - Treatment of neurologic complications

NRE180
Neuroimaging Findings in Autoimmune-Mediated Encephalitis

Education Exhibits
Location: NR Community, Learning Center

Participants
Esther De Alencar Araripe Falcao Feitosa MD (Presenter): Nothing to Disclose
Bruno Meira Castro Trindade MD: Nothing to Disclose
Raul Raposo Pereira Feitosa MD: Nothing to Disclose
Mateus Simabukuro MD: Nothing to Disclose
Leandro Tauares Lucato MD: Nothing to Disclose
Luis Henrique Castro MD, PhD: Nothing to Disclose
Maria Martin: Nothing to Disclose

TEACHING POINTS
To review the pathophysiology of autoimmune-mediated encephalitis, as well as the importance of the classification of the antibodies involved.
To discuss the relationship between autoimmune-mediated encephalitis and paraneoplastic syndrome.
To explain the utility of MRI in the diagnosis of autoimmune-mediated encephalitis.
To aid radiologists in the correct diagnosis of this pathology.

TABLE OF CONTENTS/OUTLINE
Pathophysiology of autoimmune-mediated encephalitis.
CNS antibodies-mediated involved.
Relevant clinical manifestations.
Review of imaging findings on MRI.
Sample cases and mimics.
The importance of early diagnosis and good prognosis
Future directions and summary

NRE181
Out of Africa: Advanced Cases of Infectious Diseases in Mozambique

Education Exhibits
Location: NR Community, Learning Center

Participants
Renata Rolim Soares (Presenter): Nothing to Disclose
Maud Mostafa Morshedi MD, PhD: Speaker, Surefire Medical, Inc
Mitchell Gudmundsson MD: Nothing to Disclose

TEACHING POINTS
Mozambique, an underdeveloped country in Southeast Africa, is a nation of 24 million people but with a health expenditure of $35 per capita and a life expectancy of 52.6 years, one of the lowest in the world. The prevalence of infectious disease such as HIV, tuberculosis, and malaria are high and a significant portion of the population does not receive treatment until they present with advanced stages of these and other infectious diseases. Given the limited experience of radiologists in more developed countries with these advanced disease processes, this exhibit reviews the multimodality imaging findings of some of the most common infectious diseases seen at the largest teaching hospital in Mozambique. It is critical for radiologists to be familiar with imaging findings of advanced infectious diseases in order to provide accurate diagnosis and guide treatment.

TABLE OF CONTENTS/OUTLINE
We provide a comprehensive pictorial review of a variety of advanced infectious diseases seen in Mozambique, including central nervous system tuberculosis, spondylodiscitis with multiple abdominal and retroperitoneal collections, disseminated cryptococcosis, neurotoxoplasmosis, cerebral malaria, and viral encephalitis, review their differential diagnoses, and discuss their clinical presentations.

NRE183
Progressive Multifocal Leukoencephalopathy: A Reemerging Beast

Education Exhibits
Location: NR Community, Learning Center

Participants
Arbab Zafar Iqbal MD (Presenter): Nothing to Disclose
Thomas Lostracco MD: Nothing to Disclose
Ali Haikal Hussain MD, FRCR: Nothing to Disclose
TEACHING POINTS

Provide a thorough overview of progressive multifocal leukoencephalopathy. Discuss PML and its specific risk factors including new immune modulating agents like Natalizumab for treatment of MS. Stress the importance of early detection of PML for treatment. Review the imaging appearance of PML in both conventional and advanced imaging modalities including DTI, perfusion, and spectroscopy to help distinguish PML from other related conditions such as PML IRIS and demyelination. After the review, show a series of cases which highlight the most important teaching points.

TABLE OF CONTENTS/OUTLINE

Overview of PML. Discuss the reemergence of PML secondary to treatment of MS. Discuss the treatment of PML. Overview and discussion of the radiological appearance of PML on both conventional and advanced imaging modalities such as DTI, perfusion, and spectroscopy. Review the key imaging findings which distinguish PML from other related conditions using cases to help illustrate the differences.

NRE184

Radiologic Manifestation of Fungal Infections in the Head and Spine

Education Exhibits

Location: NR Community, Learning Center

_selected for RadioGraphics

Participants

Luis Raul Ramos-Duran MD (Presenter): Nothing to Disclose
Tatiana Andrea Chacon-Quesada MD: Nothing to Disclose
Enrique Palacios MD: Nothing to Disclose
Ramón Edgardo Figueroa MD: Nothing to Disclose
Robbie Shoots MD: Nothing to Disclose
Jose Gavito MD: Nothing to Disclose
M Nawar Hakim MD: Nothing to Disclose
Akie Nassim MD: Nothing to Disclose
Roy Riascos MD: Nothing to Disclose
Andrea Corral: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To review the pathophysiology and epidemiology of fungal infections involving the CNS, spine, orbits and paranasal sinuses in the setting of immunocompromised and immunocompetent hosts. 2. To describe the imaging patterns associated with intracranial, spinal, orbital and paranasal sinus fungal infection. 3. To highlight the role of magnetic resonance and computed tomography evaluation in the timely assessment of these diseases.

TABLE OF CONTENTS/OUTLINE

OUTLINE

The increasing incidence of CNS fungal infections, a disease with high morbidity and mortality rates highlights the need for their timely and reliable identification. Although imaging findings alone are often non-specific; recognition of specific imaging patterns when correlated with clinical, epidemiological and laboratory findings, can provide a reliable tool for the accurate diagnosis of fungal infection. TABLE OF CONTENTS

- Epidemiology and pathophysiology of fungal infections
- Imaging patterns described in the setting of fungal infections

NRE185

Spectrum of Imaging Presentation of Central Nervous System Cryptococcal Infection in Immunocompetent and Immunocompromised Patients

Education Exhibits

Location: NR Community, Learning Center

Participants

Stenio Bruno Leal Duarte (Presenter): Nothing to Disclose
Felipe Barjud Pereira do Nascimento MD: Nothing to Disclose
Mariana Mari Oshima: Nothing to Disclose
Joao Amaral Mesquita MD: Nothing to Disclose
Fabiano Reis: Nothing to Disclose

TEACHING POINTS

1. To review the pathophysiology and epidemiology of CNS cryptococcosis. 2. To discuss peculiarities of gatti and neoformans variants. 3. To explain and illustrate the utility of MRI in the diagnosis. 4. Exposure results of a 16-case series

TABLE OF CONTENTS/OUTLINE

- Pathophysiology of CNS cryptococcosis
- Peculiarities of gatti and neoformans variants
- Review of imaging findings of 16 patients (MRI of 14 patients and CT scans of 2 patients) inmunocompetent (7) • Leptomeningeal enhancement (28,57%)
  • Perivascular spaces involvement (42,85%)
  • Cryptococcal granulomas (28,57%)
  • Only hydrocephalus (14,28%)
  • 28,57% had two or three concomitant different imaging findings, 71,42% had one or no radiological finding. immunocompromised (9)
  • Leptomeningeal enhancement (66,67%)
  • Perivascular spaces involvement (33,37%)
  • Cryptococcal granulomas (22,22%)
  • Pachymeningeal enhancement, only hydrocephalus, millitary nodule, plexitis (11,11% each)
  • 55,55% had two or three concomitant different imaging findings, and 11,11% had one or no radiological finding.

NRE186

The Cocci has Moxie: Central Nervous System Coccidioidomycosis and Approach to the Differential

Education Exhibits

Location: NR Community, Learning Center
Certificate of Merit

Participants
Stephanie Channual MD (Presenter): Nothing to Disclose
Jimmy C.S. Huang MD: Nothing to Disclose
Gasser M. Hathout MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is:
1) To provide a pictorial review of the different presentations of Coccidioidomycosis within the central nervous system.
2) To identify imaging pearls to differentiate Coccidioidomycosis from similar-appearing diseases.

TABLE OF CONTENTS/OUTLINE
- Introduction to and pathophysiology of CNS coccidioidomycosis
- Multi-modal imaging review of CNS coccidioidomycosis lesions
- Differential diagnoses to CNS coccidioidomycosis, which include eosinophilic granuloma, lymphoma, sarcoidosis, neurocysticercosis, tuberculosis, and bacterial abscesses
- Approach to the differential
- Summary

NRE187
What Is so Hard about Diffusion Tensor Theory? The Fast and Easy “Tract” to Learning Diffusion Tensor Imaging and Tractography

Education Exhibits
Location: NR Community, Learning Center

Participants
Mariana Coelho Silva (Presenter): Nothing to Disclose
Jeremy Binh Nguyen MD: Nothing to Disclose
Enrique Palacios MD: Nothing to Disclose
Harold Robert Neitzschman MD: Nothing to Disclose
Matthew James Brunner BA: Nothing to Disclose
Mandy Crause Weidenhaft MD: Nothing to Disclose
Quan Ngoc Nguyen: Nothing to Disclose
Montu Patel: Nothing to Disclose
Navid Eghbali: Nothing to Disclose
Erin Werhun: Nothing to Disclose

TEACHING POINTS
1. Describe the physical principle and mathematics of diffusion tensor imaging (DTI). 2. Describe the utilization of DTI data. 3. Explain the principle of tractography. 4. Review the normal anatomy of the fiber tracts of the brain in correlation with tractography.
5. Illustrate the applications of DTI to characterize encephalopathies including stroke, neoplasm, neurodegenerative disorders, congenital anomalies, trauma and demyelinating pathologies.

TABLE OF CONTENTS/OUTLINE
- Physical and mathematical principles of DTI Fiber tract neuroanatomy: Illustrative cases demonstrating the appearance of disease processes in the brain, including stroke, neoplasm, neurodegenerative disorders, congenital anomalies, traumatic brain injury, and demyelinating disease.
- Additional correlative imaging techniques, including FLAIR, T2*GRE, T1 pre- and post-contrast, T2, MRA/MRV, and computed tomography will be utilized as relevant in selected cases. Limitations and future challenges

NRE188
18FDG-PET-CT and MRI at Clinical Presentation of Neurolymphomatosis

Education Exhibits
Location: NR Community, Learning Center

Participants
ERI OUCHI (Presenter): Nothing to Disclose
Toshihiro O’Uchi MD: Nothing to Disclose

TEACHING POINTS
Neurolymphomatosis is a rare clinical entity that is defined as infiltration of the peripheral nervous system by a known or unknown hematological malignancy and is difficult to diagnose. Usefulness of 18 FDG-PET-CT in diagnosing of NL is emphasized in recent case presentations. According to our experience of nine cases of NL which includes four cases of intravascular lymphoma and five cases of DLBCL, combination of MRI with Gd and 18 FDG-PET-CT is useful to demonstrate involvement of NL due to those morphological and functional images. Seven cases out of nine showed abnormal findings both of imaging modality. Primary NL was recognized in three out of five cases of DLBCL. Understanding of clinical symptoms and typical findings of imaging modalities such as 18 FDG-PET-CT and MRI is very important to diagnose NL propery. Ther purpose of this exhibit is:
1. To review neurolymphomatosis, which is a rare entity and usually difficult to diagnose 2. To learn the typical features of NL in 18 FDG-PET-CT and MRI

TABLE OF CONTENTS/OUTLINE
- Epidemiology of Neurolymphomatosis (NL) Pathogenesis of NL Clinical Presentation of NL Apperance of NL - MRI - 18FDG-PET-CT - others

NRE190
Advanced MRI of Diffuse Low Grade Gliomas

Education Exhibits
Location: NR Community, Learning Center
Participants
Ana Alonso-Torres MD (Presenter): Nothing to Disclose
Franziska Charlotte Elisabeth Baudraxler PhD : Nothing to Disclose
Felix Guerra-Gutierrez PhD : Nothing to Disclose
Juan Jesus Gomez-Herrera PhD : Nothing to Disclose
Victor Manuel Suarez-Vega PhD : Nothing to Disclose
Jaime Fernandez Cuadrado : Nothing to Disclose
Pablo De Andres PhD : Nothing to Disclose

TEACHING POINTS
-To Understand how the management of Diffuse Low Grade Gliomas (DLGG) has dramatically changed lately due to the introduction of new surgical techniques, such as intraoperative electrophysiological monitoring, and new chemotherapy agents, and how imaging plays an increasing role in this new scenario.
-To present imaging features of DLGG at advanced MRI, and to show the role of advanced MRI in differential diagnosis, grading, surgical planning and follow-up.

TABLE OF CONTENTS/OUTLINE
I) PRESENTATION - Epidemiology, Clinical presentation, and Histology

NRE191
Benign CNS Neoplasms Showing Restricted Diffusion on DWI- A Radiopathological Correlation Study

Education Exhibits
Location: NR Community, Learning Center

Participants
Zarina Abdul Assis MBBS, MD (Presenter): Nothing to Disclose
Sunita P Kumaran MBBS, MD : Nothing to Disclose
Nandita Ghosal MD : Nothing to Disclose
Sanjaya Viswamitra MD : Nothing to Disclose

TEACHING POINTS
Readers will know the differentials of various benign primary CNS neoplasms demonstrating restricted diffusion on MRI. Readers will better appreciate the correlation between diffusion characteristics and histopathological features.

TABLE OF CONTENTS/OUTLINE
Introduction: Tumours which demonstrate restricted diffusion are commonly thought of as high grade CNS neoplasms. This is presumed due to increased cellularity and high nuclear-cytoplasmic ratio. We present a pictorial exhibit of benign CNS neoplasms showing restricted diffusion. Methods: The following pathologies will be demonstrated in case-wise manner with clinical, MR imaging and histopathological description. Diffusion MRI features will be correlated with histopathological parameters like cellularity, tumor cell morphology, nuclear-cytoplasmic ratio and extra-cellular matrix. • Meningiomas • Pituitary adenoma • Central neurocytoma • Desmoplastic infantile ganglioglioma • Gangliocytoma • Pilomyxoid astrocytoma • Pleomorphic xanthoastrocytoma • Pineocytoma

NRE192
Bevacizumab in Recurrent Glioma: Patterns of Treatment Failure and Complications

Education Exhibits
Location: NR Community, Learning Center
Cum Laude

Participants
Yi Li MD (Presenter): Nothing to Disclose
Saad Shahid Ali MD : Nothing to Disclose
Jennifer Clarke MD, MPH : Nothing to Disclose
Soonmee Cha MD : Nothing to Disclose

TEACHING POINTS
1. Bevacizumab blocks the action of vascular endothelial growth factor, and is used in the treatment of recurrent glioblastoma.
2. Response to Bevacizumab is indicated by marked decrease in enhancement and decrease in vasogenic edema. 3. The purpose of this educational exhibit is to demonstrate four main patterns of Bevacizumab failure described in the literature and associated non-neoplastic complications following therapy. After describing these patterns, we will present cases in quiz format to reinforce the major teaching points.

TABLE OF CONTENTS/OUTLINE
1. Bevacizumab in the treatment of recurrent glioma - Mechanism of action and evidence behind Bevacizumab therapy - Patterns of treatment response 2. Four main patterns of Bevacizumab failure have been identified in the literature - Pattern 1: Local tumor progression with increasing FLAIR abnormality, but without enhancement - Pattern 2: Diffuse tumor infiltration in a gliomatosis-like pattern, with minimal enhancement - Pattern 3: Improvement in local tumor, but development of new distant unifocal or multifocal enhancing tumor - Pattern 4: Continued progression of local or multifocal disease with increase in FLAIR and enhancement 3. Several complications of Bevacizumab therapy have been seen: - Diffusion abnormality: ischemic injury or hypoxic/hypercellular tumor - Hemorrhage

NRE193
Case in the Base: Skull Base Tumors- A Radiological Approach

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Prasanna M MBBS, DMRD (Presenter): Nothing to Disclose
Piyushkumar Chandubhai Pokar: Nothing to Disclose
Zarina Abdul Assis MBBS, MD: Nothing to Disclose
Sunitha P Kumaran MBBS, MD: Nothing to Disclose
Sanjaya Viswamitra MD: Nothing to Disclose

TEACHING POINTS
• Viewer will learn the skull base anatomy. • To highlight the specific imaging characteristics on CT and MRI that will enable the viewer to arrive at an appropriate diagnosis for skull base lesions.

TABLE OF CONTENTS/OUTLINE
• Introduction: CT and MR imaging complement each other and are often used together for complete evaluation of skull base lesions such as preoperative staging of the tumors, planning for surgery and to detect recurrences and follow up. • Methods: A review of 50 histopathologically proven cases involving the skull base (arising from or extending to) from 2011-2013 in our institution are used to demonstrate the variety of skull base lesions. CT and MR imaging appearances of the tumors arising from the skull base and the tumors involving the skull base are discussed along with appropriate differentials whenever necessary. Cases include Rosai dorffman disease, Intradiploic Meningioma, Chondrosarcoma, Fibrous dysplasia, Nasopharyngeal carcinoma, Lymphoma, Schwanomma, Esthesioneuroblastoma, Epidermoid, Parangangioma, Meningioma, Pituitary adenoma, Cranioopharyngioma, Juvenile Nasopharyngeal Angiofibroma.

Dural-based Tumors and Mass-like Lesions: Five Imaging Clues to Diagnose Meningioma Mimics

Education Exhibits
Location: NR Community, Learning Center

Participants
Christopher Jenn Starr MD, PhD (Presenter): Nothing to Disclose
Gregory Edward Punch MD: Nothing to Disclose
Jay Starkey MD: Nothing to Disclose
Soonmee Cha MD: Nothing to Disclose

TEACHING POINTS
- To illustrate five key differential imaging clues which can be extremely helpful in differentiating other dural-based brain masses (i.e., meningioma mimics) from meningiomas. These include: 1) lack of dural tail 2) osseous destruction 3) very dark T2 signal 4) high T2 signal 5) leptomeningeal extension - To illustrate intracranial masses, both benign and malignant, that can closely mimic meningioma on imaging. - To recognize that a high index of suspicion is a must to be able to differentiate meningioma and its mimics for proper surgical and medical management of patients.

TABLE OF CONTENTS/OUTLINE
1) The audience will first be presented with a set of unknown cases and asked to decide whether an unknown mass represent a meningioma or a meningioma mimic. 2) Using a series of example cases, we will then review a general approach to dural-based brain masses and five key imaging signs that can aid in diagnosing a meningioma mimic. 3) Cases include chondrosarcoma, solitary fibrous tumor, plasmacytoma, lymphoma, schwannoma, metastasis, astroblastoma, and empyema. 4) During the final quiz at the end of the module the audience will be asked to use five imaging signs to help pick out meningioma mimics from a series of unknown cases.

Essentials of Glioblastoma: Current Clinical Issues and Imaging Challenges

Education Exhibits
Location: NR Community, Learning Center

Participants
Akira Kunimatsu MD (Presenter): Speakers Bureau, Terumo Corporation
Harushi Mori MD: Nothing to Disclose
Shiori Amemiy MD: Nothing to Disclose
Masaki Katsura MD: Nothing to Disclose
Natsuko Kunimatsu MD: Nothing to Disclose
Kuni Ohtomo MD: Research Grant, Bayer AG Research Grant, DAIICHI SANKYO Group

TEACHING POINTS
The purpose of this exhibit is:
1. To review the current concept on genetic alterations of glioblastoma and relevant imaging biomarkers
2. To understand MR imaging findings of glioblastoma with relation to tumor prognosis
3. To discuss how imaging modalities should be used in pre-operative evaluation and post-treatment follow-up

TABLE OF CONTENTS/OUTLINE
1. Genetics and imaging genomics of glioblastoma
2. Tumor biology of glioblastoma and relevant imaging findings
3. Imaging findings and prognosis
4. Imaging strategies to follow up the evolution pathways from low-grade astrocytoma to glioblastoma
5. Evaluation of treatment response and its pitfalls
6. Detection of tumor recurrence and discrimination from necrosis

### NRE197

**Gliomatosis Cerebri: The Great Misunderstood**

*Education Exhibits*

*Location: NR Community, Learning Center*

#### Participants
- Lina Marcela Cruz Hernandez ARRT (Presenter): Nothing to Disclose
- Isabel Herrera: Nothing to Disclose
- Elena Capilla: Nothing to Disclose
- Raquel Martín Hernández: Nothing to Disclose
- Ximena Aragon Tejada MD: Nothing to Disclose
- Rafael Gonzalez Gutiérrez: Nothing to Disclose
- Paula María Hernandez Guiabert MD: Nothing to Disclose

#### Teaching Points
Gliomatosis cerebri (GC) is a rare diffusely infiltrating usually bilateral glial tumor involving at least 3 lobes. Its etiology is controversial and is classified as neoplasm of unknown histogenesis. The prognosis is generally poor, survival ranges from weeks to years. The imaging appearances of GC may be similar to more common diseases like herpes encephalitis, but the clinical presentations differ. We will be using material from our Neuroradiology Section to illustrate imaging findings and its correlation with clinical and histological features. The purpose of this exhibit is: To review general GC issues To show characteristic imaging findings at computed tomography (CT) and magnetic resonance (MR) and its correlation with microscopic pathology features To explain the utility of MR advanced techniques in the diagnosis and monitoring To illustrate differences between GC and its principal differential diagnosis using sample cases and diagnostic algorithms

#### Table of Contents/Outline
- Epidemiology, natural history and clinical presentation of GC
- Review of imaging findings
  - CT features
  - Traditional MR features
  - Functional imaging findings (Diffusion, perfusion and spectroscopic imaging)
  - Radiopathologic correlation
- Differential Diagnosis
  - Sample cases and diagnostic algorithms

### NRE198

"I Can't See; Could I Have a Pituitary Tumor?:" CT and MRI Findings in Patients with Pituitary Tumor (PT) and Visual Disturbances

*Education Exhibits*

*Location: NR Community, Learning Center*

#### Participants
- Aurymar Fraino (Presenter): Nothing to Disclose
- Jose Federico Ojeda Esparza MD: Nothing to Disclose
- Roberto Correa Soto: Nothing to Disclose
- Teresa Gonzalez De La Huebrá Labrador: Nothing to Disclose
- Percy Alexander Chaparro García: Nothing to Disclose
- Jose Manuel Villanueva Rincon: Nothing to Disclose
- Heidy Saenz Acuna MD: Nothing to Disclose
- Manuel Jesus Uribe Heredia MEd: Nothing to Disclose
- Jose David Albillo Labarra MEd: Nothing to Disclose

#### Teaching Points
To describe the different CT and MRI findings in patients with PT. To correlate the presence of PT with visual disturbances. To point out the importance of MRI images in PT symptomatic patients.

#### Table of Contents/Outline
- Epidemiology of PT.
- To discuss the different etiologies in adults implicated in PT.
- To review of imaging findings:
  - Conventional CT
  - Findings on contrast-enhanced CT
  - Conventional MRI
  - Findings on gadolinium-enhanced MRI
- Sample cases.

### NRE199

Imaging Of CNS Lymphoma and Its Treatment Complications: Typical, Atypical and Bizarre!

*Education Exhibits*

*Location: NR Community, Learning Center*

#### Participants
- Girish Bathla MBBS (Presenter): Nothing to Disclose
- Bruno A. Policeni MD: Nothing to Disclose
- Toshio Moritani MD, PhD: Nothing to Disclose
- Aristides Andres Capizzano MD: Nothing to Disclose
- Manish Bajaj MBBS, MD: Nothing to Disclose
TEACHING POINTS
1) To discuss the spectrum of imaging findings in both primary and secondary CNS lymphoma and revisit useful imaging signs.
2) To briefly review imaging of treatment related neurotoxicity and other CNS complications.

TABLE OF CONTENTS/OUTLINE
Primary CNS lymphoma [PCNSL] accounts for 1-5% of primary brain neoplasms. Given the increasing incidence, it is projected to become the most common primary brain neoplasm over the next decade. PCNSL can have a myriad of appearances although the location, appearance and epidemiology vary between immunocompetent and immunocompromised patients. It may present as a parenchymal, ventricular or meningeal lesion or uncommonly, may mimic infarcts or diffuse parenchymal infiltration. Lymphomatous CNS involvement may also occur in systemic disease, either at initial presentation or during relapse. In the later instance, CNS involvement may antedate or accompany systemic relapse. Treatment related neurotoxicity may occur due to chemotherapeutic and frequently manifests as diffuse or focal white matter changes, volume loss or shunt infection. Understanding of the underlying disease, its imaging and complications are of vital importance to the radiologist to avoid misdiagnosis and potential pitfalls.

NRE200
Imaging Review: Neoplastic and Tumor-like Lesions of the Skull

Education Exhibits
Location: NR Community, Learning Center

Participants
Burke Morin DO (Presenter): Nothing to Disclose
Steven Paul Meyers MD, PhD: Nothing to Disclose

TEACHING POINTS
1. Illustrate characteristic CT and MR imaging features of various neoplastic and tumor-like lesions of the skull.
2. Describe the significant clinical epidemiologic and histopathologic findings associated with each condition.
3. Assist in the development of an appropriate differential diagnosis for skull neoplasms.

TABLE OF CONTENTS/OUTLINE
Specific cases include: Malignant Lesions Metastatic disease, Myeloma, Lymphoma, Leukemia, Chordoma, Chondrosarcoma, Osteosarcoma, Ewing’s Sarcoma and Sinonasal Tumors (Esthesioneuroblastoma, Squamous Cell Carcinoma, Adenoid Cystic Carcinoma). Benign Lesions Meningioma, Osteoma, Glomus Tumor/Paraganglioma, Hemangioma, Giant Cell Tumor, Enchondroma, Osteoblastoma, Osteoid Osteoma and Chondroblastoma. Tumor-like Lesions Eosinophilic Granuloma, Sarcoid, Fibrous Dysplasia, Mucocele, Cholesterol Granuloma, Pseudoaneurysm and Aneurysmal Bone Cyst

NRE203
Multimodality Imaging of Hematologic Neoplasms at Central Nervous System: Can Sound Similar but They Are Not!

Education Exhibits
Location: NR Community, Learning Center

Participants
Lina Marcela Cruz Hernandez ARRT (Presenter): Nothing to Disclose
Isabel Herrera: Nothing to Disclose
Alba Lucia Reyes Ortiz MD: Nothing to Disclose
Elena Capilla: Nothing to Disclose
Rafael Gonzalez Gutierrez: Nothing to Disclose
Ivan Mauricio Vargas Orozco MD: Nothing to Disclose
Ximena Aragon Tejada MD: Nothing to Disclose

TEACHING POINTS
Hematologic neoplasms that affects central nervous system (CNS) includes a broad spectrum of radiological appearances. Lymphoma, myeloma and leukemia can mimic many other pathologies of brain and spine and should be included in the differential diagnosis for almost any lesion in these structures. Knowledge of traditional and advanced imaging techniques and their findings is key to making the diagnosis and follow treatment response. The major teaching points of this exhibit are: To review typical and atypical presentations of CNS hematologic neoplasms at traditional computer tomography (CT) and magnetic resonance imaging (MR) To show characteristic findings with advanced imaging techniques To illustrate differences between CNS hematologic neoplasms and their principal differential diagnosis

TABLE OF CONTENTS/OUTLINE
Lymphoma CT and MR Findings Intracranial Lymphoma Intravascular Lymphoma Ocular and Orbital Lymphoma Spinal Lymphoma Myeloma CT and MR Findings Cranial Affectation Spinal Myeloma Plasmocytoma POEMS Syndrome Leukemia CT and MR Findings Osseous Affectation Meningeal Disease Intravascular Aggregates Choloroma Functional Imaging Findings Diffusion, Perfusion and Spectroscopic Imaging Differential Diagnosis

NRE204
Neuroimaging in Childhood Leukemia and Lymphoma: A Pictorial Review

Education Exhibits
Location: NR Community, Learning Center

Participants
Taner Arpaci (Presenter): Nothing to Disclose
Anil Ozgur: Nothing to Disclose
TEACHING POINTS

To review the neuroimaging findings during childhood leukemia and lymphoma or after the treatments. To discuss the diagnostic approach and differential diagnosis.

TABLE OF CONTENTS/OUTLINE

The neuroimaging features of childhood leukemia and lymphoma have been classified into three main categories. I. Central nervous system findings of primary malignancy -Cerebrovascular disease (Craniospinal hemorrhage, cerebral infarction) -Central nervous system involvement (Infiltration of leptomeninges, bone marrow, orbit, spine) II. Complications of therapeutic procedures -Radiation therapy (White matter disease, cerebral volume loss and hydrocephalus, cryptic vascular malformations) -Chemotherapy and bone marrow transplantation (Dural sinus thrombosis, white matter disease, posterior reversible leukoencephalopathy syndrome) III. Infectious diseases due to immunosuppression -Fungi (Mucormycosis, aspergillus, candida) 

Summary Recent developments in the treatment of pediatric hematologic neoplasms have improved the prognosis but resulted in an increased incidence of neurologic complications. The awareness of the imaging features is essential for early diagnosis and proper treatment of neurologic symptoms to increase survival in pediatric patients with leukemia and lymphoma.

NRE205

New Faces of an Old Foe: Unusual Appearances of Glioblastoma Multiforme on MRI

Participants

Prasanna M MBBS, DMRD (Presenter): Nothing to Disclose
Zarina Abdul Assis MBBS, MD: Nothing to Disclose
Sunitha P Kumarar MBBS, MD: Nothing to Disclose
Nandita Ghosal MD: Nothing to Disclose
Sanjaya Viswamitra MD: Nothing to Disclose

TEACHING POINTS

Viewer will understand the atypical appearances of glioblastoma multiforme (GBM) on MRI along with few usual companion cases. Viewer will learn to assess atypical GBM morphology with pathology grading leading to improved patient management.

TABLE OF CONTENTS/OUTLINE

• Introduction: Atypical GBM's are rare and provide a diagnostic challenge. This exhibit helps to familiarise atypical appearances and location of GBM alongside the classical appearances. • Methods: 25 atypical cases of GBM were obtained from 125 histopathologically proven cases of GBM from year 2010-2013. We present a review of the MR findings, the differentials and histological grades of these atypical cases. Atypical locations included extra axial, intraventricular, posterior third ventricular, posterior fossa. Unusual appearances were purely cystic lesion, cystic lesion with a mural nodule, non enhancing, multifocal, GBM with sub ependymal spread. • Summary: It would be of interest to the viewer that most of the atypical GBM’s with non aggressive appearances on MR imaging turned out to be a Grade IV tumor on histopathology.

NRE206

Opportunistic Infection of Head and Neck: Spectrum of Appearances at CT and MR Imaging

Participants

Ryutarou Uksu MD (Presenter): Nothing to Disclose
Yusuke Inoue MD, PhD: Nothing to Disclose
Takuro Yamane: Nothing to Disclose
Asami Otsuka: Nothing to Disclose
Rie Shimada: Nothing to Disclose

TEACHING POINTS

Patients with immune suppression may present with unusual infectious process of the head and neck. Sinonasal diseases are the most frequent and manifest in up to 60% of immunosuppressed adult patients. Early recognition and timely treatment of these potentially life-threatening disorders are essential. In this exhibit, we review and describe the CT/MR imaging characteristics together with signs and symptoms of the pathologic conditions in the head and neck in immunosuppressed patients. The teaching points of this exhibit are; 1) to know the opportunistic head and neck infections in patients with immunosuppression; 2) to expose radiologists for relatively unusual lesions on CT/MR imaging in order to improve their diagnostic ability.

TABLE OF CONTENTS/OUTLINE

Introduction Case presentation Each case will be presented with a review of clinical signs and symptoms, epidemiology, treatment as well as CT/MR imaging pearls with unique pathological insights. 1) Invasive aspergillosis 2) Aspergillus otomastoiditis 3) Malignant external otitis 4) Tuberculosis lymphadenitis 5) Chronic osteomyelitis of mandible 6) Gingival actinomycosis 7) Venous thrombosis 8) Others Summary

NRE208

Post Therapy Evaluation of Brain Tumors

Education Exhibits

Participants

Jeffrey Ware MD (Presenter): Nothing to Disclose
TEACHING POINTS
Understanding the key concepts of pseudoprogression and pseudoresponse. Specific MRI features that can help differentiate between residual tumor and treatment-related changes. Understanding the Response Assessment in Neuro-Oncology (RANO) criteria.

TABLE OF CONTENTS/OUTLINE

NRE210
Radiologic Findings of Primary Posterior Fossa Brain Tumors in Children

Education Exhibits
Location: NR Community, Learning Center

Participants
Tae Wook Heo (Presenter): Nothing to Disclose
Seul Kee Kim: Nothing to Disclose
Woong Yoon MD: Nothing to Disclose
Heoung-Keun Kang MD: Nothing to Disclose

TEACHING POINTS
1. To review the MRI findings of infratentorial pediatric primary brain tumor
2. To explain the utility of advanced MRI (diffusion-weighted imaging and susceptibility-weighted imaging) in diagnosis
3. To explain the diagnostic flow chart of posterior fossa tumor

TABLE OF CONTENTS/OUTLINE
Overview of pediatric brain tumor - age distribution - tumor locations. Review the MRI findings of the following posterior fossa tumors: Medulloblastoma, Atypical teratoid/rhabdoid tumor, Ependymoma, Pilocytic astrocytoma, Brain stem glioma. Explain the utility of the advanced MRI (DWI and SWI) in diagnosis. Diagnostic flow chart in differential diagnosis of posterior fossa tumors.

NRE212
Response Assessment Criteria in Neuro-Oncology: Past, Present and Future

Education Exhibits
Location: NR Community, Learning Center

Participants
Maria Paramo Alfaro MD (Presenter): Nothing to Disclose
Maite Millor MEd: Nothing to Disclose
Pablo Daniel Dominguez MD: Nothing to Disclose
Romina Zalazar MD: Nothing to Disclose
Maria De Los Reyes Garcia de Eulate: Nothing to Disclose
Jaime Gallego Perez-Larraya: Nothing to Disclose
Jose Luis Zubieta: Nothing to Disclose

TEACHING POINTS
1.- To review the history of response assessment criteria for high-grade Gliomas. 1.1 Macdonald Criteria (1990) 1.2 Response Evaluation Criteria in Solid Tumors (2000) [RECIST] 1.3 RECIST version 1.1 (2009) 2.- To analyze the advantages and limitations of each group of criteria and to compare them. 3.- To explain important modern concepts 3.1 Pseudoprogression 3.2 Pseudoresponse 4.- The Response Assessment in Neuro-oncology working group [RANO] 4.1 RANO vs RECIST

TABLE OF CONTENTS/OUTLINE
History revision of response assessment criteria for high-grade Gliomas. MacDonald RECIST (v 1.0) RECIST (v 1.1) RANO. Differences and changes between them. Important concepts (review of imaging findings and sample cases). Pseudoprogression Pseudoresponse. Future directions and summary.

NRE213
Spectrum of Imaging Findings of Glioblastomas (GBMs): Focused on MR Findings

Education Exhibits
Location: NR Community, Learning Center

Participants
Yutaka Ozaki MD, PhD (Presenter): Nothing to Disclose
Shigeki Aoki MD, PhD: Nothing to Disclose
Maki Amano MD: Nothing to Disclose
Mirei Watanabe: Nothing to Disclose
Masato Hishii MD, PhD: Nothing to Disclose
Kanako Ogura MD, PhD: Nothing to Disclose
TEACHING POINTS
The purpose of this exhibit is: To illustrate the spectrum of imaging findings of GBMs, and to discuss protocol of preoperative examination, especially focused on MR images. To learn common and unusual manifestations; such as infratentorial location, secondary GBM, multifocal GBM, paucity of contrast enhancement, marked cystic degeneration, massive bleedings mimic intracerebral hemorrhage. To learn recent application of advanced techniques to GBM, such as diffusion kurtosis imaging, ASL, and etc. The major teaching points of this exhibit are: Each unusual manifestations of GBM, such as multifocal, secondary, mainly cystic, massive hemorrhage, and poor enhancement visualized in approximately less than 5% of the patients. It is important to make a correct diagnosis of GBM complementary usage of MRS, diffusion, and perfusion imaging.

TABLE OF CONTENTS/OUTLINE
Introduction General aspects of GBM Protocol of MRI for pretreatment of GBM Location of GBM Multifocal GBM Primary vs. secondary GBM Gd enhancement of GBM T2 prolongation and diffusion restriction of GBM Secondary degeneration of GBM MR spectroscopy Diffusion tensor imaging/ DKI and other diffusion MR metrics Perfusion imaging: DSC, ASL and pearmeability 18F-FDG vs. 11C-MET PET

NRE214
Spectrum of Tumors involving Posterior Third Ventricle: Anatomical, Clinical, Radiological and Histopathological Review
Education Exhibits
Location: NR Community, Learning Center

Participants
Sunitha P. Kumaran MBBS, MD (Presenter): Nothing to Disclose
Zarina Abdul Assis MBBS, MD : Nothing to Disclose
Sanjaya Viswamitra MD : Nothing to Disclose

TEACHING POINTS
Understand the anatomy of posterior third ventricular region. Learn the imaging appearances of posterior third ventricular tumors with histopathological correlation. Utilise radiological clues to arrive at the diagnosis.

TABLE OF CONTENTS/OUTLINE
Introduction: Posterior third ventricle and its surrounding region is rich in varied tissue types clustered within a very small area. Common pathologies in this uncommon location and rare pathologies may be found here. Thus, understanding the anatomy of this region and the various lesions that occur here is important in making the correct diagnosis. Methods: Detailed anatomy of posterior third ventricle region will be followed by 20 histologically proven cases from our institutional experience, presented in a case based format with MR imaging. Viewers will be encouraged to deduce the anatomy of origin and specific tissue characteristics when possible in the following common and rare tumors: Pineoblastoma Pineocytoma Pilocytic astrocytoma Pleomorphic xanthoastrocytoma Anaplastic Astrocytoma Pilomyxoid Astrocytoma Glioblastoma multiforme Quadrigeminal plate lipoma Epidermoid Teratoma Germinoma Meningioma Hemangioma Atypical neurocytoma Ependymoma Choroid plexus papilloma Pineal metastasis Fibro-osseous tumor Mixed germ cell tumors

NRE215
The Faces of Intraventricular Neoplasms: Narrowing a Difficult Differential
Education Exhibits
Location: NR Community, Learning Center

Participants
Mark Broadbent MD (Presenter): Nothing to Disclose
Ted Alexander Seltman MD : Nothing to Disclose
Jared Shields BS : Nothing to Disclose
Isaac Wu : Nothing to Disclose

TEACHING POINTS
The differential diagnosis of intraventricular neoplasm is large, and is complicated by significant overlap between the different entities. This exhibit discusses key points from imaging and patient history that allow radiologists to appropriately narrow the differential.

TABLE OF CONTENTS/OUTLINE
Biopsy-proven cases are presented to demonstrate key points that aid in narrowing the differential diagnosis of intraventricular neoplasms. Cases include: 1. Ependymoma 2. Subependymal giant cell tumor 4. Central neurocytoma 5. Choroid plexus neoplasms 6. Intraventricular meningioma 7. Choroid glioma 8. Rosette-forming glioneuronal tumor The presentation ends with key points being reinforced by challenging cases presented as quizzes

NRE216
Third Eye Blind? Pearls for Differentiating Pineal Lesions
Education Exhibits
Location: NR Community, Learning Center

Participants
Robert Joseph Shroyer MD (Presenter): Nothing to Disclose
Ammar Ahmed Chaudhry MD : Nothing to Disclose
Alexander Filatov MD : Nothing to Disclose
Avraham Bluestone MD, PhD : Nothing to Disclose
Robert George Peyster MD : Nothing to Disclose
Lev Bangiyev DO : Nothing to Disclose
TEACHING POINTS

Pineal region pathology is relatively common and has a broad differential diagnosis. A systematic approach is therefore required in narrowing the differential for various pineal lesions. It is important to consider not only the pertinent imaging findings, but also the patient's demographics and available history in order to improve diagnosis accuracy. The purpose of this educational exhibit is to present an algorithmic approach to pineal region lesions with emphasis on patient clinicopathologic findings and imaging features.

TABLE OF CONTENTS/OUTLINE

Using quiz format key differential diagnostic points will be highlighted in the discussion of each case. Systematic review will include following categories and cases: • Germ Cell Tumors - germinoma, teratoma, malignant NOS • Pineal Parenchymal Tumors - pineocytoma, pineoblastoma, pineal parenchymal tumor of intermediate differentiation, trilateral retinoblastoma • Neoplasms of adjacent tussies - tectal glioma, meningioma, Lymphoma • Metastasis • Papillary tumors of the pineal region • Non-neoplastic - pineal cyst, pineal lipoma, arachnoid cyst, epidermoid cyst, neurocysticercosis, cavum velum interpositum

NRE217

Too Late for a Pilocytic Astrocytoma?

Education Exhibits

Location: NR Community, Learning Center

Participants

Joao Maia Jacinto MD (Presenter): Nothing to Disclose
Mariana Goncalves Dias Diogo MD: Nothing to Disclose
Isabel Fragata MD, MSc: Nothing to Disclose
Carla Conceicao MD: Nothing to Disclose
Joao Reis: Nothing to Disclose

TEACHING POINTS

• Astrocytomas are the single largest group of all primary central nervous system (CNS) neoplasms. • They are currently classified according to histological features and the subtypes prevalence differs on peak age. • The pilocytic subtype occurs almost exclusively in children and frequently in the posterior fossa. • Despite the fact that diffuse subtypes are more common in adults and mostly located in the cerebral hemispheres, pilocytic astrocytoma should not be discarded from differential diagnosis, regardless of age or lesion topography.

TABLE OF CONTENTS/OUTLINE

• Review of our prospective database of CNS neoplasms between January and December 2013. • A total of 255 CNS tumors were found, with 10 pilocytic astrocytomas. Of these, 3 were found in adults above 60 years-old. One was infratentorial and the other two were hemispheric. • Clinical data, imagingological findings and pathological features were analyzed.

NRE218

Uncommon and Unusual Lesions of the Pineal Region

Education Exhibits

Location: NR Community, Learning Center

Certificate of Merit

Participants

Gabriela De La Vega Muns MD (Presenter): Nothing to Disclose
Gaurav M. Saigal MBBS: Nothing to Disclose
Rita G. Bhatia MD: Nothing to Disclose

TEACHING POINTS

1. Discuss the differential diagnosis of lesions in the pineal region focusing on uncommon and unusual masses encountered in this region 2. Describe the salient imaging findings of uncommon pineal region lesions 3. Review the literature in regard to CT and MRI findings associated with the pineal region masses discussed

TABLE OF CONTENTS/OUTLINE

Pineal gland region masses present a diagnostic challenge to the radiologist because many of their imaging findings overlap. Furthermore, making the correct diagnosis is important since it may alter surgical approach and subsequent management in some cases. Representative cases for each entity will be presented along with a review of the relevant literature regarding CT, MRI, and, in some cases, PET/CT in order to emphasize the imaging characteristics that help to differentiate them, when possible.

NRE220

Applications of FDG-PET and Arterial Spin Labeling MR Imaging in Quantification of Cerebral Metabolic Activity and Blood Flow in Neurodegenerative Diseases: Comparison of FDG-PET and ASL

Education Exhibits

Location: NR Community, Learning Center

Participants

Sina Houshmand MD (Presenter): Nothing to Disclose
Ali Salavati MD, MPH: Nothing to Disclose
Benjapa Khiewwan: Nothing to Disclose
Thomas J. Werner: Nothing to Disclose
Sudipto Dolui PhD: Nothing to Disclose
Abass Alavi MD: Nothing to Disclose
TEACHING POINTS
To review applications of currently available FDG-PET quantification techniques in assessment of cerebral metabolic activity of Alzheimer's disease patients. To review and compare arterial spin labeled MR imaging with FDG-PET in diagnosis and characterization of Alzheimer's disease.

TABLE OF CONTENTS/OUTLINE
Alzheimer's disease is a neurodegenerative disease associated with alterations in cerebral blood flow (CBF) in different regions of brain. These changes have been well correlated with cerebral metabolism abnormalities using 18F-fluorodeoxyglucose positron emission tomography (FDG PET). Arterial spin labeling (ASL) MRI which utilizes magnetically labeled blood water as a tracer for CBF quantification has shown to be a potential non-invasive biomarker for AD over the last several years. In this review we will discuss applications of these two modalities and compare their characteristic features and potential for diagnosis of AD and its spectrum. 1. FDG-PET i. Pathophysiology of changes in FDG-PET images ii. Pattern of changes iii. Correlation with clinical severity iv. Use as therapeutic endpoint v. Sensitivity and specificity vi. Quantitative methods 2. ASL MRI i. Technical aspects of ASL ii. Regions of hypoperfusion iii. Correlation with PET

NRE221
Approach to Acute Visual Loss

Education Exhibits
Location: NR Community, Learning Center

Participants
Sameer Surendra Soneji DMRD (Presenter): Nothing to Disclose
Ritu Manoj Kakkar MBBS: Nothing to Disclose
Ankit Radhakrishna Bajpai MBBS: Nothing to Disclose
Shrinivas Balaji Desai MD: Nothing to Disclose

TEACHING POINTS
To outline a clinico-radiological approach to acute visual loss.

TABLE OF CONTENTS/OUTLINE
Causes of acute visual loss are optic or neurological. Optic causes are refractive errors and media opacities and do not require cross-sectional imaging. Neurological visual loss assessed by unilateral relative afferent pupillary defect (RAPD) and pattern of visual loss (POVL). RAPD differentiated between prechiasmal and retrochiasmal lesions. Characteristic POVL's are Central scotoma in optic neuritis (ON) Altitudinal defect in anterior ischemic optic neuritis (AION) Bitemporal deficit in chiasmal lesions Peripheral constrictive with enlarged blind spot in papilledema or pseudotumor cerebri Homonymous Incongruous Hemianopia/Homonymous Quadrantanopia/Homonymous Congruous Hemianopia in optic tract and optic radiation lesions. Commonest causes of Optic Neuritis are Demyelination, ADEM, Infectious, inflammatory, compressive and traumatic. Giant cell arteritis is important caused of AION. In Papilledema differential diagnosis to consider are hydrocephalous, masses and venous thrombosis. Sellar and parasellar lesions can compress the chiasma. Optic tract and radiations affection can be seen by vascular causes, tumors, trauma and migraines. Radiological evaluation of acute visual loss with neuro-ophthalmological findings can guide timely emergency management.

NRE222
Be Smart and Know SMART

Education Exhibits
Location: NR Community, Learning Center

Participants
Arbab Zafar Iqbal MD (Presenter): Nothing to Disclose
Mohammed Mohsin Khadir MD: Nothing to Disclose
Ali Haikal Hussain MD, FRCR: Nothing to Disclose

TEACHING POINTS
1) Gain a thorough understanding of this rare, but important condition including presenting symptoms and prognosis. 2) Discuss the radiological manifestations of SMART syndrome and its mimics. 3) Become aware of the proposed diagnostic criteria

TABLE OF CONTENTS/OUTLINE
Background of SMART syndrome Review proposed diagnostic criteria and postulated pathophysiological mechanisms Review of radiological presentations Discussion of differential diagnoses Show cases of SMART syndrome in addition to cases of mimics Summary of SMART syndrome with emphasis on most pertinent take home points

NRE224
Brain Death: Radiologic Signs of a Nonradiologic Diagnosis

Education Exhibits
Location: NR Community, Learning Center

Selected for RadioGraphics

Participants
Joseph Brian Gastala MD (Presenter): Nothing to Disclose
Aristides Andres Capizzano MD: Nothing to Disclose
Patricia A. Kirby: Nothing to Disclose
Toshio Moritani MD, PhD: Nothing to Disclose

TEACHING POINTS
1. Review the clinical findings of brain death
2. Illustrate the multimodal imaging findings of brain death
3. Explain the utility of imaging in the diagnosis of brain death

TABLE OF CONTENTS/OUTLINE

NRE225
Cerebellar Tonsillar Herniation: More than the Chiari Malformation

Education Exhibits
Location: NR Community, Learning Center

Participants
Erik Steckler MD, BS (Presenter): Nothing to Disclose
Ryan David Murtagh MD, MBA: Nothing to Disclose
Robert Andrew Zamore MD: Nothing to Disclose

TEACHING POINTS
1. The reader should understand criteria for cerebellar tonsillar herniation as well as appropriate landmarks and measurement techniques used to confirm presence of herniation. 2. Reader should understand differential diagnosis of cerebellar tonsillar herniation and be aware of relevant imaging findings that can be used to suggest etiology.

TABLE OF CONTENTS/OUTLINE

NRE227
Changes Post Neurosurgery: A Pictorial Review for Residents

Education Exhibits
Location: NR Community, Learning Center

Selected for RadioGraphics

Participants
Luiz Carlos Donoso Scoppetta MD (Presenter): Nothing to Disclose
Fabricius Andre Lyrio Traple MD: Nothing to Disclose
Janaina Johnson MD: Nothing to Disclose
Roberta Stoppato De Carvalho: Nothing to Disclose
Andre de Queiroz Pereira da Silva MD: Nothing to Disclose
Maria Eugenia Durante: Nothing to Disclose
Simone Shibao MD: Nothing to Disclose
Bruno barcelos nobrega MD: Nothing to Disclose

TEACHING POINTS
To review the expected postoperative appearances and complications in neurosurgery. To explain the usefulness of computed tomography and magnetic resonance imaging in diagnosis of each particular post surgical complication.

TABLE OF CONTENTS/OUTLINE
Introduction Review the normal postoperative appearances, as extra cranial soft tissues findings, burr holes, craniotomy, craniectomy, cranioplasty, pneumocephalus and surgical bed appearance. Review the complications like tension pneumocephalus, infection (abscess, empyema, osteomyelitis), hemorrhagic lesions (such as hematomas and remote cerebellar hemorrhage), brain herniation (paradoxical herniation, extra cranial herniation), vascular lesions (arterial occlusion and venous thrombosis) and CSF fistula.

NRE228
Clinical Utility and Pitfalls of Arterial Spin Labeling (ASL) in Depressed Patients

Education Exhibits
Location: NR Community, Learning Center

Participants
Yoko Kaichi (Presenter): Nothing to Disclose
Toru Higaki PhD: Nothing to Disclose
Chihiro Tani MD: Nothing to Disclose
Yuko Nakamura MD: Nothing to Disclose
Fuminari Tatsugami: Nothing to Disclose
Kazuo Awai MD: Research Grant, Toshiba Corporation Research Grant, Hitachi Ltd Research Grant, Bayer AG Research Consultant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd
TEACHING POINTS

1. The clinical utility of ASL, a noninvasive neuroimaging modality, for the objective assessment and differential diagnosis of neuropsychiatric deficits in depressed patients. Although some diseases eliciting depression share neuropsychiatric features, their regional cerebral blood flow (rCBF) distribution is different.
2. Some depressed patients manifest carotid artery stenosis. As the delayed arterial transit effect may result in the retention of labeled arterial blood in the feeders, this must not be misinterpreted as increased rCBF. The presence of extra-axial lesions must be considered.

TABLE OF CONTENTS/OUTLINE

1. Interpretation of ASL in depressed patients - principles of ASL - rCBF distribution in depressed patients
2. Value of ASL for evaluating the severity of depression - correlation between rCBF and depression severity
3. Value of ASL for the differential diagnosis of diseases that may produce depression - comparison of the rCBF distribution in patients with transient hypothyroidism, major depressive disorder, and the controls
4. Value of ASL for predicting the response to antidepressants - comparison of the rCBF distribution in patients with refractory- and responsive depressive disorder
5. Value of ASL for the assessment of cure from depression
6. Diagnostic pitfalls in readings of ASL

NRE229

High Resolution 3D Magnetic Resonance Imaging of the Oculomotor Nerve: Segmental Anatomic and Pathologic Considerations

Education Exhibits
Location: NR Community, Learning Center
Certificate of Merit

Participants
Marinos Kontzialis MD (Presenter): Nothing to Disclose
Asim F. Choudhri MD : Nothing to Disclose
Vivek R. Patel MD : Nothing to Disclose
Prem Subramanian : Nothing to Disclose
Gary Gallia : Nothing to Disclose
Masaru Ishii MD : Nothing to Disclose
Nafi Aygun MD : Nothing to Disclose
Ari Meir Blitz MD : Research Grant, B. Braun Melsungen AG

TEACHING POINTS

1. On imaging the cranial nerves may be generically divided into segments based on the surrounding tissue (and referred to with the abbreviation CN #.segment). This variation in environment poses particular imaging challenges, influences the differential diagnosis and, when applicable, has implications for neurosurgical approach.
2. High-resolution 3D skull base MRI without and with contrast allows for visualization of the oculomotor nerve along much of its course and may increase sensitivity for abnormalities of the oculomotor nerve in regions that were previously challenging to evaluate. For each segment the high resolution anatomy is described along with important considerations for localization on physical examination and relevant pathologic entities.

TABLE OF CONTENTS/OUTLINE

Segmental anatomy of the oculomotor nerve: -Nuclear (CN III.a) -Parenchymal fascicular (CN III.b) -Cisternal (CN III.c) -Dural cave (CN III.d) -Interdural (CN III.e) -Foraminal (CN III.f) -Extraforaminal (CN III.g). In this scientific exhibit, we share our experience to date with high resolution imaging of the anatomic segments of the oculomotor nerve and review pathologic conditions relevant to each segment along with important considerations for localization on physical examination.

NRE230

How Do Stalks Wither? – An Interactive Case Series on Bilateral Middle Cerebellar Peduncle Abnormalities

Education Exhibits
Location: NR Community, Learning Center

Participants
Yin Jie Chen MD (Presenter): Nothing to Disclose
Arastoo Vossough MD, PhD : Nothing to Disclose
Laurie A. Loevner MD : Nothing to Disclose
Farbod Nasseri MD : Nothing to Disclose
Suyash Mohan MD : Nothing to Disclose

TEACHING POINTS

1. Review the anatomy of middle cerebellar peduncles (MCP) and associated fiber tracts
2. Discuss how to characterize bilateral MCP lesions in narrowing the differential diagnoses
3. Present an interactive case series on bilateral MCP lesions to improve diagnostic accuracy of radiologists

TABLE OF CONTENTS/OUTLINE

1. MCP - anatomy, vascular supply, and associated fiber tracts
2. Interactive case series with relevant clinical data and key differential diagnostic features
A. Neurodegenerative
   - Sporadic olivopontocerebellar atrophy
   - Parkinson-plus syndromes
   - Spinocerebellar ataxia
   - Fragile X-associated tremor/ataxia syndrome
B. Metabolic
   - Adrenoleukodystrophy
   - Hepatic encephalopathy
   - Extra-pontine myelinolysis
   - Hypoglycemia
C. Cerebrovascular
   - Infarction
### NRE232

**Hypointensities in the Brain on T2* Weighted Gradient Echo MR Imaging: What Radiologist Should Know**

**Education Exhibits**  
Location: NR Community, Learning Center

#### Participants

Claudio Lagana, MD (Presenter): Nothing to Disclose  
Luis Fernández, Fresno: Nothing to Disclose

#### TEACHING POINTS

The purpose of this exhibit is: Investigate the meaning of the images punctuate of low signal ("black dots") on magnetic susceptibility sequences. Consider the differential diagnosis of the various causes of cerebral microbleeds, illustrating all with images collected during assistencial activity developed in our center.

#### TABLE OF CONTENTS/OUTLINE

"Hot spots" in the sequence T2 * and currently the most modern magnetic susceptibility sequences are hypointense lesions less than half centimeter of diamtero, that go unnoticed in other MR sequences. These images are derived from a ferromagnetic artifact produced by accumulation of hemosiderin inside macrophages after microhemorrhages. Causes of "black dots" produced by micro bleeds are:  
- Congofila or amyloid angiopathy.  
- Hypertensive angiopathy.  
- Multiple cavernous.  
- Diffuse axonal-injury.  
- Hemorrhagic micrometastasis.  
- Microembolisms metal originators from artificial heart valves.  
- Vasculitis - CADASIL.  
With magnetic susceptibility sequences we identify "black spots" not visible in other sequences. Considering its distribution, morphology, other MRI findings and the clinical context of the patient, we can guide a differential diagnosis between various pathologies that may determine it.

### NRE234

**Imaging of the Ventricular Shunts: Normal Findings and Complications**

**Education Exhibits**  
Location: NR Community, Learning Center

#### Participants

Maria Del Pilar Sanchez-Camacho Gonzalez-Carrato, MD (Presenter): Nothing to Disclose  
Isabel Herrera: Nothing to Disclose  
Elena Capilla: Nothing to Disclose  
Manuel Amosa: Nothing to Disclose  
Rafael Gonzalez Gutierrez: Nothing to Disclose

#### TEACHING POINTS

1. To review the normal findings and intra-extracranial complications after hydrocephalus treatment by ventricular shunt  
2. To learn the normal imaging findings and intra-extracranial complications after ventricular shunt placement with computed tomography (CT), magnetic resonance imaging (MRI), digital radiography (DR), abdominal ultrasound (AU) and transfontanelar ultrasound (TU)

#### TABLE OF CONTENTS/OUTLINE

We retrospectively reviewed the ventricular shunt procedures performed at our center from October 2012 to January 2014, analyzing postprocedural normal imaging findings and complications. Postoperative control was carried out with CT, MRI, DR, AU and/or TU. Out of overall 614 neurosurgical procedures, 206 were ventricular shunt placements. Postoperative complications were observed in 72 (34.95%) of them:  
- Intra cranial complications (65 - 90.28% -): - 19 infections, - 16 shunt obstructions, - 11 pericatheter or intraventricular bleedings, - 11 overshuntings, - 4 misplacements into brain parenchyma, - isolated cases of ventricular loculation, corpus callosum edema, cerebral venous thrombosis and paradoxical herniation.  
- Extracranial complications (7 - 9.72% -): - 2 abdominal pseudocysts, - isolated cases of intestinal perforation, peritoneal fibrosis, distal catheter misplacement, broken shunt and atrial thrombosis.

### NRE235

**Imaging Review: Non-neoplastic Skull Abnormalities**

**Education Exhibits**  
Location: NR Community, Learning Center

#### Participants

Burke Morin, DO (Presenter): Nothing to Disclose
TEACHING POINTS

1. Give an overview of non-neoplastic conditions that affect the skull, to include congenital, developmental, hematologic, metabolic, genetic and inflammatory causes.

2. Provide a description of characteristic imaging findings illustrated with CT and MRI.

3. Describe significant clinical epidemiologic and histopathologic findings associated with each condition.

TABLE OF CONTENTS/OUTLINE

Examples include: Congenital Meningoceles, Meningoencephaloceles and Atretic cephaloceles (e.g. Nasal glioma, Dermoid/Epidermoid, Neurenteric cyst, Sinus pericranii, Parietal foramina). Developmental Microcephaly (e.g. Hypoxic ischemic injury, TORCH, Trisomies 13 and 21). Macrocephaly (e.g. Alexander, Canavan, Megalencephalic Leukodystrophy with subcortical cysts, Hydrocephalus), Cranial Asymmetry (e.g. Craniosynostosis, Apert, Crouzon, Cleidocranial dysostosis, Achondroplasia). Hematologic Sickle cell disease, Thalassemia and Leukemia. Metabolic/Genetic Osteogenesis imperfecta, Achondrogenesis, Hypophosphatasia, Menkes syndrome, Osteopetrosis, Oxalosis, Hyperparathyroidism, Hyperphosphatemic rickets, Paget’s disease. Inflammatory Osteomyelitis, Sarcoid, Eosinophilic granuloma, Erdheim Chester disease, Sinusitis, Potts puffy tumor and Mastoiditis.

NRE236

Intracranial Hypotension: A Clinical Conundrum

Education Exhibits

Location: NR Community, Learning Center

Participants

Mustafa Al Roubaie MD (Presenter): Nothing to Disclose
David Borukhov MD: Nothing to Disclose
Adam Evans MD: Nothing to Disclose

TEACHING POINTS

The purpose of this educational exhibit is to: 1. Review the clinical presentation of patients with intracranial hypotension, which is often confusing. Intracranial hypotension can masquerade as intracranial hypertension due to the presence of subdural hematomas, and this may have grave consequences since management is considerably different. 2. Review imaging findings of intracranial hypotension.

TABLE OF CONTENTS/OUTLINE

1. Intracranial Hypotension.
   a. Etiology, pathophysiology and clinical presentation.
   b. Imaging findings and other work-up.
   c. Treatment.
2. Sample Cases.

NRE237

Is Magnetoencephalography for Radiologists? Yes!

Education Exhibits

Location: NR Community, Learning Center

Certificate of Merit

Participants

Judith Ann Gadde DO (Presenter): Nothing to Disclose
William C. Gaetz PhD: Nothing to Disclose
Timothy Roberts PhD: Nothing to Disclose
Erin Simon Schwartz MD: Nothing to Disclose

TEACHING POINTS

1. To increase awareness of the technique and utility of magnetoencephalography (MEG), particularly in the settings of intractable epilepsy and presurgical functional mapping. 2. To emphasize the unique role that Radiologists can play in integrating multimodal imaging for MEG patients.

TABLE OF CONTENTS/OUTLINE

1. Brief introduction to MEG, including a review of current techniques, clinical indications, and relevant literature. 2. Correlation of MEG, MRI, electroencephalography (EEG), and clinical findings in patients with intractable epilepsy, including demonstration of the valuable contributions of MEG data in presurgical evaluation and planning. 3. Correlation of MEG findings with histopathology and clinical outcome from surgical resection in intractable epilepsy.

NRE239

Like a Hole in the Head: An Anatomical Approach to Calvarial Lesions

Education Exhibits

Location: NR Community, Learning Center

Certificate of Merit
Participants
Amar P. Patel MD (Presenter): Nothing to Disclose
Thomas P. Madaeli MD: Nothing to Disclose
James W. Berger MD: Nothing to Disclose
Matthew Shawn Parsons MD: Nothing to Disclose

TEACHING POINTS
1. Understand cross sectional calvarial anatomy
2. Recognize the characteristic imaging findings of various calvarial lesions
3. Use location, key imaging features, and radiological pearls to accurately diagnose calvarial lesions

TABLE OF CONTENTS/OUTLINE
1. Review cross sectional calvarial anatomy categorized into the outer table, diploic space, and inner table 2. Case-based presentation with emphasis on the location and distinguishing imaging features of the following benign and malignant calvarial lesions: - Outer Table: Parietal thinning, Osteoma, Emissary vein - Diploic Space: Diploic veins, Venous lakes, Epidermoid, Dermoid, Eosinophilic granuloma, Hemangioma - Inner Table: Arachnoid granulations, Meningioma, Hyperostosis frontalis interna - All Tables: Parietal foramen, Leptomeningeal cyst, Cephalocele, Multiple myeloma, Metastasis, Paget's disease, Acromegaly, Fibrous dysplasia 3. Review of some fundamental rules to keep in mind when trying to distinguish benign from malignant calvarial lesions 4. Summary table of lesions classified by location within the calvaria

NRE241

Education Exhibits
Location: NR Community, Learning Center

Participants
Chris Bent MD (Presenter): Nothing to Disclose
Peter Shen MD: Nothing to Disclose
Paul Sung Lee MD: Nothing to Disclose

TEACHING POINTS
1. Review normal skull base anatomy and common pathologies treated with endonasal endoscopic surgery 2. Demonstrate normal post-operative MR appearance of nasoseptal flap reconstruction 3. Review imaging findings for most common complications after nasoseptal flap reconstruction

TABLE OF CONTENTS/OUTLINE

NRE242
MRI Findings of Acute Toxic and Acquired Metabolic Encephalopathies: Role of Diffusion Weighted Imaging

Education Exhibits
Location: NR Community, Learning Center

Participants
Eun Ja Lee (Presenter): Nothing to Disclose
Bo Young Jeong: Nothing to Disclose
Eun Kyoung Lee: Nothing to Disclose

TEACHING POINTS
To review and illustrate the characteristic MRI features of common and uncommon toxic-acquired metabolic encephalopathies and correlate with their clinical features. To determine the role of diffusion weighted imaging (DWI) for the diagnosis of toxic and acquired metabolic encephalopathies To help narrow the differential diagnosis in a case of acute encephalopathy.

TABLE OF CONTENTS/OUTLINE

NRE243
Multiparametric and Multidetector Computed Tomography Role in the Supplementary Evaluation of Suspicion of Brain Death

Education Exhibits
Location: NR Community, Learning Center

Participants
TEACHING POINTS

1. To review the pathophysiology of brain death
2. To review recognizable neuroimaging patterns of brain death
3. To gain awareness of the pitfalls in the vascular imaging when brain death is suspected
4. To learn optimal methods using multiparametric computed tomography to reduce false-negative patients

TABLE OF CONTENTS/OUTLINE

Brain death is the final stage of a progressive and irreversible brain damage. Some countries legislation requires a full supplementary method to corroborate the diagnosis of brain death by demonstrating the absence of electrical activity, metabolic or brain circulation. We evaluated multiparametric multidetector computed tomography (MDCT), such as CT angiography and CT perfusion maps, of 50 patients after the diagnosis of brain death through clinic examination and evidentiary complementary methods. The international experience confirms the use of multiparametric MDCT as a complementary alternative for the diagnosis of brain death, that this is a safe, reliable and reproducible. We aimed to create a standard protocol for brain death diagnosis and to describe the imaging patterns found in MDCT of patients with confirmed brain death.

NRE244

Pachymeninges: MRI Findings in Benign and Malignant Disease

Education Exhibits
Location: NR Community, Learning Center

Participants
Kwesi Frempong Agyem MD (Presenter): Nothing to Disclose

TEACHING POINTS

1. Gain an understanding of the components of the pachymeninges, its relation to other anatomical structures, and its various functions.
2. Develop an approach for assessing and describing the imaging appearance of the pachymeninges, and develop skills to localize abnormalities within the subdural or epidural spaces.
3. Review specific benign etiologies (intracranial hypotension, osteomyelitis/discitis, trauma, soft tissue infections) that alter the appearance of the pachymeninges on MRI.
4. Review specific malignancies that commonly involve the pachymeninges (meningiomas, secondary CNS lymphoma, small cell lung cancer, prostate cancer) and their typical appearances on MRI.

TABLE OF CONTENTS/OUTLINE


NRE245

Pictorial Review of Cerebral Venous Thrombosis; Causal Factors, Clinical Manifestations and Imaging Finding

Education Exhibits
Location: NR Community, Learning Center

Participants
Kushal Singh MBBS : Nothing to Disclose
Zarina Abdul Assis MBBS, MD : Nothing to Disclose
Sunitha P Kumaran MBBS, MD : Nothing to Disclose
Sanjaya Viswamitra MD (Presenter): Nothing to Disclose

TEACHING POINTS

1. Familiarize readers to the key imaging features of cerebral venous thrombosis.
2. Discuss etiopathogenesis of cerebral venous thrombosis.

TABLE OF CONTENTS/OUTLINE

Introduction: Cerebral venous thrombosis is not uncommon. The clinical signs are highly variable with headaches, seizures, focal neurologic deficits, and impaired level of consciousness representing the most common symptoms. Missed diagnosis of cerebral venous thrombosis can lead to potentially fatal outcome. Methods: Our pictorial essay is from a single institute experience of 48 patients of cerebral venous thrombosis. In this study 28 patients had idiopathic venous thrombosis. Out of these, 17 patients had venous infarct of various stages, 10 patients had otherwise normal brain imaging and 1 patient had diffuse subarachnoid hemorrhage. 20 patients had secondary venous thrombosis. Underlying conditions included 17 patients with neoplastic lesions, 1 with eosinophilic granuloma, 1 with chronic otitis media, 1 with SLE and ALPA syndrome.

NRE247

Spectrum of Radiation Induced Changes in the Brain

Education Exhibits
Location: NR Community, Learning Center
Teaching Points

Mechanism of radiation injury is likely multifactorial representing a combination of demyelination, vascular injury/ischemia as well as host immune response. Neurotoxicity can be divided into three phases: Acute, Early delayed and Late delayed. Acute radiation neurotoxicity is due to disruption of the blood-brain barrier and associated vasogenic edema. Early delayed neurotoxicity involves continued vasogenic edema and demyelination. Late delayed neurotoxicity results from continued demyelination, white matter necrosis and ischemic vasculopathy.

Table of Contents/Outline

1. Introduction
2. Expected changes to the brain following radiation
3. Acute encephalopathy - White matter edema
4. Early delayed - White matter edema +/- enhancement that spontaneously resolves
5. Late delayed - Cerebral atrophy - Vascular complications (ischemic vasculopathy, cavernoma) - Radiation necrosis - Cysts - SMART (stroke like migraine attacks after radiation therapy) syndrome

NRE248

Teach a Man to Fish: Clinical Applications of Brain PET Tracers by Biochemical Schema

Education Exhibits

Location: NR Community, Learning Center

Teaching Points

The purpose of this exhibit is: To review current clinically relevant tracers used in PET neuroimaging. To describe the underlying biochemical mechanism of selected tracers used in brain PET. To identify several broad clinical applications of PET tracers in the evaluation of neuropathology with an emphasis on a biochemical schema.

Table of Contents/Outline

• Basic principles of PET
• Review of mechanism of action, targets, and applications of selected PET tracers in three different imaging schemas: Metabolic imaging (18F-FDG, 18F-FLT, 11C-Methionine, 11C-Choline) Imaging of the chemical microenvironment (18F-MISO) Receptor/protein target imaging (11C-PIB, 18F-Florbetapir, 18F-T807, 18F-RGD) • Future directions • Summary

NRE249

The Stalk Matters: Imaging of Pituitary Infundibulum

Education Exhibits

Location: NR Community, Learning Center

Teaching Points

The purpose of this exhibit is 1. To provide an overview of normal anatomy of pituitary and surrounding important structures in diagrammatic form with emphasis on structure of infundibulum including embryologic aspects. 2. To establish a step-by-step approach to diagnosis of lesions involving/ affecting the infundibulum to reach final diagnosis.

Table of Contents/Outline

The pituitary infundibulum can be affected by pathologies extending from pituitary as well as adjacent structures in the form of infiltration or displacement. Some pathologies may present with isolated involvement of pituitary stalk. Congenital anomalies such as ectopic neurohypophysis may be identified by noting absence of infundibulum on MR imaging. Neoplastic pathologies like germinoma may be specifically localized to infundibulum. Drug induced hypophysitis may present with smooth enhancing thickening of pituitary infundibulum. Vascular causes like pituitary apoplexy may also have their pathological correlate in blood vessels traversing the stalk. Inflammatory pathologies including sarcoidosis may manifest as thickening and enhancement of infundibulum. A knowledge of important MR imaging characteristics and common differentials to be considered can help pin point the diagnosis.

NRE250

Tips and Tricks for Narrowing the Differential Diagnosis of Bilateral Abnormal Thalamic Signal Intensity on MRI

Education Exhibits

Location: NR Community, Learning Center

Teaching Points

1. To review the differential diagnosis of symmetric bilateral thalamic diseases. 2. To illustrate MRI features of different thalamic
TABLE OF CONTENTS/OUTLINE
Pathophysiology, MRI characteristics, images and clinical course of various pathologies resulting in abnormal bilateral thalamic MRI abnormalities. The differential diagnosis includes vascular, infectious, metabolic and neoplastic entities including but not limited to: Creutzfeldt-Jakob disease (CJD) Vasculitis Hypoxic ischemic encephalopathy (HIE) Hypertensive encephalopathy, PRES Osmotic demyelination Wilson’s disease Wernicke’s encephalopathy Viral encephalitis West Nile/Japanese/rabies/E. Equine Fabry disease Leigh syndrome Fahr disease Venous occlusion/deep vein thrombosis Arterial ischemia: Artery of Percheron occlusion Bilateral thalamic glioma

NRE251
To Bleed or Not to Bleed: An Updated Review of the Causes and MR Appearance of Cerebral Microhemorrhages

Education Exhibits
Location: NR Community, Learning Center

Participants
Stephen Quinet MD (Presenter): Nothing to Disclose
Patrick A. Turski MD: Research support, General Electric Company

TEACHING POINTS
(1) Review the common etiologies of cerebral microhemorrhages with recent imaging examples of each entity. An emphasis will be placed on distinguishing these entities based on location and pattern of hemorrhage as well as clinical presentation and patient demographics. (2) Briefly review T2* GRE and SWI techniques. (3) Emphasize the utility of T2* and SWI for the detection and classification of cerebral microhemorrhages.

TABLE OF CONTENTS/OUTLINE
Comparison of conventional T2* GRE imaging with SWI: - Brief overview of the sequences - Comparison GRE and SWI for detection of microbleeds, integrated with clinical examples of the various etiologies of microhemorrhages (as outlined below) for which these sequences are particularly valuable Review of cerebral microhemorrhage, including review of pathophysiology, patient demographics, and appearance/pattern on imaging. Etiologies to be reviewed include: - Cerebral amyloid angiopathy (CAA) - Hypertensive arteriopathy - Hemorrhagic metastatic disease - Sporadic and inherited developmental venous anomalies and cavernomas - Radiation-induced vasculopathy and vascular lesions - Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) - Hemorrhagic infarct - Diffuse axonal injury (DAI) - Infection - Vasculitis

NRE252
When to Call the (Spinal) Plumber?: Spontaneous Intracranial Hypotension, Typical and Unusual Cases of Spinal Leak, and Blood Patch Treatment

Education Exhibits
Location: NR Community, Learning Center
Certificate of Merit

Participants
Marcel Brus-Ramer MD, PhD (Presenter): Nothing to Disclose
Esther Lim Yuh MD, PhD: Nothing to Disclose
Jason F. Talbott MD, PhD: Nothing to Disclose
William P. Dillon MD: Nothing to Disclose

TEACHING POINTS
1. To discuss the typical imaging findings and clinical presentation of spontaneous intracranial hypotension (SIH).
2. To discuss the imaging work-up for several of the most common causes of spinal CSF leaks that can lead to intracranial hypotension.
3. Detail the imaging features of several interesting cases of spinal CSF leak associated with SIH.
4. To discuss the indications and proper technique for image guided blood patching for sites of CSF leak in the spine.

TABLE OF CONTENTS/OUTLINE
Review of imaging findings and clinical presentation of SIH
- Typical imaging and clinical findings of SIH
- Additional findings associated with an underlying spinal cause
Presentation of interesting cases of spinal CSF leaks leading to or associated with SIH
- Iatrogenic: Delayed hardware failure
- Perineural cyst/Arachnoid cyst
- Discogenic injury
- Collagen vascular disease related
- Idiopathic spinal cord herniation
Discussion of the imaging work-up for spinal leak identification
- Cross-sectional imaging
- Radionuclide cisternography
- Myelography: CT and MR
Discussion of blood patch technique
- Indications and patient preparation
- Pictorial demonstration of technique
- Post-procedural imaging and interventional management

NRE253
Emergent CTA: A Primer - Tips/Pitfalls and What the Clinician Needs to Know

**Teaching Points**

The purpose of this exhibit is to review: 1. To present in an interactive manner a series of challenging cases to help improve the radiologist’s diagnostic accuracy and to provide clinical context for better reporting (i.e. ‘what the clinician needs to know’). 2. To address common interpretive errors in an attempt to improve the diagnostic accuracy of the interpreting radiologist. 3. To review basic vascular anatomy, common anatomic variants and sites that are most likely to harbor missed vascular entities (i.e. ‘blind spots’) and to present a comprehensive checklist that will help decrease the likelihood of interpretation errors at routine CTA interpretation.

**Table of Contents/Outline**

- Indications for emergent CTA
- Technical considerations/troubleshooting
- Basic approach to CTA (including discussion of using TeraRecon, other thin clients)
- Cases (including discussion of pathophysiology, signs/symptoms, imaging approach including tips/pitfalls and what the clinicians need to know from the radiologist, treatment)
  1. Acute stroke
  2. Aneurysmal subarachnoid hemorrhage
  3. Cerebral venous thrombosis
  4. Vasopasm
  5. Traumatic cerebral vascular injury

**NRE254**

How to Detect Carotid Dissections in the Acute Stroke Setting. Survival Guide for Beginners

**Teaching Points**

To describe the imaging findings, including CT angiography and CT perfusion, in patients with acute carotid dissection. To establish a differential diagnosis with other diseases that can mimic carotid dissection and their correlation with MR angiography.

**Table of Contents/Outline**

- Pathophysiology and causal factors: 1. Spontaneous 2. Traumatic
- Imaging techniques and findings: - Multimodal acute stroke CT: o Non enhanced CT o CT perfusion o CT angiography - Pearls and key findings in elderly and young patients
- Correlation with clinical and imaging findings: a. MR and MRA b. DSA c. Doppler-Ultrasound
- Potential pitfalls in image interpretation

**NRE255**

Neuroradiological Findings of Paediatric Cerebral Sinovenous Thrombosis due to Acquired Risk Factors: Personal Experience and Literature Review

**Teaching Points**

Pediatric sinus venous thrombosis (CSVT) is relatively rare but potentially life-threatening condition; nevertheless in Children's Hospitals (CH) an increasing of CSVT is reported, likely due to increase clinical awareness, risks related to intensive care, longer survival to primary disease, imaging improvement. Early symptoms are often not specific, neuroimaging can be request without suspect of CSVT; early diagnosis/treatment are important for decreasing the morbidity and mortality. Purpose: illustrate neuroimaging of CSVT or severe flow impairment secondary complication of primary underlying disease; underline potential/limit of neuroradiological techniques; improve radiologist's knowledge/diagnostic accuracy.
TABLE OF CONTENTS/OUTLINE
Epidemiology, pathophysiology, acquired risk factors of pediatric CVST. Case series: 23 children, older than 1 month with CVST or severe flow impairment due to epidural compression, followed up (Sept 2011 to March 2014) in our CH. Neuroradiological findings (MRI-MR, CT-CTA), clinical onset and follow-up, presented to identify diagnostic key for each technique, depending on clinical condition. CVST diagnosis in childhood without inherited thrombophilia could be delayed or missing. It is important to know the myriad of acquired risk factors, potential/limit of each diagnostic tool, best modality for neuroimaging follow-up.

NRE257
Tissue Characterization of Carotid Atherosclerotic Plaque with Magnetic Resonance (MR) Imaging

Education Exhibits
Location: NR Community, Learning Center

Participants
Takafumi Naka (Presenter): Nothing to Disclose

TEACHING POINTS
1) Histopathology of carotid atherosclerotic plaque
2) Magnetic resonance imaging techniques of carotid atherosclerotic plaque
2-1 Comparison and feature of several T1 weighted imaging techniques
3) Relationship between signal hyperintensity on T1WI of carotid atherosclerotic plaque and pathological findings

TABLE OF CONTENTS/OUTLINE
1) The thickness of the fibrous cap is significantly thinner in symptomatic patients. Furthermore, plaque ulceration and thrombus formation are more common with symptomatic patients.
2) Although electrocardiograph (ECG) gating has been used in conventional imaging technique for carotid atherosclerotic plaque has been used, there is a serious problem that TR changes with the heart rate of the patient. However, 3 dimensional (3D) fast spin echo (FSE) sequence and 3D inversion recovery gradient echo (IR-GRE) sequence dose not have the necessity for ECG gating. In addition, these new imaging techniques make higher in-plane resolution and shorter imaging time possible.
3) Carotid plaque with hyperintensity on T1WI consists of abundant hemorrhage, and lipid core beneath thin fibrous cap. And there are highly correlated with ischemic events.

NRE258
High Resolution 3T MR-Neurography of the Brachial Plexus: Normal Anatomy and Traumatic, Non-traumatic Brachial Plexopathies

Education Exhibits
Location: NR Community, Learning Center

Participants
Mar Jimenez De La Pena (Presenter): Nothing to Disclose
Ana Fernandez Alfonso: Nothing to Disclose
Luis Carlos Hernandez Gonzalez: Nothing to Disclose
Javier Carrascoso Arranz: Nothing to Disclose
Luis Herraiz Hidalgo: Nothing to Disclose
Vicente Martinez de Vega: Nothing to Disclose

TEACHING POINTS
1. To illustrate the anatomy and common pathologies of the brachial plexus, describing the respective imaging findings at 3T MR neurography.
2. To highlight the 3D high-resolution imaging which plays a significant role, aiding in the early diagnosis and patient management.
3. In traumatic plexopathy, the MR study must include the shoulder to detect muscle edema, which facilitate the diagnosis.

TABLE OF CONTENTS/OUTLINE
The complex anatomy of the brachial plexus is better depicted with the new 3D-MR sequences, the better fat-suppression techniques, the new coils and the increasing use of 3T magnets. In this pictorial review, the anatomy of the roots, trunks, divisions and cords is shown, facilitated by comparison with cadaver cross sections. Indeed common pathologies as neurogenic tumors, superior sulcus tumors and other tumors in the vicinity of the brachial plexus, radiation and metastatic plexopathy, trauma, neurogenic thoracic outlet syndrome and immune-mediated neuropathies are discussed.

NRE260
Intraoral Sonography for the Evaluation of the Depth of Invasion of the Tongue Carcinoma Using Acoustic Polymer Gel

Education Exhibits
Location: NR Community, Learning Center
The application of the acoustic polymer gel to the intraoral sonography provides the reliable visualization of the muscular invasion of the tongue carcinoma.

### TABLE OF CONTENTS/OUTLINE

It is important to evaluate the depth of invasion in order to predict the subsequent cervical lymph node metastasis in patients with tongue carcinoma. Recent studies addressed that the depth of invasion is a reliable parameter for predicting regional nodal involvement and patient survival. In this presentation, I will propose the three layer structures of normal tongue mucosa, i.e., (1) mucosal surface, (2) mucosal layer, (3) submucosal and muscular layers demonstrated on the intraoral sonography. Intraoral sonographic examination is performed using a small 'hockey-stick' probe and an acoustic polymer gel with a thickness of 3 mm in order to obtain fine image quality, and commonly, the superficial carcinoma is demonstrated as a thickened mucosal layer.

### TEACHING POINTS

The application of the acoustic polymer gel to the intraoral sonography provides the reliable visualization of the muscular invasion of the tongue carcinoma.

### TABLE OF CONTENTS/OUTLINE

It is important to evaluate the depth of invasion in order to predict the subsequent cervical lymph node metastasis in patients with tongue carcinoma. Recent studies addressed that the depth of invasion is a reliable parameter for predicting regional nodal involvement and patient survival. In this presentation, I will propose the three layer structures of normal tongue mucosa, i.e., (1) mucosal surface, (2) mucosal layer, (3) submucosal and muscular layers demonstrated on the intraoral sonography. Intraoral sonographic examination is performed using a small 'hockey-stick' probe and an acoustic polymer gel with a thickness of 3 mm in order to obtain fine image quality, and commonly, the superficial carcinoma is demonstrated as a thickened mucosal layer.

### NRE261

**Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) of Lower Cranial Nerves (IX, X, XI and XII): A Pictorial Essay**

**Education Exhibits**

Location: NR Community, Learning Center

### Participants

- Tatiana Goyanna Lyra MD (Presenter): Nothing to Disclose
- Samir El-Kadum Noujaim MD: Nothing to Disclose
- Lucas Nunes Silva MD: Nothing to Disclose
- Luis Filipe de Souza Godoy MD: Nothing to Disclose
- Eloisa Maria Santiago Gebrim MD: Nothing to Disclose

### TEACHING POINTS

The purpose of this exhibit is:

1. To review and understand the anatomy of lower cranial nerves (IX, X, XI and XII) using original drawings, CT and MR images.
2. To present a variety of common and uncommon pathologies that affect the lower cranial nerves using CT and MRI images from our digital archives emphasizing important findings and their differential diagnosis.

### TABLE OF CONTENTS/OUTLINE

The authors will discuss the normal anatomy of the lower cranial nerves and their relationship with the corresponding anatomic structures. It will include practical review of the jugular fossa and the hypoglossal canal using original drawings, CT and MRI images. Several pathologic conditions will be presented with emphases on imaging findings and differential diagnosis. Pathologic conditions to be presented include, but not limited to: primary and extrinsic tumors (schwannoma, neurofibroma, paraganglioma, meningioma, metastasis), jugular fossa syndrome (Vernet's syndrome), vocal cord paralysis caused by high and lower vagus nerve injury, denervation atrophy, perineural tumor spread, infectious (Lyme's disease), autoimmune conditions, Wallenberg syndrome, carotid artery dissection, glossopharyngeal neurovascular conflict.

### NRE262

**MR Imaging Anatomy of the Cervical Sympathetic and Parasympathetic Nerves**

**Education Exhibits**

Location: NR Community, Learning Center

### Participants

- Hajime Yokyota MD (Presenter): Nothing to Disclose
- Koji Matsumoto RT: Nothing to Disclose
- Hiroki Mukai: Nothing to Disclose
- Atsushi Saiga MD: Nothing to Disclose
- Takuro Horikoshi MD: Nothing to Disclose
- Ken Motoori MD: Nothing to Disclose
- Takashi Uno: Nothing to Disclose

### TEACHING POINTS

- The cervical sympathetic and parasympathetic nerves are a potential risk of injury during surgery, target for local anesthetic block and origin of neoplasms. However, there are few reports about imaging anatomy of these nerves.
- Although it is difficult to detect the nerves totally, recent high-resolution MR neuragraphy sequences can identify their ganglions. Recognizing the ganglions can have you predict the nerve routes. Exceptionally, hypertrophic neuropathy improves anatomical visualization of the nerve routes.
- Previous reports with cadavers are partially different from MR imaging anatomy. Postmortem changes and autopsy procedures may affect morphology and locations of the nerves. High-resolution MR neurography can be gold standard to evaluate anatomical features of the nerves.

### TABLE OF CONTENTS/OUTLINE

1. Imaging technique - High-resolution MR sequences, especially 3D-STIR 2. Sympathetic nerve: the cervical sympathetic trunk - Location and morphology of the ganglions: Superior cervical ganglion, middle cervical ganglion, vertebral ganglion and stellate ganglion - White and gray ramus communications 3. Parasympathetic nerve; the vagus nerve - Location and morphology of the ganglion: the nodose ganglion - The vagus nerve on hypertrophic neuropathy 4. Differences between previous reports with
Ossicular Anatomy Revisited: Virtual Otoscopy with 3-D Volume Reconstructions

**Participants**
- Jennifer Lynn McCarty MD (Presenter): Nothing to Disclose
- John Louis Dornhofer MD: Inventor, Olympus Corporation
- Rohan Samant MD: Nothing to Disclose
- Rudy Lee Van Hemert MD: Nothing to Disclose
- Raghu Hosahalli Ramakrishnaiah MBBS, FRCP: Nothing to Disclose
- Manoj Kumar MD, MBBS: Nothing to Disclose
- Edgardo J.C. Angtuaco MD: Nothing to Disclose
- Ryan T. Fitzgerald MD: Nothing to Disclose

**TEACHING POINTS**
1. Review the anatomy of the middle ear -- including osseous, ligamentous, and neurovascular structures -- using diagrams, cross sectional imaging and 3-D volumetric reconstructions (VR).
2. Explore the concept of a virtual otoscopic exam using 3-D VR.
3. Correlate clinical and intraoperative otoscopic exam with imaging and virtual otoscopy.
4. Present a few common pathologic entities of the middle ear and demonstrate their involvement with the ossicular chain, using a quiz format.

**TABLE OF CONTENTS/OUTLINE**
- Anatomy - Osseous - Ligamentous - Neurovascular
- Imaging - CT and MR of the Middle Ear - 3-D Volumetric Reconstructions and Virtual Otoscopy - Limitations of Imaging Clinical - Clinical Otoscopic Exam - Clinical Intraoperative Exam Cases - Glomus Tympanicum Paraganglioma - Cholesteatoma - Otosclerosis - Trauma - Ossicular Chain Reconstruction

Abnormalities of Middle Ear in Pierre-Robin Sequence

**Participants**
- Harutyun Haroyan MD: Nothing to Disclose
- Daniel Thomas Ginat MD (Presenter): Nothing to Disclose

**TEACHING POINTS**
1. Understanding of sequence of events leading to development of Pierre-Robin sequence and associated middle ear abnormalities based on discussion of embryology of facial and middle ear development.
2. Learning about range of middle ear abnormalities encountered in Pierre-Robin sequence.
3. Discussion of clinical correlation of observed imaging findings and brief discussion of severity and observed frequency of middle ear abnormalities.

**TABLE OF CONTENTS/OUTLINE**
- Brief review of facial and middle ear embryology.
- Correlation of middle ear abnormalities with other manifestation of Pierre-Robin syndrome.

Congenital Anomalies of the Branchial Apparatus: Focusing on Embryologic Background and Radiologic Features

**Participants**
- Seul Kee Kim: Nothing to Disclose
- Yang jun Kang MD (Presenter): Nothing to Disclose
- Woong Yoon MD: Nothing to Disclose
- Heoung-Keun Kang MD: Nothing to Disclose

**TEACHING POINTS**
1. To review the embryologic basis related to branchial apparatus anomalies.
2. To explain the radiologic findings of branchial apparatus anomalies.

**TABLE OF CONTENTS/OUTLINE**
1. Normal embryology of branchial apparatus
2. Imaging findings of branchial apparatus anomalies
3. Imaging finding of complication of branchial apparatus anomalies
4. Summary
Imaging of Benign Jaw Lesions and Tumor-like Processes with Pathologic Correlation

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Chikaodili Iloanusi Logie MD (Presenter): Nothing to Disclose
Eric A. Walker MD : Research Consultant, Medical Metrics, Inc
Matthew J. Minn MD : Nothing to Disclose
Mark Douglas Murphey MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the wide range of benign processes that involve the jaw, including jaw cysts, inflammatory processes, and histologically benign tumors. 2. To review benign processes of the jaw, which may appear aggressive, such that they are nearly indistinguishable from malignant jaw tumors. 3. To establish familiarity with imaging features of the most commonly encountered benign jaw lesions.

TABLE OF CONTENTS/OUTLINE

NRE269
Imaging of the Congenital Anomalies of the Facial Nerve (CN7): How to Make Sure Your Favorite Surgeon Does Not Hit CN7 during His Procedure?

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Aina Venkatasamy (Presenter): Nothing to Disclose
Marcela DE ALMEIDA CAVALCANTI : Nothing to Disclose
Sophie Anne Cahen Riehm MD : Nothing to Disclose
Francis P. Veillon MD : Nothing to Disclose

TEACHING POINTS
Anomalies of the course of the tympanic portion of the CN7 (VII-2) are the most common. An anterior displacement of the mastoid portion of the CN7 (VII-3) is important to specify before cochlear implantation. The CN7 canal may be dehiscent, with or without inferior herniation of the corresponding nerve. The CN7 must always be analyzed on temporal bone CT / MRI.

TABLE OF CONTENTS/OUTLINE
1) Agenesia or hypoplasia of the CN7 2) Anatomical anomalies of the course of the facial nerve and/or canal 2.1 Above the internal auditory meatus 2.2 Open angle between VII-1 and VII-2 2.3 Absence of VII-2 2.4 Lateralized VII-2 in the tympanic cavity 2.5 Inferior herniation of the nerve in a dehiscent bony canal 2.6 Lowered facial nerve in, close or not to the jugular bulb 2.8 Anteriorized VII-3 3) Anomalies of size of the facial nerve canal The normal CN7 canal size has numerous normal variants: geniculate ganglion fossa ranging from 1.8 to 4.5 mm, VII-2 from 1.3 to 2.9mm. MRI HR T2 images are necessary for the detection of CSF in the geniculate ganglion fossa, which is a normal variant. The T1 postcontrast images eliminate a tumor. The enlarged geniculate ganglion fossa may also be due to a meningcele. 4) Nerve duplication VII-1, VII-2 or VII-3 duplication

NRE271
Radiology of Cleft Lip and Palate: Imaging for the Prenatal Period and throughout Life

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Selected for RadioGraphics

Participants
Zachary Abramson DMD (Presenter): Nothing to Disclose
Harris L. Cohen MD : Nothing to Disclose
Asim F. Choudri MD : Nothing to Disclose

TEACHING POINTS
After completing this education exhibit, participants will be able to: 1. Describe normal and abnormal development of the nose, lip, primary and secondary palates. Cleft lip occurs as a result of failure of fusion of the palatal shelves at 6-8 weeks gestation. 2. Identify cleft lip and palate both pre-natally and post-natally on ultrasound, CT and MRI. Unilateral vs. bilateral Complete vs. incomplete Cleft lip and/or palate vs. isolated Cleft palate 3. Discuss and identify anomalies associated with cleft lip and/or palate, as well as secondary conditions, such as congenitally absent teeth, oronasal fistula, velopharyngeal insufficiency, and maxillary growth restriction.

TABLE OF CONTENTS/OUTLINE
1. Introduction 2. Embryology (Normal and abnormal development) 3. Radiologic Appearance a. Prenatal Imaging Diagnosis:
Spectrum of Cranio-Vertebral Junction Anomalies on MRI: Pictorial Review

Education Exhibits
Location: NR Community, Learning Center

Participants
Sonia Sandip MD (Presenter): Nothing to Disclose
Neera Kohli MBBS, MD : Nothing to Disclose
Ishrat Afshan MD : Nothing to Disclose
Rohit Kr Khandelwal MD : Nothing to Disclose
Devasenathipathy Kandasamy : Nothing to Disclose
Sheragaru H. Chandra Shekara MD : Nothing to Disclose

TEACHING POINTS
1) MRI is a novel modality for assessment of cranio-vertebral junction. 2) Because of excellent spatial and contrast resolution of MRI, detailed evaluation of anatomic relationship as well as associated abnormalities of CVJ can be done.

TABLE OF CONTENTS/OUTLINE
The craniovertebral junction(CVJ) is the most complex region of the axial skeleton, residing between the skull and the upper cervical spine. CVJ refers anatomically to the occiput, first (atlas) and second cervical (axis) vertebral segments, their articulations and connecting ligaments. CVJ anomalies are defects of development, not necessarily congenital and may not manifest at birth. The spectrum of CVJ anomalies include: A-Congenital : 1. Malformation of occipital bone(clivus segmentation, occipital vertebra, platybasia, condylar hypoplasia) 2. Malformation of atlas(segmentation failure from occiput, atlanto-axial fusion, aplasia of arches) 3. Malformation of axis(segmentation failure C2-C3, dens dysplasia) B-Acquired: 1. Atlanto-axial dislocation 2. Secondary basilar invagination. The exhibit will include the following contents. 1. Anatomy 2. Embryology and Development 3. Relevant lines and landmarks at CVJ 4. Classification of CVJ anomalies 5. Spectrum of CVJ anomalies on MRI and associated findings.

Unravelling the Link of Mind to Body: Role of CT and MRI in Evaluation of Craniovertebral Junction Anomalies

Education Exhibits
Location: NR Community, Learning Center

Participants
Nishchint Jain MBBS (Presenter): Nothing to Disclose
Ritu Verma MBBS, MD : Nothing to Disclose
Sachin Kumar Jain MD : Nothing to Disclose
BARINDRA BARUAH : Nothing to Disclose
Suryanarayanan Bhaskar MS, MChir : Nothing to Disclose

TEACHING POINTS
1. To study embryology, anatomy and topographic relationship of craniovertebral junction on imaging.
2. To understand imaging features of various craniovertebral junction anomalies on CT and MRI.

TABLE OF CONTENTS/OUTLINE
Craniovertebral Junction (CVJ) is a complex osseous-ligamentous structure responsible for enclosing the traversing neural elements as they make a transition from brain to spine. EMBRYOLOGY and ANATOMY: The CVJ is the product of the occipital and first three cervical somites with subsequent endochondral ossification. A myriad of congenital and acquired anomalies affect CVJ presenting with varying clinical symptoms. CVJ ANOMALIES :Congenital anomalies include basilar invagination, atlanto axial dislocation, platybasia, atlas defects( split Atlas, posterior Rachiscisis), defect in synchondrosis of axis( aplasia, Os odontoideum, os terminale). Acquired conditions include trauma, infections, inflammatory ( rheumatoid, JRA, CPPD, ankylosing spondylitis) and tumors. IMAGING: CT and MRI are used to assess craniometry, morphology and topographic relation of various constituents, pre dental soft tissue, cord status, ligamentous morphology, vertebral artery course and stability of AAD. CONCLUSION: CT and MRI characterisation of CVJ anomalies is must for accurate diagnosis and management.

A Broadened Differential for Signal Loss in the Semicircular Canals on MRI or Sclerosis of the Semicircular Canals on CT: Pictorial Overview with CT and MRI Correlation

Education Exhibits
Location: NR Community, Learning Center

Participants
Jurgen Bielen MD (Presenter): Nothing to Disclose
Bruno Mutien Marie Marcel Termote MD : Nothing to Disclose
Steven Schepers MD : Nothing to Disclose

TEACHING POINTS
The differential diagnosis for signal loss in the semicircular canals on MRI or sclerosis of the semicircular canals on CT can be broadened with a specific hereditary form of progressive severe hearing loss.

TABLE OF CONTENTS/OUTLINE
Anatomy of the semicircular canals (CT and MRI) Pathology: differential diagnosis of signal loss of the SCC’s on MRI or sclerosis on CT Broadened differential with overview of genetics sample (12) cases (both CT and MRI for every patient) and mimics summary

NRE276
Abnormal Intensity/Density in the Labyrinth: Diseases and Diagnostic Points

Education Exhibits
Location: NR Community, Learning Center

Participants
Yoshiko Yakushiji Kurihara MD (Presenter): Nothing to Disclose
Hirotaka Ikeda MD: Nothing to Disclose
Atsuko Fujikawa MD: Nothing to Disclose
Hayato Tomita: Nothing to Disclose
Takuya Suzuki: Nothing to Disclose

TEACHING POINTS
1) To review the pathological categories and diseases causing abnormal intensity/density in the membranous labyrinth
2) To show the anatomical location and pattern of abnormality
3) To assist the exact diagnosis, inform the additional clinical issues other than hearing loss or vertigo

TABLE OF CONTENTS/OUTLINE
Anatomy and normal intensity/density of labyrinth
Causes of abnormal intensity/density of labyrinth
Pathological categories and imaging findings - trauma - inflammation - tumors - congenital - influences of adjacent pathological changes
Summary

NRE278
Eye and Orbit MRI Multiple Choice Quiz: What Is Your Diagnosis?

Education Exhibits
Location: NR Community, Learning Center

Participants
Ana Isabel Cisneros (Presenter): Nothing to Disclose
Beatriz Rodriguez-Vigil MD: Nothing to Disclose
Jon Echeveste: Nothing to Disclose
Carmen Romera MD: Nothing to Disclose
Rocio Pelaez-Chato: Nothing to Disclose
Blanca Martinez de Guerenu MD: Nothing to Disclose

TEACHING POINTS
By viewing this exhibit we will learn to:
Characterize the most common pathological entities of the eye and orbit through different cases of daily clinical practice in a tertiary hospital MRI department
Limit differential diagnosis and lead to an accurate diagnosis by recognizing pearls and pitfalls in MR imaging.

TABLE OF CONTENTS/OUTLINE
Spectrum of disease: MRI findings, differential diagnosis, pearls and pitfalls
Congenital: lymphangioma, dermoid and epidermoid, neurofibromatosis, cavernous hemangioma
Infection: cellulitis, subperiosteal abscess
Inflammation: idiopathic orbital inflammatory disease, sarcoidosis, optic neuritis, mucocoele
Vascular: venous varix and carotid-cavernous fistula
Traumatic: fractures, extrinsic ocular muscles hematoma
Neoplastic: hemangioma, neural tumors, optic nerve glioma, lymphoma, basocellular carcinoma, melanoma, metastases, sphenoidal meningioma
Postsurgical: silicone implants
Miscellaneous: thyroid associated orbitopathy, fibrous dysplasia, intracranial hypertension

NRE279
Imaging of Non-acute Laryngeal Conditions: Clinicoradiological Correlation

Education Exhibits
Location: NR Community, Learning Center

Participants
Marie Kim MD (Presenter): Nothing to Disclose
Akifumi Fujita MD: Nothing to Disclose
Joan M. Cheng MD: Nothing to Disclose
Hiroyuki Fuji MD: Nothing to Disclose
Scharukh Jalisi MD: Owner, DRX UC Watertown PC
Osamu Sakai MD, PhD: Speaker, Bracco Group Speaker, KYORIN Holdings, Inc Speaker, Eisai Co, Ltd

TEACHING POINTS
Laryngeal abnormalities are easily assessed clinically via direct visualization or endoscopically. Imaging may not be indicated in the setting of acute airway obstruction and diagnosis of common epithelial tumors such as squamous cell carcinoma is often made prior to imaging. However, non-acute laryngeal or other airway conditions often require radiological assessment because clinical pictures can be nonspecific and direct visualization or endoscopy cannot assess submucosal diseases very well.

The purpose of this exhibit is to:
1. Review various non-acute pathologies that cause laryngeal and airway compromise
2. Provide a clinicoradiological correlation of various disorders
3. Review of key imaging findings to narrow the differential diagnosis

TABLE OF CONTENTS/OUTLINE
1. Endoscopic and radiological anatomy of the larynx and trachea
2. Non-acute laryngeal abnormalities
   a. Non-squamous cell neoplasms
      - Epithelial tumors
      - Non-epithelial tumors: granular cell tumor, rhabdomyoma, schwannoma, hemangioma, chondrosarcoma, lymphoma, metastasis, etc.
   b. Amyloidosis
   c. Laryngoecele, laryngeal cyst
   d. Inflammatory / infectious conditions
      - Inflammatory: Granulomatosis with polyangitis, sarcoidosis, relapsing polychondritis
      - Infectious: Tuberculosis
   e. Post-traumatic abnormalities
   f. Post-treatment changes
      - Post-radiation changes
      - Post-surgical changes

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**NRE280**

**Intraocular Lesions at 3T Magnetic Resonance Imaging**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Naim Ceylan, MD, PhD (Presenter): Nothing to Disclose
- Selin Bayraktaroglu: Nothing to Disclose
- Ozlem Sezgin Okcu: Nothing to Disclose
- Recep Savas, MD: Nothing to Disclose

**TEACHING POINTS**

1. To demonstrate various diseases involving intraocular spaces at 3T MRI
2. To highlight importance of surface coil usage in the intraocular lesions
3. To make differential diagnosis between intraocular lesions

**TABLE OF CONTENTS/OUTLINE**

- Imaging Techniques
- Classification of intraocular lesions
- Review of imaging findings
- Sample cases
- Summary

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**NRE282**

**Multimodality Approach to Imaging of Epiphora - Tears Matter**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Anand Sastry, MBBS (Presenter): Nothing to Disclose
- Muthu Balasubramaniam, FRCP: Nothing to Disclose
- Arun David Jacob, MBBS, FRCP: Nothing to Disclose

**TEACHING POINTS**

1. The nasolacrimal drainage system drains the tears from the eyes. This system is susceptible to variety of pathological entities presenting clinically as epiphora.
2. Imaging provides both structural and functional information of the nasolacrimal duct (NLD) system.
3. The digital subtraction dacryocystography and dacryoscintigraphy provides structural and functional information respectively, whilst the cross sectional studies such as CT and MRI provide additional soft tissue information.

**TABLE OF CONTENTS/OUTLINE**

1. Imaging anatomy of the nasolacrimal apparatus using Digital subtraction dacryocystography with schematic illustration.
2. Aetiology of epiphora is classified under Congenital, Inflammatory, infection, traumatic, neoplastic and functional. Each topic is described with relevant examples using multi-modality imaging. Examples of some of the cases include Absent inferior canaliculus, Dacrocystocele, Chronic canaliculitis, Aspergilosis invading the nasolacrimal duct (NLD), Dacrocystolith, orbital floor fracture involving the NLD, Sinonasal neoplasms invading the NLD, functional epiphora with normal anatomical patency of NLD etc.
3. Post-operative imaging appearance of Dacrocystorhinostomy- A surgery commonly performed in the management of epiphora.
4. Emerging Role of MR dacryocystography and the limitations.
Multimodality Imaging of Diffuse Thyroid Disease: More than Just "Goiter"

**Education Exhibits**
Location: NR Community, Learning Center

**Participants**
- Shuchi Kiri Rodgers MD (Presenter): Nothing to Disclose
- Crystal Chang MD: Nothing to Disclose
- Peter S. Wang MD: Nothing to Disclose
- Huyen D. Tran MD: Nothing to Disclose

**TEACHING POINTS**
1. To describe a systematic approach to thyroid ultrasound.
2. To review the classic patterns of benign diffuse thyroid disease focusing on autoimmune thyroid disease (Graves' disease and various forms of thyroiditis including Hashimoto's thyroiditis).
3. To review the classic appearance of thyroid goiter on ultrasound and other imaging modalities.
4. To review imaging findings differentiating benign from malignant diffuse thyroid disease.

**TABLE OF CONTENTS/OUTLINE**
- Systematic approach thyroid ultrasound size, contour, echogenicity assessment of nodules or calcifications
- Thyroid vascularity on color Doppler
- Evaluation of adjacent lymph nodes
- Benign diffuse thyroid disease
- Classic patterns of Graves' disease and thyroiditis
- Imaging characteristics of suspicious focal lesion in background of thyroiditis
- Multimodality imaging of the thyroid goiter ultrasound chest x-ray nuclear medicine computed tomography magnetic resonance imaging
- Malignant diffuse thyroid disease
- Key imaging features in distinguishing benign from malignant thyroid disease
- Case examples: Metastatic disease
- Infiltrating papillary carcinoma
- Lymphoma
- Anaplastic thyroid cancer

Pitfalls in Ultrasound Diagnosis of Major Salivary Glands Diseases

**Education Exhibits**
Location: NR Community, Learning Center

**Certificate of Merit**

**Participants**
- Ewa Jolanta Bialek MD, PhD (Presenter): Nothing to Disclose
- Wieslaw Jakubowski MD, PhD: Nothing to Disclose

**TEACHING POINTS**
Recall shortly ultrasound (US) anatomy of salivary glands. Describe basic US features of most common salivary glands diseases and present potential diagnostic pitfalls. Display anatomical US cases mimicking pathology. Familiarize with overlapping US presentations of different pathologies (benign and malignant) affecting major salivary glands. Exemplify circumstances of overlooking a malignancy. Present diseases of surrounding organs or tissues possible to be mistaken with salivary glands disease.

**TABLE OF CONTENTS/OUTLINE**
- Anatomy of salivary glands (short recollection including US anatomy)
- List of main salivary glands diseases
- Examples of diseases and their mimics on US images including: normal anatomy that may be taken for pathology similar ultrasound features of different diseases (benign mimicking malignant and malignant mimicking benign) extraglandular pathology that may be described as intraparenchymal salivary mass atypically or uncommonly located pathology originating from salivary gland tissue
- Some tips how to avoid a mistake if they exist

Sizing Up the Extraocular Muscles: Small or Big?

**Education Exhibits**
Location: NR Community, Learning Center

**Participants**
- Minesh Patel MD (Presenter): Nothing to Disclose
- Anna Knobel MD: Nothing to Disclose
- Deborah Rachelle Shatzkes MD: Nothing to Disclose

**TEACHING POINTS**
Review the anatomy and innervations of the extraocular muscles (EOM). Present various pathological conditions that cause the EOMs to either increase or decrease in size. Describe the general categories of relevant disease processes, which will help approach cases in a systematic manner. Discuss patterns of involvement and other imaging features specific to some conditions that can help narrow the differential diagnosis. Emphasize the importance of correlating radiologic findings with clinical history, ancillary tests and in some cases, tissue sampling.

**TABLE OF CONTENTS/OUTLINE**
1. Introduction
2. Anatomy and innervation
   - Cases: Duane syndrome, congenital palsy/hypoplasia, cranial nerve palsies, chronic progressive external ophthalmoplegia, mitochondrial myopathy, myasthenia gravis.
   - 4. Large EOMs: Etiologies: Idiopathic/inflammatory, autoimmune, infectious, vascular, trauma, neoplasm.
   - Cases: Orbital pseudotumor, sarcoidosis, Erdheim-chester disease, thyroid orbitopathy, acute invasive fungal sinusitis, ethmoid sinusitis, cavernous sinus dural AVF, SOV thrombosis, lymphangiomatosis, trauma/iatrogenic, lymphoma, metastases.
4. Conclusion

Spitting Images: Anatomy and Pathology of the Major Salivary Glands

**Education Exhibits**
Location: NR Community, Learning Center

**Participants**
- Minesh Patel MD (Presenter): Nothing to Disclose
- Anna Knobel MD: Nothing to Disclose
- Deborah Rachelle Shatzkes MD: Nothing to Disclose

**TEACHING POINTS**
- Review the anatomy and innervations of the extraocular muscles (EOM). Present various pathological conditions that cause the EOMs to either increase or decrease in size. Describe the general categories of relevant disease processes, which will help approach cases in a systematic manner. Discuss patterns of involvement and other imaging features specific to some conditions that can help narrow the differential diagnosis. Emphasize the importance of correlating radiologic findings with clinical history, ancillary tests and in some cases, tissue sampling.

**TABLE OF CONTENTS/OUTLINE**
1. Introduction
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   - Cases: Duane syndrome, congenital palsy/hypoplasia, cranial nerve palsies, chronic progressive external ophthalmoplegia, mitochondrial myopathy, myasthenia gravis.
   - 4. Large EOMs: Etiologies: Idiopathic/inflammatory, autoimmune, infectious, vascular, trauma, neoplasm.
   - Cases: Orbital pseudotumor, sarcoidosis, Erdheim-chester disease, thyroid orbitopathy, acute invasive fungal sinusitis, ethmoid sinusitis, cavernous sinus dural AVF, SOV thrombosis, lymphangiomatosis, trauma/iatrogenic, lymphoma, metastases.
4. Conclusion
Participants

Susan Sotardi MD, MS (Presenter): Nothing to Disclose
Jacqueline Anne Bello MD: Nothing to Disclose
Thomas Ow: Nothing to Disclose
Keivan Shifted MD: Nothing to Disclose

TEACHING POINTS

1. Review anatomy of the major salivary glands. 2. Provide an approach to differential diagnosis of salivary gland pathology. 3. Provide a pictorial review of common and rare major salivary gland pathologies, including congenital, infectious, inflammatory, acquired, benign and neoplastic abnormalities.

TABLE OF CONTENTS/OUTLINE


NRE287

Stones, Bones, Groans and Moans- Case Based Review of Ectopic Parathyroid Adenomas

Participants

Michael James Connolly BSC, MD (Presenter): Nothing to Disclose
Santanu Chakraborty FRCR, DMRD: Speakers Bureau, Merck KGaA, Speakers Bureau, Novartis AG Grant, Bayer AG
Marlise Peruzzo Dos Santos MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: -To review the pathophysiology of parathyroid adenomas, the most common cause for primary hyperparathyroidism -To review the embryogenesis of parathyroid glands -To review the prevalence and locations of ectopic parathyroid adenomas, a major cause for failed neck exploration for primary hyperparathyroidism -To explain the utility of preoperative, multi-modality imaging studies for localization of parathyroid adenomas.

TABLE OF CONTENTS/OUTLINE

Pathophysiology of primary hyperparathyroidism and parathyroid adenomas. Embryogenesis of parathyroid glands. Incidence and locations of ectopic parathyroid adenomas. Review of imaging findings -CT -Sestamibi iodine I123 subtraction studies -99mTc-MIBI SPECT/CT Sample cases Summary and Recommendations.

NRE288

The Spectrum of Cervical Lymphadenopathy: From Mundane to Macabre

Participants

Chinmay Nagesh MBBS, MD: Nothing to Disclose
Rahul Ganapati Hegde MBBS, MD (Presenter): Nothing to Disclose
Anagha Ravi Josa MD, MBBS: Nothing to Disclose
Hardik Uresh Shah MBBS, MD: Nothing to Disclose
Bhagya Sannanangajja MBBS, MD: Nothing to Disclose
Suleman Adam Merchant MD: Nothing to Disclose

TEACHING POINTS

To review the normal appearance of cervical lymph nodes on CT and MRI with emphasis on morphology and size criteria. To describe the morphological characteristics and enumerate enhancement patterns in order to reach more specific diagnoses, a spectrum from the usual to rare. To enumerate patterns of involvement at various levels in the neck with differing pathologies. To discuss the possible mimics of cervical lymph nodes.

TABLE OF CONTENTS/OUTLINE

Normal cervical lymph nodes: appearance, size criteria and lymph node levels. Pathological lymph nodes: Imaging characteristics by aetiology Infectious: Cervical adenitis, Tuberculosis, HIV related lymphoepithelial lesions. Auto-immune / Quasimalignant: Castleman's disease, Kikuchi's disease, Kimura's disease. Neoplastic: Primary: Head and neck lymphomas Metastatic: Squamous cell carcinomas of head and neck, Thyroid carcinomas. Mimes of cervical lymphadenopathy: Carotid body tumor, ectopic thyroid, soft tissue tumors such as hemangiomas, nerve sheath tumors. Conclusion: Cervical lymph nodes, as those in the body, need to be assessed in terms of morphology (including the presence of calcification and necrosis), margins, enhancement characteristics and patterns of involvement by level and laterality.

NRE289

What is your Diagnosis? Common and Uncommon Cystic Lesions of the Neck. A Case-based, Computer-interactive Tutorial

Participants

Chinmay Nagesh MBBS, MD: Nothing to Disclose
Rahul Ganapati Hegde MBBS, MD (Presenter): Nothing to Disclose
Anagha Ravi Josa MD, MBBS: Nothing to Disclose
Hardik Uresh Shah MBBS, MD: Nothing to Disclose
Bhagya Sannanangajja MBBS, MD: Nothing to Disclose
Suleman Adam Merchant MD: Nothing to Disclose

TEACHING POINTS

To review the normal appearance of cervical lymph nodes on CT and MRI with emphasis on morphology and size criteria. To describe the morphological characteristics and enumerate enhancement patterns in order to reach more specific diagnoses, a spectrum from the usual to rare. To enumerate patterns of involvement at various levels in the neck with differing pathologies. To discuss the possible mimics of cervical lymph nodes.
TEACHING POINTS
1. Describe the imaging appearance of the most common cystic neck masses. 2. Learn less common cystic lesions that must also be considered in the differential diagnosis. 3. Learn the typical locations of these various cystic neck lesions.

TABLE OF CONTENTS/OUTLINE
Cystic neck masses can be a diagnostic challenge for the radiologist. It is important to consider both common and uncommon entities when faced with these lesions. One needs to consider congenital, neoplastic, and miscellaneous lesions. Reviewers are challenged with both common and uncommon cystic neck lesions utilizing a case-based, computer-interactive quiz format. Each case includes representative images that illustrate key diagnostic findings for the disease entity. A brief discussion highlighting salient clinical and imaging features follows each case. Cases include: Congenital lesions: thyroglossal duct, branchial cleft (II-IV), cervical bronchogenic, and thymic cysts, as well as venolymphatic malformations. Neoplastic lesions: nodal metastases, dermoid and epidermoid cysts, and cystic schwannomas. Miscellaneous lesions: abscesses and saccular cysts.

NRE290
"What Lies Beneath?" - Imaging Assessment of the Submucosal Laryngeal Lesion

**Education Exhibits**

**Participants**
Neil Hemant Thakur MD (Presenter): Nothing to Disclose
Nancy Jane Fischbein MD: Nothing to Disclose

**TEACHING POINTS**
Familiarize the reader with common and uncommon submucosal laryngeal lesions. Identify key imaging features that can help differentiate among the various neoplastic and non-neoplastic submucosal laryngeal lesions. Recognize potential 'don't touch' submucosal laryngeal lesions. Review next step in management of these lesions.

**TABLE OF CONTENTS/OUTLINE**
- Essential laryngeal anatomy will be reviewed via diagrams and patient cross-sectional imaging studies.
- Through a number of CT and MRI cases from our institution the reader will be exposed to various submucosal laryngeal lesions including: benign and malignant neoplastic, infectious, inflammatory, vascular, congenital and traumatic.
- Key imaging features on CT and MRI, etiology, patient demographics, and next steps in management for the various lesions will be reviewed.

NRE291
CT of the Postoperative Midfacial Skeleton Following Trauma: Review of Normal Appearances and Common Complications

**Education Exhibits**

**Participants**
Michael Jason Reiter DO (Presenter): Nothing to Disclose
Ryan Becton Schwope MD: Nothing to Disclose
Jonathan Kini: Nothing to Disclose
Jared Theler: Nothing to Disclose

**TEACHING POINTS**
The major teaching points of this exhibit are:
1. Repair of midfacial fractures is warranted to restore both form and function as the facial skeleton protects the brain and globes in addition to serving as a framework for soft tissues and as a site for muscular attachment
2. Le Fort fractures undergo plate and screw fixation, often at the ZMB, infraorbital rim and ZF suture, depending on the pattern
3. 2-point fixation for NOE fractures is at the piriform rim and nasofrontal junction; infraorbital rim may be plated as necessary
4. Sinus preservation is ideal following frontal sinus fractures but obliteration or cranialization are performed depending on the presence of outflow tract disruption or CSF leak
5. Failed repair due to improper alignment, mucocele formation, infection and temporal hollowing are potential complications

**TABLE OF CONTENTS/OUTLINE**
1. Indications for surgical intervention of midfacial fractures
   a. Le Fort
   b. Naso-orbital-ethmoidal (NOE)
   c. Frontal sinus
2. Operative approaches
   a. Le Fort
   b. NOE
   c. Frontal sinus
3. Goals of surgical repair and the desired CT appearance in the postoperative setting
   a. Overview
   b. Le Fort
   c. NOE
   d. Frontal sinus
4. Common complications
   a. Failed repair
   b. Infection
   c. Temporal hollowing

NRE293

Don’t Lose Your Head: The Spectrum of Blunt Cranio cervical Junction Injury at a Level I Trauma Center

Education Exhibits
Location: NR Community, Learning Center

Participants
Juveria Siddiqui MBBS, MRCS (Presenter): Nothing to Disclose
Tom Campion MBChB, BA: Nothing to Disclose
Richard Jonathan Paul Smith MBChB, MA: Nothing to Disclose
Amit Roy MBBS, MRCS: Nothing to Disclose
Ashok Adams MRCP, FRCR: Nothing to Disclose

TEACHING POINTS
- Cranio cervical junction (CCJ) injuries carry significant morbidity and mortality.
- The normal bony, ligamentous and vascular anatomy of the CCJ.
- Examples of subtle and major osseous, ligamentous and vascular traumatic injuries to this region.

TABLE OF CONTENTS/OUTLINE
- CCJ injuries are common traumatic injuries of the skull base and cervical spine. Mechanisms may include hyperextension, hyperflexion, distraction and axial load injuries.
- The unique anatomy and biomechanics of the cranio cervical junction give risk to characteristic injury patterns, which may be subtle to detect.
- This educational exhibit explains normal bony, ligamentous and vascular anatomy of the cranio cervical junction.
- All CCJ injuries at our level I trauma center over the last 5 years were reviewed. Here we provide a method of assessment for the region, and highlight features not to be missed.
- We describe classification with relevance to further management.
- CT/MR imaging examples will include:
  - Osseous and ligamentous injuries: occipital condyle, atlas and axis fracture patterns and instability, C2-3 facetal injuries, as well as atlanto-occipital disassociation, and distraction injuries.
  - Non-osseous, non-ligamentous vascular injuries including transection, dissection, AV fistulae and pseudoaneurysms.

NRE294

Head and Neck Trauma from Blast Injuries: Boston Marathon Bombing Experience

Education Exhibits
Location: NR Community, Learning Center

Participants
Ajay K. Singh MD (Presenter): Nothing to Disclose
Edward Kiho Sung MD: Nothing to Disclose
John Franklin Brunner MD: Nothing to Disclose
Karen Buch MD: Nothing to Disclose
Osamu Sakai MD, PhD: Speaker, Bracco Group Speaker, KYORIN Holdings, Inc Speaker, Eisai Co, Ltd
Stuart R. Pomerantz MD: Research Grant, General Electric Company
Aaron D. Sodickson MD, PhD: Research Grant, Siemens AG
Michael H. Lev MD: Research support, General Electric Company Stockholder, General Electric Company

TEACHING POINTS
- This exhibits describes the imaging features of primary, secondary and tertiary blast wave injuries from Boston marathon bombing.
- Cases from Boston marathon bombing will be used to describe how a low detonation device can still cause significant injuries to the head and neck.

TABLE OF CONTENTS/OUTLINE
- Introduction
  - Blast waves: primary, secondary and tertiary blast waves
- Reasons for the infrequency of upper body injuries:
  1. Location of blast device
  2. Low power explosive
  3. Protection by bony calvarium
- Reasons for intracranial injuries:
  - Passage of shrapnel through the weak spots: Orbital and external auditory canal
  - Passage of Examples of injuries to head and neck:
  1. Ocular rupture and orbital foreign bodies
  2. Intracranial shrapnel with frontal lobe laceration
  3. Facial injuries: Nasal and orbital wall fractures
  4. Neck injuries: Tympanic membrane perforation from shrapnel
  5. Scalp foreign bodies and subgaleal hematoma

NRE295

Imaging of the Complications of Middle Ear Surgery: How Do I Keep my Favorite Surgeon away from Jail?

Education Exhibits
Location: NR Community, Learning Center

Participants
Aina Venkatasamy (Presenter): Nothing to Disclose
Marcela DE ALMEIDA CAVALCANTI: Nothing to Disclose
Sophie Anne Cahen Riehm MD: Nothing to Disclose
Francis P. Veillon MD: Nothing to Disclose

TEACHING POINTS
- The most common surgical complications of middle ear surgery are facial nerve lesions, meningoencephalocele. For stapes surgery they may concern the middle ear, the inner ear or the oval window. These complications may be prevented by a precise and oriented analysis of the preoperative imaging.

TABLE OF CONTENTS/OUTLINE
1) Complications of middle ear surgery (cholesteatoma) 1.1 Facial nerve lesions 1.2 Meningoencephalocele 2) How to prevent these complications? 2.1 Facial nerve position Lowered VII-2 Dehiscent VII-2 canal, with or without inferior nerve herniation Anteriorized VII-3 2.2 Position of the sigmoid sinus 2.3 Height of the tegmen 2.4 Osteomatous otitis masking VII-2 or semicircular canal 3) Complications of stapes surgery (otosclerosis) 3.1 Middle ear Lateral displacement of the prosthesis Erosion of the long process of the incus 3.2 Oval window Perilymphatic fistula Hemorrhage (wound to a persistent stapedial artery) Granuloma/scarring tissue in the OW 3.3 Inner ear Pneumolabyrinth Intra vestibular displacement of the prosthesis or granuloma Infectious labyrinthitis Cophosis on Gusher ear 4) How to prevent these complications? 4.1 Position of the VII-2 4.2 Stenosis/congenital hypoplasia of the OW 4.3 Persistence of a stapedial artery 4.4 Associated inner ear malformations

NRE296
CT and MR Imaging of Aspergillosis in the Head and Neck: Typical and Atypical Manifestations

Education Exhibits
Location: NR Community, Learning Center

Participants
Ryutarou Ukisu MD (Presenter): Nothing to Disclose
Yusuke Inoue MD, PhD : Nothing to Disclose
Takuro Yamane : Nothing to Disclose
Asami Otsuka : Nothing to Disclose
Rie Shimada : Nothing to Disclose

TEACHING POINTS
Head and neck aspergillosis occurs in both invasive and noninvasive forms, and the former is a major cause of morbidity and mortality in immunosuppressed patients. Diagnosis of aspergillosis is often complicated by the varied clinical presentation, however, the delay of prompt diagnosis can be life-threatening. The purpose of this exhibit is: 1) to know the typical and atypical manifestations of aspergillosis on CT/MR imaging; 2) to recognize radiologic-pathologic correlation in aspergillosis. By being familiar with this entity, the radiologist can contribute to early recognition that facilitates timely treatment of these potentially life-threatening disorders.

TABLE OF CONTENTS/OUTLINE
Introduction Etiology, Pathology, treatment and prognosis based on clinical classification Case presentation with /without complications A. Paranasal sinus 1) Mycetoma 2) Acute invasive aspergillosis i) bilateral IC occlusion, ii) pseudoaneurysm and iii) others 3) Chronic invasive aspergillosis i) blindness, ii) cerebral mycetoma mimicking brain neoplasm 4) Granulomatous invasive aspergillosis B. Temporal bone 1) Aspergillus otomastoiditis with dural sinus thrombosis 2) Malignant external otitis with brain abscess C. Neck 1) Deep neck space infections

NRE299
Head and Neck Lesions in IgG4-related Disease - A Newly Recognized Systemic Inflammatory Condition

Education Exhibits
Location: NR Community, Learning Center

Participants
Maira Sarpi MD (Presenter): Nothing to Disclose
Regina Lucia Elias Gomes MD : Nothing to Disclose
Marcio Ricardo Taveira Garcia MD : Nothing to Disclose
Flavia I. Cevasco MD : Nothing to Disclose
Mauro Miguel Daniel MD : Nothing to Disclose
Eloisa Maria Santiago Gebrim MD : Nothing to Disclose

TEACHING POINTS
Literature review emphasizing head and neck manifestations of IgG4-related disease(s) (a newly recognized clinical condition). To highlight and exemplify possible imaging features and follow up findings using clinical cases. To aggregate this differential diagnosis in the evaluation of head and neck tumors.

TABLE OF CONTENTS/OUTLINE
IgG4-related disease has been recently recognized as an inflammatory condition, characterized by pseudotumoral lesions and particular histopathological findings. Recently the occurrence in diverse organs was linked, so previously recognized head and neck distinct lesions are now acknowledged as manifestations of this disease (inflammatory pseudotumors, Küttner’s tumor, Mikulicz’s syndrome, Riedel’s thyroiditis, etc). In some patients it manifests in a single structure, and the differential diagnosis with tumors is important. Initially imaging features do not permit this distinction, but when clinical and histopathological data directs to an IgG4-related disease, imaging follow up demonstrates a characteristic significative response to treatment with glucocorticoids. Cases selected from our digital archive will demonstrate the manifestations in diverse head and neck structures (parotid gland, skull base, paranasal sinuses, parotid gland, parapharyngeal space and lymph nodes) and follow-up imaging findings .

NRE300
Orbital Inflammation & Infection: What Does the Clinician Need to Know?

Education Exhibits
Location: NR Community, Learning Center

Participants
Bethany Milliron MD (Presenter): Nothing to Disclose
Kristen Lloyd Baugnon MD : Nothing to Disclose
Hee Joon Kim MD : Nothing to Disclose
Hans Grossniklaus MD, MBA : Nothing to Disclose
Ashley Hawk Aiken MD : Nothing to Disclose
TEACHING POINTS

- Review orbital and periorbital anatomy
- Describe imaging features of orbital inflammatory and infectious processes
- Discuss pertinent findings important to clinician to direct diagnosis and biopsy

TABLE OF CONTENTS/OUTLINE

1. Review orbital and periorbital anatomy
   a. Structures within the orbits (globe, extraocular muscles, lacrimal glands, etc)
   b. Pertinent periorbital structures (paranasal sinuses, cavernous sinus)
2. Orbital infections
   a. Orbital cellulitis
   b. Complications of bacterial and invasive fungal sinusitis
3. Orbital inflammation
   a. Common causes
      i. Thyroid eye disease
      ii. Nonspecific orbital inflammation
        (pseudotumor)
   b. Uncommon causes
      i. Sarcoidosis
      ii. Wegener's granulomatosis
      iii. Lupus, scleroderma iv. IgG4
4. Management of orbital inflammation and infection

TABLE OF CONTENTS/OUTLINE

1-Updated classification of sialadenitis 2-Mertis and limitations of routine and advanced imaging modalities for diagnosis of sialadenitis 3-Imaging findings differentiate acute sialadenitis from abscess 4-Ultrasound and MR findings of chronic recurrent juvenile sialadenitis 5-Imaging appearance of IgG4-related chronic sclerosing sialadenitis 6-Ultrasound and MR sialogram and interventional of obstructive sialadenitis 7-Imaging appearance of specific sialadenitis such as TB and HIV 8-Imaging biomarkers such as diffusion MR imaging for prediction of radiation induced sialadenitis 9- Imaging appearance of specific sialadenitis such as sarcoid 10-Role of imaging in differentiation sialadenitis from simulating lesions 11-Role of imaging in follow up and monitoring patients with sialadenitis after therapy 12-Summary and future directions

TABLE OF CONTENTS/OUTLINE

1. Hyperparathyroidism: diagnosis and therapy. 2. State of the art imaging and issues in presurgical localization of parathyroid adenomas: literature review. 3. Qualitative elastography with Ueno score and semi-quantitative strain ratio measurements in parathyroid adenoma localization. 4. US features of parathyroid adenoma and differentiation from paratracheal lymph nodes and ectopic thyroid nodules. 5. Parathyroid lesions at 2D and 3D US elastography, with image review of representative cases from our cohort - 34 cases of parathyroid adenomas and 16 cases of hyperplasia, 4 carcinomas. 6. Stiffness and US 2-D and 3-D features correlated with parathyroid adenoma, differentiating it from reactive lymph nodes of chronic thyroiditis and benign posterior thyroid nodules. 7. Differential diagnosis and role of the various imaging modalities. 8. Conclusion.
**4D Parathyroid CT: A Pictorial Essay on How to Localize Parathyroid Adenomas**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

Melissa Mei Chen MD (Presenter): Nothing to Disclose  
Wilson Altmeyer MD: Nothing to Disclose  
Erin Flaherty MD: Nothing to Disclose  
Bundhit Tantiwongkosi MD: Nothing to Disclose  
Darlene Fong Metter MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is:

1. To describe the 4D CT technique in the evaluation of parathyroid adenomas.  
2. To review the imaging characteristics of surgically proven parathyroid adenomas and correlation with imaging findings on ultrasound and sestimibi scintigraphy.

**TABLE OF CONTENTS/OUTLINE**

1. Description of the 4D CT technique  
2. Imaging characteristics of parathyroid adenomas on 4D CT.  
3. Common pitfalls of diagnosing parathyroid adenomas, including anatomic variants.  
4. CONCLUSION: Imaging, particularly 4D CT, has provided head and neck surgeons with a critical diagnostic tool in localizing parathyroid adenomas. Knowledge of anatomic variants and enhancement characteristics of the parathyroid adenoma are key in making the diagnosis.

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**NRE304**

An Imaging Checklist and Algorithm for Accurate Staging of Laryngeal Squamous Carcinoma in the Era of Laryngeal Conservation: What Really Matters and Why?

*Education Exhibits*

*Location: NR Community, Learning Center*

*Certificate of Merit*

**Participants**

Supreeta Arya MD (Presenter): Nothing to Disclose  
Ankur Pradeep Gupta MBBS: Nothing to Disclose  
Hirofumi Kuno MD: Nothing to Disclose  
Suresh K. Mukherji MD: Nothing to Disclose

**TEACHING POINTS**

1. To bring awareness of therapy options for various stages of laryngeal cancer in this era of multidisciplinary disease management.  
2. To highlight the critical imaging information that can impact choice of therapy.  
3. To review the role of various imaging methods to provide this information, describe pitfalls and suggest an imaging algorithm to maximize information from imaging.

**TABLE OF CONTENTS/OUTLINE**

Treatment goals in laryngeal cancers, conclusions of the major Phase III trials in laryngeal cancers and outline of stage based therapy in laryngeal cancers Imaging features of laryngeal cancers in various stages and the “key” features that can alter therapy plan. Review of literature to assess accuracy of imaging to predict the “key” features as well as to predict prognosis following definitive radiotherapy and chemo-radiotherapy Pitfalls in staging and a suggested imaging algorithm for clinical practice.

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**NRE305**

Beyond Skin Deep: Role of CT and MR in the Evaluation of Cutaneous Malignancies of the Head and Neck

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

Marin Alisa McDonald MD, PhD (Presenter): Nothing to Disclose  
Julie Bykowski MD: Nothing to Disclose

**TEACHING POINTS**

- CT and MRI serve important roles in the evaluation of locoregional spread of non-melanoma head and neck cutaneous malignancies.  
- Accurate imaging diagnosis of recurrence requires understanding of local, lymphatic and perineural pathways and correlation with clinical symptoms.

**TABLE OF CONTENTS/OUTLINE**

Table of contents: Review of NCCN guidelines for surgical and/or adjuvant treatment of non-melanoma head and neck cutaneous malignancies based on stage and pathological grade. Case series illustrating the role of CT and MRI in the assessment of large, deeply invasive cutaneous malignancies, suspected recurrence, nodal metastasis, and suspected...
perineural spread. Specific cases will include: Direct soft tissue, parotid gland and osseous invasion Occipital and parotid nodal metastases Extracranial perineural extension (Fig 1-3) Intracranial perineural extension Dural invasion (Fig 4) Orbital extension and recurrence after exenteration (Fig 5) Recurrence presenting as non-healing soft tissue ulceration Osteoradionecrosis Presentation and recurrence in immunocompromised/immunosuppressed patients Brief self-assessment test to consolidate the basic principles and approach for successful diagnosis.

**NRE306**

**Clinical Presentation and Imaging Findings of Chronic Sclerosing Sialadenitis for Smart Diagnosis and Therapy for IgG4-related Diseases**

*Education Exhibits*

Location: NR Community, Learning Center

Certificate of Merit

**Participants**

- Etsushi Iida MD (Presenter): Nothing to Disclose
- Matakazu Furukawa MD: Nothing to Disclose
- Takaaki Ueda: Nothing to Disclose
- Masahiro Tanabe MD: Nothing to Disclose
- Yoshiie Kunihiro MD: Nothing to Disclose
- Naofumi Matsunaga MD, PhD: Nothing to Disclose

**TEACHING POINTS**

This exhibit illustrates multimodal imaging findings of chronic sclerosing sialadenitis (CSS) with correlation of the clinical presentation and pathologic findings. CSS is one of IgG4-related diseases which involve various organs. Radiologists should know the clinical presentation and the imaging findings of the CSS to diagnose IgG4-related disease efficiently when the other critical organ might be involved in this entity, because the diagnostic biopsy of most of those affected organs is often invasive and difficult to perform without risk, while biopsy of the salivary gland is considered safe and less invasive way to the accurate diagnosis.

**TABLE OF CONTENTS/OUTLINE**

1. Introduce a history of chronic sclerosing sialadenitis from Küttnner tumor in 1896 to recent concept of IgG4-related disease. 2. Review of clinical presentation of chronic sclerosing sialadenitis. 3. Review of CT, MR, PET-CT and ultrasonography of chronic sclerosing sialadenitis in comparison with resected specimens. 4. Differential diagnosis of chronic sclerosing sialadenitis. 5. Review of clinical presentation of the other IgG4-related diseases. 6. Review of CT, MR, PET-CT and ultrasonography of the other IgG4-related diseases. 7. Discussion the treatment of the IgG4-related diseases.

**NRE307**

**Current Concepts in Molecular Genetics and Management of Thyroid Malignancies: An Update for Radiologists**

*Education Exhibits*

Location: NR Community, Learning Center

Selected for RadioGraphics

**Participants**

- Tatiana Kellil MD (Presenter): Nothing to Disclose
- Stephanie A. Howard MD: Nothing to Disclose
- Michael Hayden Rosenthal MD, PhD: Nothing to Disclose
- Katherine Margaret Krajewski MD: Research Grant, General Electric Company Spouse, Employee, Ironwood Pharmaceuticals, Inc
- Nikhil H. Ramaiya MD: Nothing to Disclose
- Sreeharsha Tirumani MBBS, MD: Nothing to Disclose

**TEACHING POINTS**

1. Epithelial thyroid malignancies are of follicular cell (follicular (FTC), papillary (PTC), Hurthle cell, anaplastic thyroid carcinoma) or c-cell (medullary thyroid carcinoma (MTC)) origin. 2. PTC is associated with mutations in the APC gene (Familial Adenomatous Polyposis), familial non-MTC, Carney syndrome and childhood radiation. 3. FTC is associated with mutations in the PTEN gene (PTEN-hamartoma). 4. MTC is associated with RET gene mutations (multiple endocrine neoplasia 2A/B and familial MTC). 5. Imaging plays a crucial role in early detection and accurate staging of thyroid cancer, and in detecting other syndromes associated with them. 6. Correlation with biochemical markers can help radiologists in interpreting images. 7. Prognostic factors in thyroid malignancies include anaplastic histology, tumor size, familial PTC; RET mutation in sporadic MTC and vascular invasion.

**TABLE OF CONTENTS/OUTLINE**

1. Describe WHO classification of thyroid malignancies. 2. Review molecular genetics of thyroid malignancies with emphasis on syndromes associated with them. 3. Illustrate the role of multimodality imaging (CT, MRI, PET/CT) in staging, evaluating treatment response and post treatment surveillance. 4. Elucidate advances in imaging techniques including new radiotracers. 5. Discuss advances in treatment including molecular targeted therapies.

**NRE308**

**Determination of Unresectability in Head and Neck Cancer with Imaging**

*Education Exhibits*

Location: NR Community, Learning Center

Certificate of Merit

**Participants**

- Etsushi Iida MD (Presenter): Nothing to Disclose
- Matakazu Furukawa MD: Nothing to Disclose
- Takaaki Ueda: Nothing to Disclose
- Masahiro Tanabe MD: Nothing to Disclose
- Yoshiie Kunihiro MD: Nothing to Disclose
- Naofumi Matsunaga MD, PhD: Nothing to Disclose

**TEACHING POINTS**

- Epithelial thyroid malignancies are of follicular cell (follicular (FTC), papillary (PTC), Hurthle cell, anaplastic thyroid carcinoma) or c-cell (medullary thyroid carcinoma (MTC)) origin. 2. PTC is associated with mutations in the APC gene (Familial Adenomatous Polyposis), familial non-MTC, Carney syndrome and childhood radiation. 3. FTC is associated with mutations in the PTEN gene (PTEN-hamartoma). 4. MTC is associated with RET gene mutations (multiple endocrine neoplasia 2A/B and familial MTC). 5. Imaging plays a crucial role in early detection and accurate staging of thyroid cancer, and in detecting other syndromes associated with them. 6. Correlation with biochemical markers can help radiologists in interpreting images. 7. Prognostic factors in thyroid malignancies include anaplastic histology, tumor size, familial PTC; RET mutation in sporadic MTC and vascular invasion.

**TABLE OF CONTENTS/OUTLINE**

1. Describe WHO classification of thyroid malignancies. 2. Review molecular genetics of thyroid malignancies with emphasis on syndromes associated with them. 3. Illustrate the role of multimodality imaging (CT, MRI, PET/CT) in staging, evaluating treatment response and post treatment surveillance. 4. Elucidate advances in imaging techniques including new radiotracers. 5. Discuss advances in treatment including molecular targeted therapies.
TEACHING POINTS

Head and neck cancer, particularly potentially unresectable advanced lesions, should be accurately evaluated because the results strongly impact on a treatment planning and patient outcomes. Radiologists must carefully detect the presence of deep invasion that may upstage a tumor to stage T4b and predict inoperability in cases of lymph node metastases. The most common and crucial factors associated with unresectability are carotid encasement, prevertebral fascia involvement and nasopharyngeal extension. Understanding the advantages, limitations, and appropriate criteria of each imaging modality (CT/MRI) for detecting the factors that determine unresectability improves decision-making regarding treatment, thus ensuring optimal therapeutic outcomes.

TABLE OF CONTENTS/OUTLINE

Factors associated with unresectable head and neck cancer (mainly, oro/hypopharyngeal and laryngeal cancer). Cases illustrating various patterns of unresectability. Some of the information is presented as a quiz, followed by case presentations with the patients’ treatment choice/outcome and histopathological findings: Resectability issues for primary disease: carotid encasement, prevertebral fascia involvement and nasopharyngeal extension Resectability issues for lymph node metastases: carotid encasement and invasion of the deep layer of the deep cervical fascia

NRE309

Elastography of Cervical Lymph Nodes: Which Index Can Predict Benignity or Malignancy?

Education Exhibits
Location: NR Community, Learning Center

Participants
Osmar Cassio Saito MD, PhD (Presenter): Nothing to Disclose
Igor Fontenele MD : Nothing to Disclose
Maria Cristina Chammas MD : Nothing to Disclose
Andrea Cavalanti Gomes MD : Nothing to Disclose
Yerma Fugikawa MD : Nothing to Disclose
Giovanni Guido Cerri MD, PhD : Nothing to Disclose

TEACHING POINTS

(1) The purpose of this educational exhibit is describe the imaging patterns of elastography in solid or cystic/solid benign and malignant cervical lymph nodes; (2) To establish a mean index in the solid component of benign or malignant cervical lymph nodes; (3) To compare elastography results with FNA or surgery findings; (4) To be able to reproduce the static elastography step by step after reading this presentation.

TABLE OF CONTENTS/OUTLINE

Cervical lymph nodes are frequent and its cause usually is confirmed by FNA or surgery. Static elastography is a new ultrasound modality that provides information about tissue distortion under local pressure. Basically there are three sorts of elastography: static, share wave and ARFI. We used the static elastography. Hard nodes are supposed to be malign whereas benign ones are usually soft. We made a retrospective study with 64 cases and our results are similar to the worldwide experience. However there is no consensus regarding the elastography index concerning benignity or malignity nature. In our study benign nodules have an index mean of 1,6 whereas a mean index of 6,0 or more is certainly considered to be malign.

NRE310

Elastography of Thyroid Nodules: Which Elastography Index Can Predict Malignancy?

Education Exhibits
Location: NR Community, Learning Center

Cum Laude

Participants
Osmar Cassio Saito MD, PhD (Presenter): Nothing to Disclose
Maria Cristina Chammas PhD : Nothing to Disclose
Felipe Boschini Franco MD : Nothing to Disclose
Sandra M. Tochetto MD : Nothing to Disclose
Giovanni Guido Cerri MD, PhD : Nothing to Disclose

TEACHING POINTS

(1) The purpose of this educational exhibit is describe the imaging patterns of elastography in solid or cystic/solid benign and malignant thyroid nodules; (2) To establish a mean elastography index for benign and malignant thyroid nodules; (3) To compare elastography results with fine needle aspiration (FNA) or surgery findings; (4) To be able to reproduce the active elastography step by step.

TABLE OF CONTENTS/OUTLINE

Thyroid nodules are frequent and its nature usually is not always an easy task for ultrasound or any other imaging method. The final nodule diagnosis is often confirmed by FNA. Elastography is a new ultrasound technology that provides information about tissue elasticity. There are three types of elastography, which includes: static, transient elastography and ARFI (acoustic radiation force impulse). This new technology is based on deformation under local probe pressure. Hard nodules are supposed to be malign whereas benign are often soft. We made a retrospective study with 128 cases and our results are similar to the worldwide literature. However there is no consensus regarding the elastography index for each sort of nodule. The elastography index is calculated by means of comparing the deformation percentage of nodule tissue and normal surround parenchyma. In our study benign nodules have an index of 1,2 whereas an index of 4,5 or more is considered malign.
NRE311

Evaluation of Oral Cavity Carcinomas: A Case-based, Computer-Interactive Tutorial

Education Exhibits
Location: NR Community, Learning Center

Participants
Mark Scott Van Tassell MD (Presenter): Nothing to Disclose
Lindell R. Gentry MD: Nothing to Disclose
Deborah L. Reede MD: Nothing to Disclose
Wendy R. K. Smoker MD: Nothing to Disclose

TEACHING POINTS
1. Review normal anatomy of the oral cavity. 2. Learn the AJCC criteria for staging of OCCa. 3. Gain an understanding of how to assess extent of lesions in the various oral cavity subsites.

TABLE OF CONTENTS/OUTLINE
Following a brief review of pertinent normal oral cavity anatomy and review of AJCC TNM criteria, we present multiple cases in quiz format of oral cavity carcinoma in each of the top five subsites on CT/MR, (1- lower lip; 2- oral tongue; 3- floor of mouth; 4- gingiva/retromolar trigone; and 5- hard palate.) We employ a computer-interactive checklist approach for systematic evaluation of tumors in the various sub sites and lead the reader through a step-by-step analysis of each tumor. This permits the reviewer to optimize his/her imaging reports by inclusion of both pertinent positive and negative findings, thus providing accurate information for appropriate clinical staging.

NRE312

Extension Patterns of Oral Cavity Carcinoma in the Mandible and Its Clinical Significance

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Kotaro Sekiya DDS, PhD (Presenter): Nothing to Disclose
Hirofumi Kuno MD: Nothing to Disclose
Satoshi Fuji MD, PhD: Nothing to Disclose
Takashi Kanaeda DDS, PhD: Nothing to Disclose
Masahiko Kusumoto MD: Nothing to Disclose
Ryuichi Hayashi MD, PhD: Nothing to Disclose
Masaaki Suemitsu DDS, PhD: Nothing to Disclose
Mitsuo Satake MD, PhD: Nothing to Disclose

TEACHING POINTS
In patients with oral cavity carcinoma, preoperative evaluation of the extension of tumors (depth and range) in the mandible is crucial for planning surgical procedures and postoperative treatment. The extension of a tumor into/in the mandible has several patterns, and depends on the following factors: a. Primary location of the tumor (e.g. gingiva, retromolar trigone) b. Mandibular subsite for invasion c. Histological characteristics of the tumor d. Condition of the mandible (e.g. presence of teeth, dental or periodontal disease) e. Presence of perineural spread Furthermore, some dental and inflammatory diseases may influence bone marrow imaging of the tumor in the mandible, and may mimic the tumors on CT and MRI. This educational exhibit will show what radiologists need to know for accurately evaluating extension of tumors in the mandible based on clinical significance.

TABLE OF CONTENTS/OUTLINE
1. Key anatomy of the mandible for evaluating bone marrow invasion 2. Illustrations of various cases of carcinoma invading the mandibular bone marrow a. How to diagnose invasion to the mandibular bone marrow b. How to evaluate the extension of the tumor in the mandible based on surgical procedures c. How to determine when postoperative chemo-radiotherapy is required 3. Summary and classification of extension patterns of tumors

NRE313

Extranodal Lymphoma of the Head and Neck: A Multi-Modality Review

Education Exhibits
Location: NR Community, Learning Center

Participants
Sofia Otero MBCh, FRCR (Presenter): Nothing to Disclose
Kanchana Rajaguru MD, FRCR: Nothing to Disclose
Monika Rowe MD, PhD: Nothing to Disclose

TEACHING POINTS
This education exhibit will: 1. Provide a structured review of the clinical, pathological, and imaging features (using a multi-modality approach that includes US, CT, MRI and PET) of extranodal lymphoma of the head and neck using a series of cases organised by their anatomical site. 2. Give a list of differential diagnoses for a lesion at each anatomical location. 3. Include cases that illustrate complications associated with these neoplasms, which have the potential to cause diagnostic ambiguity at presentation, namely infection.

TABLE OF CONTENTS/OUTLINE
Lymphoma is the second most common malignant neoplasm of the head and neck, and one of the most common sites for extranodal disease. This exhibit will describe the following features of lymphoma for each of the commonly affected extranodal
sites within the head and neck: 1. Clinical features 2. Pathological features 3. Imaging features, using a multi-modality approach that includes US, CT, MRI and PET imaging 4. Differential diagnosis The anatomical sites to be described include: 1. Waldeyer’s ring 2. Sinonasal passage 3. Oral cavity/palate 4. Salivary glands 5. Orbit 6. Face/soft tissues 7. Thyroid Some cases will be included to illustrate complications of these neoplasms, e.g. infection, which can cause diagnostic ambiguity in these patients at presentation.

NRE315

FDG PET/CT Evaluation of the Postoperative and Irradiated Head and Neck

Education Exhibits
Location: NR Community, Learning Center

Participants
Travis David Howard MD (Presenter): Nothing to Disclose
Christopher Harker Hunt MD : Nothing to Disclose
Geoffrey Bates Johnson MD, PhD : Nothing to Disclose
Stephen Michael Broski MD : Nothing to Disclose
Patrick James Peller MD : Speakers Bureau, General Electric Company

TEACHING POINTS
1. Review dedicated FDG PET/CT imaging of the head and neck 2. Briefly discuss the clinical role of FDG PET/CT imaging of the head and neck in the management of disease focusing on evaluation following therapy 3. Demonstrate imaging features that distinguish benign etiologies from malignancy 4. Illustrate mimics and pitfalls providing case examples and correlation with multimodality imaging

TABLE OF CONTENTS/OUTLINE
Dedicated FDG PET/CT imaging of the head and neck • Protocol and benefits of dedicated imaging of the head and neck • Illustration of the appropriate time intervals for imaging of the postoperative and irradiated head and neck II. Normal Uptake • PET/CT Anatomic review • Expected physiologic uptake in normal anatomic head and neck structures III. Roles and limitations of FDG PET/CT imaging for restaging head and neck malignancy • TNM staging • Clinical algorithm for staging head and neck malignancy IV. Mimics and Pitfalls of disease in the postoperative and irradiated head and neck • Inflammatory or reactive changes • Common and uncommon postoperative changes • False negative examination in the setting of necrotic nodes • Unexpected vascular uptake in bland thrombus • Exaggerated physiologic uptake and how to avoid it • Common artifacts in PET/CT and how to avoid them • Importance of multimodality imaging correlation

NRE316

Fine Needle Aspiration of Thyroid Nodules: Why, When and How to Do It

Education Exhibits
Location: NR Community, Learning Center

Participants
Steven Raeymaeckers (Presenter): Nothing to Disclose
Tim I.J. Vanderhasselt MD : Nothing to Disclose
Johan De Mey : Research Grant, General Electric Company

TEACHING POINTS
The learner should understand that thyroid nodules are frequent and incidental, thyroid cancer however is rare Anatomopathological diagnosis is the golden standard, but performing FNA of all thyroid nodules is no option The learner should know key alarm symptoms (pain, rapid growth, nodules in children...) and must understand the importance of ultrasonographic key-features of malignancy The TIRADS-system as proposed in Radiology (Radiology, 2011, Vol.260: 892-899, 10.1148/radiol.11110206) is an easy and reproducible classification, it scores nodules based on 5 ultrasonographic features This system allows for an adequate risk-assessment of malignancy and can help to select those nodules with the highest risk-profile for FNA The learner will learn how to perform an adequate fine needle aspiration and what material to use

TABLE OF CONTENTS/OUTLINE
Epidemiology of thyroid nodules/thyroid cancer Prognosis of thyroid cancer Anatomopathological diagnosis Bethesda classification and it’s repercussions TIRADS-system 1. The criteria 2. Some examples 3. The risk-assessment for malignancy associated with the different categories Which nodules to puncture? How to puncture 1. Materials 2. Technique Results, outcome and follow up

NRE317

How to Assess and Report Upper Aerodigestive Tract Carcinomas: A Case-based Interactive Tutorial

Education Exhibits
Location: NR Community, Learning Center
Certificate of Merit

Participants
Joel Ziegelbein MD, MS (Presenter): Nothing to Disclose
Wendy R. K. Smoker MD : Nothing to Disclose
Lindell R. Gentry MD : Nothing to Disclose
Deborah L. Reede MD : Nothing to Disclose

TEACHING POINTS
1. Review normal anatomy of the nasopharynx and oropharynx. 2. Learn the primary pathways of perineural and submucosal spread of tumors in these regions.
3. Learn the AJCC criteria for staging of nasopharyngeal carcinomas, how to assess extent of these lesions, and what to include in your report.

4. Learn the AJCC criteria for staging of oropharyngeal (tonsil and base of tongue) carcinomas, how to assess extent of these lesions, and what to include in your report.

TABLE OF CONTENTS/OUTLINE
Nasopharynx anatomy Nasopharyngeal carcinoma staging Nasopharyngeal carcinoma imaging checklist and cases Oropharynx anatomy Oropharyngeal carcinoma staging - Tonsillar carcinoma imaging checklist and cases - Base of tongue carcinoma imaging checklist and cases Summary

NRE318
Imaging Findings of Benign Tumors and Tumor-like Lesions of the Nasal Cavity and Paranasal Sinuses: Implications for Endoscopic Surgery

Education Exhibits
Location: NR Community, Learning Center

Participants
Etsushi Iida MD (Presenter): Nothing to Disclose
Takefumi Mikuriya: Nothing to Disclose
Matakazu Furuhashi MD: Nothing to Disclose
Masatoshi Kato: Nothing to Disclose
Naofumi Matsunaga MD, PhD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the clinical issues about benign tumors and tumor-like lesions of the nasal cavity and paranasal sinuses. 2. To demonstrate characteristic imaging findings on CT, MRI, PET-CT and angiography. 3. To highlight imaging findings that otolaryngologists want to know before the endoscopic nasal surgery.

TABLE OF CONTENTS/OUTLINE
This exhibit includes six benign tumors (papilloma, pleomorphic adenoma, schwannoma, juvenile angiofibroma, ossifying fibroma and lobular capillary hemangioma) and two tumor-like lesions (invasive fungal sinusitis and organized hematoma). 1. Summary of clinical presentation, demographics, natural history and prognosis. 2. Characteristic findings of diagnostic imaging with pathologic correlation. 3. Key points of practical preoperative imaging assessments for the endoscopic nasal surgery by otolaryngologist. 4. Role of follow up imaging after surgery Complication Recurrence

NRE319
Imaging of Uncommon Nasal and Paranasal Malignant Tumors

Education Exhibits
Location: NR Community, Learning Center

Participants
Asari Sai (Presenter): Nothing to Disclose
Taro Shimono MD: Nothing to Disclose
Yukio Miki MD, PhD: Nothing to Disclose

TEACHING POINTS
Among nasal and paranasal malignancies, squamous cell carcinoma (SCC) is the most common histology. Other nasal and paranasal malignancies are diverse and relatively rare. However, it is important to understand their imaging features in order to differentiate among them and from benign lesions. Computed tomography (CT) and magnetic resonance (MR) imaging play an important role in characterization and in the assessment of the extent of the disease and involvement of adjacent and distant structures. Familiarity with the CT and MR imaging features of various nasal and paranasal malignancies will facilitate accurate diagnosis and staging. The purpose of this exhibit is: 1. To learn clinical characteristics and incidence of each uncommon nasal and paranasal malignant tumor. 2. To review the imaging features of uncommon nasal and paranasal tumors. 3. To learn how to differentiate among these uncommon malignancies and from benign lesions

TABLE OF CONTENTS/OUTLINE
General epidemiology of nasal and paranasal malignant tumors. Clinical characteristics and CT/MR imaging features of common and uncommon nasal and paranasal malignant tumors. Malignant melanoma, olfactory neuroblastoma, solitary fibrous tumor, carcinosarcoma, rhabdomyosarcoma, etc. Differential diagnosis

NRE320
Imaging Parapharyngeal Tumors: A Holistic Approach and Imaging Checklist to Assist the Clinician

Education Exhibits
Location: NR Community, Learning Center
Cum Laude

Participants
Supreeta Arya MD (Presenter): Nothing to Disclose
Ashita Rastogi MBBS, MD: Nothing to Disclose
Nilesh Sable: Nothing to Disclose
Robert Hermans MD, PhD: Nothing to Disclose
Suresh K. Mukherji MD: Nothing to Disclose

TEACHING POINTS
To discuss the definition of parapharyngeal space as understood by most clinicians.

2. Discuss differential diagnoses of parapharyngeal neoplasms with level 1 evidence from literature.

3. Role of various imaging methods in a) establishing diagnosis and b) assisting optimal therapy.

**TABLE OF CONTENTS/OUTLINE**

1. Anatomy of the parapharyngeal space including the prestyloid and poststyloid compartments.
3. Unusual neoplasms that can confound diagnosis.
4. Role of CT, MRI, angiography, FNAC and nuclear medicine in diagnosing parapharyngeal tumors.
5. Imaging features that can impact therapy and various surgical approaches.
6. A checklist for the optimal structured report.

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**NRE322**

**Odontogenic Tumors: Spectrum of Findings at Multi-imaging Modalities**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Ahmed Abdel Razek MD (Presenter): Nothing to Disclose
- Lamia Elsorogy MD, PhD: Nothing to Disclose
- Hesham Elemam: Nothing to Disclose
- Shefeek Abubacker MD, FRCR: Nothing to Disclose

**TEACHING POINTS**

1. To review WHO classification, demographic and clinical presentations of odontogenic tumors.
2. To demonstrate typical and atypical imaging appearance of odontogenic tumors at multi-imaging modalities.
3. To discuss the role of advanced CT and MR imaging in assessment of odontogenic tumors.

**TABLE OF CONTENTS/OUTLINE**

1. Basic background about odontogenic tumors
2. Updated WHO classification of odontogenic tumors
3. Mertis and limitations of panorama, CT scan and MR imaging
4. Role of cone beam CT and dynamic contrast CT scan in assessment of odontogenic tumors
5. Role of diffusion MR imaging, dynamic contrast MR imaging in characterization of odontogenic tumors
6. Diagnostic approach and interpretation of odontogenic tumors 6-CT and MR Imaging appearance of typical and atypical ameloblastoma
7. Imaging appearance of keratocystic odontogenic tumor and calcifying epithelial odontogenic tumor
8. Imaging of odontomas and cementomas 9-Imaging of fibro-osseous and other cystic lesions simulating odontogenic tumors
9. Imaging appearance of malignant odontogenic tumors 11-Imaging findings used to differentiate odontogenic tumors from simulating lesions

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**NRE323**

**Pediatric Head and Neck Nonrhabdomyosarcomatous Sarcomas (nonRMS): Imaging, Clinical and Pathological Assessment**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

- Bing Wang MD (Presenter): Nothing to Disclose
- Alfred Leo Weber MD: Nothing to Disclose
- Paul Albert Caruso MD: Nothing to Disclose
- Baiju Shah MD: Nothing to Disclose
- Hugh D. Curtin MD: Nothing to Disclose

**TEACHING POINTS**

To demonstrate the clinical, imaging, and pathological findings of different head and neck nonRMS in children and adolescents.

**TABLE OF CONTENTS/OUTLINE**

Method: We evaluated 20 cases of nonRMS in 2-20 year-old. All cases were studied with CT and/or MRI, and in some cases PET-CT. Representative cases of different type of sarcomas were evaluated including osteosarcomas (3), chondrosarcomas (2), synovial sarcomas (3), the Ewing's sarcoma family of tumors (4), spindle cell sarcomas (undifferentiated) (2), alveolar soft part sarcomas (1), fibrosarcomas (2), and neurofibrosarcomas (4). Pertinent differential diagnosis of imaging findings will be presented with the illustrated cases. Results: On CT the densities were homogeneous with variable enhancement but usually low to medium. Calcification was encountered in osteosarcomas, chondrosarcomas, and in some large tumors with necrosis. MRI revealed low signal intensities (SI) relative to muscle on T1-WI, variable increased SI on T2-WI, and slight to moderate enhancement on post-Gadolinium images. Tumor necrosis was related to size of tumor and was observed in large tumors. Local lymph node metastases are less common than in carcinomas of the head and neck. Conclusion: We present the imaging findings of pediatric nonRMS and evaluated them for size, margins, location, bony erosion, and metastases.

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**NRE324**

**Seeing is Believing: Laryngeal Carcinoma Imaging and Laryngoscopy Correlation**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Certificate of Merit**

**Participants**

- Michael Cathey MD (Presenter): Nothing to Disclose
TEACHING POINTS

Superficial neoplasms involving the surface of the vocal cords, cord fixation, and early transglottic extension can be difficult to recognize on CT/MR imaging. Laryngoscopy (ES) remains the gold standard for characterizing the extent of mucosal disease and vocal cord mobility in the setting of laryngeal neoplasia. It is important to correlate clinically apparent mucosal abnormalities with cross-sectional imaging in order to correctly identify submucosal and deep spread of tumor. Ongoing advances in ES technology, such as narrow band imaging (NBI) and the ability to digitally record ES exams may help to improve diagnostic accuracy and help direct the radiologist’s approach for a given case. The radiologist should be familiar with findings at ES and how those findings might guide patient management and subsequent imaging. The purpose of this exhibit is to review normal anatomy at ES with an emphasis on case based radiology-laryngoscopy correlation which will enable the radiologist to more effectively approach the imaging evaluation of laryngeal neoplasms.

TABLE OF CONTENTS/OUTLINE

Review normal anatomy at ES. Revisit AJCC TNM staging system for laryngeal and hypopharyngeal cancer Imaging examples of laryngeal carcinoma with digital laryngoscopic correlation. Familiarize interpreters with advanced laryngoscopy imaging technology: NBI

NRE325

Solitary Fibrous Tumor of the Head & Neck and Spine. Imaging and Physiopathology Study. Our Experience in Nine Cases

Education Exhibits
Location: NR Community, Learning Center

Participants

Cristina Corbella MD (Presenter): Nothing to Disclose
Josep Lluis Dolz MD : Nothing to Disclose
Xavi Tarroch : Nothing to Disclose
Anna Unguetti : Nothing to Disclose
Javier Maiz : Nothing to Disclose
Jose Angel De Marcos Izquierdo : Nothing to Disclose

TEACHING POINTS

1- To describe the clinical, physiopathology and imaging features of EXTRAPLEURAL Solitary Fibrous Tumors (SFT) based in 9 cases diagnosed and treated at our center. 2-To show the imaging and histological correlation. 3-To make a review of the literature.

TABLE OF CONTENTS/OUTLINE

1-Introduction about SFT. What we have to know? SFT is a rare spindle-cell neoplasm of mesenchimal origin that were first described in the pleura. Is an uncommon tumor occurring in the intracranial and extra cranial head and neck regions. We reported nine cases in in the head&neck and spine regions. Correct diagnosis could be challenging as some other lesions can mimick these tumors. 2. Physiopathology and natural history of SFT and hemangioperytomas. Immunohistochemical study. 3-MR and CT features. Evaluation of location, margins,MR signal intensity,CT density,internal architecture,pattern of enanchement.Darker signal intensity on T2-weighted images represents a firmer fibrous tumor composed of abundant collageneous stroma. 4-Differential diagnosis.Mimicks lesions. 5-Comments about recurrences and metastasis. Most SFT are bening but exist local recurrences and invasive growth pattern and metastasis(lung,lives,bones). 5. Summary

NRE327

Ultrasound Elastography in the Differential Diagnosis of Benign and Malignant Parotid Lesions as Compared with CEUS and MRI or CT

Education Exhibits
Location: NR Community, Learning Center

Participants

Hektor Grazhdani MD, PhD (Presenter): Nothing to Disclose
Vito Cantisani MD : Speaker, Toshiba Corporation
Marco De Vincentis : Nothing to Disclose
Mattia Di Segni MD : Nothing to Disclose
Nicola Di Leo MD : Nothing to Disclose
antonello rubini MD : Nothing to Disclose
Cristina Fioravanti : Nothing to Disclose
Carlo Catalano MD : Nothing to Disclose
Ferdinando D’Ambrosio : Nothing to Disclose

TEACHING POINTS

1. Description of elastographic features of various parotid masses, with definitive histological confirmation, in comparison with CDUS, contrast enhanced ultrasound (CEUS), and MRI findings. 2. Explanation of technical issues of various US elastography methods and their application in the parotid. 3. Review of epidemiology, clinical presentation, state of the art work up, differential diagnosis and treatment options.

TABLE OF CONTENTS/OUTLINE

1. Diagnostic issues of parotid masses. 2. State of the art imaging and literature review. 3. US techniques available for parotid lesion evaluation and their use in the malignant/benign differentiation: qualitative elastography with Ueno score,
semi-quantitative strain ratio measurements and carotid artery in vivo compression (ECI index). 4. CEUS as an alternative to MRI for vascularization assessment. 5. Parotid masses at US elastography, CEUS and MRI in correlation with histopathology, with image review of representative cases from our cohort of 48 patients with parotid lesions (18 pleomorphic adenomas, 14 Warthin tumors, 8 intraparotid reactive lymphnodes, 4 carcinomas, 3 parotiditis, 1 lymphoma). 6. Qualitative and semiquantitative Stiffness and CEUS patterns correlating with malignancy. 7. Discussion on differential diagnosis and the role of the various imaging modalities. 8. Conclusion.

NRE328

Ultrasound Surveillance of the Thyroid Cancer Patient: Review of Technique and Common Pitfalls

Education Exhibits

Location: NR Community, Learning Center

Certificate of Merit

Participants

Philose Getachew Mulugeta MD (Presenter): Nothing to Disclose
Lisa Po-Lan Jones MD, PhD: Nothing to Disclose
Jill Eve Langer MD: Consultant, BioClinica, Inc

TEACHING POINTS

Ultrasoundography (US) has become the modality of choice for surveillance of the neck following thyroidectomy for thyroid cancer. US detection of metastatic disease allows for image-guided biopsy when abnormal lymph nodes or thyroid bed findings are identified in the post thyroidectomy setting. The aim of the education exhibit is to: 1. Demonstrate US technique for adequate surveillance of the post thyroidectomy neck 2. Present expected and pathological post surgical findings

TABLE OF CONTENTS/OUTLINE


NRE330

Why Thyroid Surgeons Are Frustrated with Radiologists: Lessons Learned from Pre- and Postoperative Ultrasound

Education Exhibits

Location: NR Community, Learning Center

Cum Laude

Selected for RadioGraphics

Participants

Sachin Shivaji Kumbhar MBBS (Presenter): Nothing to Disclose
Suresh Maximin MD: Nothing to Disclose
Carolyn Lee Wang MD: Nothing to Disclose
Ryan O'Malley MD: Nothing to Disclose
Neeraj Lalwani MD: Nothing to Disclose

TEACHING POINTS

After completing this exhibit, the learner will: 1. Gain background information regarding thyroid cancer and surgical management with specific attention to types of lymph node dissection 2. Understand role of preoperative neck ultrasound (US) and how thyroid surgeons use it to guide management 3. Review standardized US technique to optimize preoperative work-up and maximize detection of postoperative recurrence 4. Observe standardized reporting to consistently assess key components of pre- and postoperative US evaluation

TABLE OF CONTENTS/OUTLINE

Overview of thyroid cancer, sonographic detection, and diagnosis Review of pertinent neck anatomy in the context of surgical management Preoperative ultrasound: -Optimal sonographic technique and reporting format to consistently provide necessary information for surgeon’s preoperative planning -Specific attention to cervical lymph node size, features, and location that may determine type of lymph node dissection Postoperative ultrasound: -Normal post-thyroidectomy appearance -Optimal sonographic technique to adequately assess areas of recurrence -Specific suspicious features that suggest recurrent disease -Sample reporting format that appropriately conveys key information to referring surgeon and endocrinologist (i.e. indicating a level of suspicion rather than just reporting sizes)

NRE331

You’re Getting on My Nerves – Imaging of Perineural Spread in Head and Neck Cancer

Education Exhibits

Location: NR Community, Learning Center

Participants

Michael Eric Stone MD (Presenter): Nothing to Disclose
Brent David Griffith MD: Nothing to Disclose
Suresh C. Patel MD: Nothing to Disclose
TEACHING POINTS

Perineural spread (PNS) is a well-recognized entity involving cancers of the head and neck, which has important diagnostic, prognostic, and treatment implications. Because the clinical presentation of PNS is often nonspecific, the radiologist plays an important role in patient work-up and staging. The purpose of this exhibit is to discuss: 1. Clinical implications of PNS, including impact on patient prognosis and treatment. 2. Common routes for PNS in the head and neck, including normal skull base and cranial nerve (CN) anatomy. 3. Imaging findings in PNS, including role of CT and MRI.

TABLE OF CONTENTS/OUTLINE

I. Etiologies and Implications of PNS a. Malignancies most commonly implicated in PNS, including adenoid cystic and squamous cell carcinoma, as well as potential mimics of PNS. b. Impact of PNS on staging, prognosis, and treatment. II. Imaging of PNS in the Head and Neck a. Strengths and weaknesses of CT and MRI. b. Normal skull base and CN anatomy, including skull base foramina, as well as course and branches of the most commonly involved CN’s (e.g., CN V and CN VII). c. Imaging findings of perineural spread, including: foraminal enlargement or destruction, nerve enlargement/enhancement, loss of perineural fat, muscle atrophy. d. Case review emphasizing “do not miss” findings of PNS that all radiologists should be aware of.

NRE332

“There Is More than Meets the Eye”. Everything Behind the Ocular Ultrasound

Education Exhibits
Location: NR Community, Learning Center

Selected for RadioGraphics

Participants
Marcela De la Hoz Polo MD (Presenter): Nothing to Disclose
Anna Torramilans: Nothing to Disclose
Oscar Pozuelo Segura: Nothing to Disclose
Stefano Pasetto MD: Nothing to Disclose
Sergi Sedo Fernandez: Nothing to Disclose
Albert Anguera: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To illustrate and describe the sonography anatomy of the eye 2. To illustrate the main pathological conditions that affect the eye depicted by US, and its correlation with CT, MR and ophthalmoscopic image when available 3. To describe the sonographic technical procedure

TABLE OF CONTENTS/OUTLINE

1. Introduction : Ocular US plays an important role in the evaluation of the diseases that affect the eye, especially in those cases when is not possible to perform an appropriate ophthalmoscopy due to the opacification of transparent media resulting from cataracts, vitreous hemorrhage or extreme miosis. Nevertheless most radiologists are unfamiliar with ocular anatomy and the most prevalent ocular diseases that could be depicted sonographically. 2. Technique and Study Protocol 3. Sonographic Normal Ocular Anatomy 4. Imaging of the Pathologic Conditions: Ocular Globe Morphology Lens Vitreous Choroid Retina Optic Disk and Optic Nerve Post-surgical Eye 5. Summary : Ocular US is an accurately diagnostic tool in the ophthalmologic examination. A proper knowledge of the sonographically anatomy and familiarity with the variety of multiple conditions that affect the eye may enhance our ability to get the most of this efficient and valuable technique.

NRE333

A “Window” into Temporal Bone Pathology: Imaging of the Normal Anatomy and Pathology of the Oval and Round Windows of the Temporal Bone

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Behroze Vachha MD, PhD (Presenter): Nothing to Disclose
Azita Sara Khorsandi MD: Nothing to Disclose
Gul Moonis MD: Nothing to Disclose

TEACHING POINTS

Pathology of the oval and round window may result in conductive and mixed hearing loss. Familiarity with the normal anatomy, appropriate technical procedures and imaging findings related to oval and round window pathology can optimize pre-clinical assessment and management of conductive and mixed hearing loss.

TABLE OF CONTENTS/OUTLINE

Imaging of the oval and round windows is important in the assessment of hearing loss, vertigo and tinnitus particularly in the context of congenital and acquired malformations, trauma, otosclerosis and chronic otitis media. We review the normal anatomy of the oval and round windows and the appropriate CT and MRI techniques for imaging them. MDCT and MRI features of the following oval and round window pathologies will be reviewed: 1. Trauma with and without fractures of the oval and round windows. 2. Ossicles of the oval and round windows. 3. Malformations (congenital and acquired) of the oval and round windows. 4. Post surgical complications related to the oval window such as dislocation of prosthesis into the vestibule through the oval window.

NRE335

Basic Approach for Characterization of Pathologic Cervical Lymph Node with Triplex Ultrasonography

Education Exhibits
Location: NR Community, Learning Center
**TEACHING POINTS**

The purpose of this exhibit is: 1. To review the underlying pathologic changes that create the imaging appearances of malignant cervical lymph node at triplex ultrasonography. The neck status is the single most important indicator of prognosis in head and neck cancers and early detection of LNs involvement has great therapeutic and prognostic implications and in order to prevent invasive diagnostic procedures. 2. To gain an awareness of the detection of pathologic lymph nodes, and learn the imaging appearances of malignant lymph nodes. 3. To learn optimal methods to detect pathologic cervical lymphnode with triplex ultrasonography.

**TABLE OF CONTENTS/OUTLINE**


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**NRE337**

**Dose Estimation of Patient and Operator in Swallowing CT Examination Performed with a 320-detector-Row Multislice CT**

**Education Exhibits**

**Location: NR Community, Learning Center**

**Participannts**

- Masanao Kobayashi PhD, RT (Presenter): Nothing to Disclose
- Yasuki Asada PhD: Nothing to Disclose
- Kosuke Matsubara PhD: Nothing to Disclose
- Yuta Matsunaga RT: Nothing to Disclose
- Aki Kawaguchi RT: Nothing to Disclose
- Kazuhiro Katada MD: Consultant, Toshiba Corporation
- Hiroshi Toyama: Nothing to Disclose
- Kichiro Koshida PhD: Nothing to Disclose
- Shouichi Suzuki PhD: Nothing to Disclose

**TEACHING POINTS**

Recently, attempts to develop new types of swallowing function analysis with 320-detector-row multislice CT (320-MDCT) have been reported. The present report addresses (1) patient exposure, (2) operator exposure, and (3) spatial dose distribution. For dose measurement, a human-body phantom in which 303 thermoluminescent dosimeter elements were inserted and a survey meter was used. Swallowing CT (SCT) was performed at 120kV, 10mA, 0.35sec/rot, 160mm/rot, and tilt angle of 22 (volume CT dose index displayed on the console 0.8 mGy, dose length product 12.1 mGy cm). The effective dose for the patient was 3.9 mSv. The conversion factor for obtaining the effective dose was 0.0066 mSv/mGy cm. The effective dose for the operator was 0.002 mSv. In the operator exposure measurement, the ambient dose equivalent H*(10), that would be produced by an expanded and aligned radiation field at a depth 10 mm in the International Commission on Radiation Units and Measurements sphere, was 0.012 mSv. In this report, the safety of SCT, which has become possible with the introduction of 320-MDCT, was evaluated by measurement of the exposure to the patient and operator.

**TABLE OF CONTENTS/OUTLINE**

- Radiation protection

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**NRE339**

**Flaps in Head and Neck Oncology Surgery. How to Recognize the Normal Findings on CT**

**Education Exhibits**

**Location: NR Community, Learning Center**

**Certificate of Merit**

**Participannts**

- Evelyn Claudia Montano Clauré MD (Presenter): Nothing to Disclose
- Daniel Rodriguez Bejarano: Nothing to Disclose
- Lisbeth Valoyes Guerrero MD: Nothing to Disclose
- Lucia Aja MD: Nothing to Disclose
- Sonia Aixut: Nothing to Disclose
- Paloma Mora MD: Nothing to Disclose

**TEACHING POINTS**

- To review the most common flaps used in reconstructive head and neck oncology surgery.
- To recognize the normal CT findings in flaps, to achieve a proper postoperative interpretation in the follow up of these patients.

**TABLE OF CONTENTS/OUTLINE**

Immediate reconstruction of defects in the head and neck has evolved with the use of flaps. There are techniques to mobilize tissue with similar characteristics of tissue in the lost territory, looking for the best functional and cosmetic result for the patient. The flaps may be composed of one type of tissue or several different types of tissue such as skin (cutaneous), fascia, muscle, bone and visceral (e.g., colon, small intestine, omentum) (Table 1). The flaps also could be free or pediculated (Table 2). The acknowledgement of the type of flap used and the recognition of their structures are important to achieve a proper interpretation of the radiological TC findings (fig 1).

In our work we describe the most common flaps used in head and neck reconstructive oncology surgery reviewing the radiological aspects of these techniques. We have retrospectively reviewed CT findings in 55 patients treated in our hospital from 2008 to 2011. This group of patients corresponds to 42 males and 13 females with a median age of 65 years (range...
Table 3 summarizes the types of flaps in our series.

**NRE340**

High-Resolution and Quantitative MR Imaging of the Temporomandibular Joint

**Education Exhibits**

Location: NR Community, Learning Center

**Participants**

Monica Tafur MD (Presenter): Nothing to Disclose
Renji Biswas: Nothing to Disclose
Kyu-Sung Kwack MD, PhD: Nothing to Disclose
Won Chol Bae PhD: Nothing to Disclose
Robert Healey: Nothing to Disclose
Sheronda Statum: Nothing to Disclose
Jiang Du PhD: Nothing to Disclose
Christine B. Chung MD: Nothing to Disclose

**TEACHING POINTS**

The objectives are to review the anatomy of the Temporomandibular joint (TMJ) using high-resolution MRI with ultrashort time-to-echo (UTE) techniques; to quantify MR properties of the disc using conventional and UTE quantitative MRI (qMRI) techniques; and to correlate MR with histochemical properties of the disc.

1. High-resolution MRI demonstrate the anatomy of osseous and soft tissues of TMJ.
2. High-resolution UTE MRI allows visualization of tissues with short T2 components in TMJ such as the fibrocartilage in the disc, mandibular condyle and articular eminence of temporal bone, not provided by the standard clinical sequences.
3. The disc of the TMJ is composed mostly by short T2 components such as fibrocartilaginous matrix and collagen network with an average T2* value of 17.3ms. The main contrast available in the TMJ is obtained from T2* contrast.
4. MR properties of the TMJ articular disc correlate with the collagen organization and the degree of GAG staining. UTE T1rho showed stronger correlation as compared with T2 and T2* techniques.

**TABLE OF CONTENTS/OPTLINE**

1. Anatomy of the TMJ demonstrated in high-resolution UTE MRI with illustrations and correlation with gross anatomy in human cadaveric specimens. 2. Quantitative MRI in normal and abnormal articular discs and correlation of qMRI values with histochemical composition.

**NRE341**

Imaging Features in Proptosis: What the Radiologist Should Look for?

**Education Exhibits**

Location: NR Community, Learning Center

**Participants**

Mina Boussalah MS (Presenter): Nothing to Disclose
Fourat Ridouani: Nothing to Disclose
Naima El Benna: Nothing to Disclose
Nadia Moussali: Nothing to Disclose
Amina Gharbi: Nothing to Disclose

**TEACHING POINTS**

To understand orbital anatomy and pathophysiology of proptosis. To outline common causes of proptosis. To discuss role of imaging modalities in the diagnosis and treatment proptosis.

**TABLE OF CONTENTS/OPTLINE**

Proptosis is a common clinical manifestation in orbital pathology, due to globe displacement. Its causes are multiple. Imaging cross sectional modalities performed in the clinical setting allow an accurate diagnosis and a causal approach to treatment management. Based on case material collected in Ibn Rochd Radiology Department (101 patient data), recorded between 2006 and 2013, we will illustrate the imaging finding in proptosis. All our patients underwent orbital CT and/or an MRI exploration. Various non tumoral pathologies appealed to orbital cellulitis (22), hormonal causes (14), trauma of the orbit (16), inflammatory pseudo-tumor (4), orbital hydatid cyst (4), orbital venous anomaly (1), sphenoid-orbital dysplasia (3). Orbital tumors found were lymphoproliferative lesions (14), lacrimal gland masses (5), optic nerve (1) and metastatic lesions (15). Cross sectional imaging can aid in the diagnosis and evaluation of proptosis causes, supplementing finding from clinical ophthalmologic examinations. A compartmental approach to assess orbital disease guides the differential diagnostic considerations.

**NRE342**

Imaging Impact for Facial Aging “Clinical Application”: Utilize of CT/MRI for a Clinical Understanding of the Facial Aging

**Education Exhibits**

Location: NR Community, Learning Center

**Participants**

Itsuko Okuda MD (Presenter): Nothing to Disclose
Keiichi Akita MD, PhD: Nothing to Disclose
Katsuhiro Abe: Nothing to Disclose
Masahiro Tritomo MD: Nothing to Disclose
Yukio Shirakabe MD: Nothing to Disclose
Yasu Nakajima MD: Nothing to Disclose

**TEACHING POINTS**
1. To review the clinical facial aging manifestations and factors that it occurs in.
2. To learn the facial structures involved in facial aging.
3. To demonstrate anatomic-radiological correlations of the facial structures.
4. To emphasize the clinical impact of the facial aging and anti-aging using CT/MRI.

TABLE OF CONTENTS/OUTLINE
1. Clinical manifestations of the facial aging. 2. Clinical-imaging correlation of facial aging features. 3. Classify aging changes of the facial structures according to age on CT/MRI. Facial muscles, Superficial musculoaponeurotic system (SMAS), Retinacula cutis (RC). Fat layers. 4. Clinical usage of CT and MRI for facial aging and anti-aging. Baggy eyelid, Nasolabial fold, Cheek sagging.

NRE343
Lub-dub within the Ear: A Review of Pulsatile Tinnitus

Education Exhibits
Location: NR Community, Learning Center

Participants
Tina Mistry MBBS, FRCR (Presenter): Nothing to Disclose
Dominic St Leger MBCh, BMedSc: Nothing to Disclose
Ravi K. Lingam MRCP, FRCR: Nothing to Disclose

TEACHING POINTS
1. To review the anatomy of the middle ear highlighting the intimate relationships to local structures.
2. Describe the pathological entities responsible for pulsatile tinnitus.
3. Review the multi-modality (US/CT/MRI) imaging applications and findings in pulsatile tinnitus.
4. What do the surgeons need to know - providing a guide to structured reporting to aid in the patient’s management. ’Quick review notes’ for the general radiologist and radiology trainee.

TABLE OF CONTENTS/OUTLINE

NRE344
Parathyroid Imaging: Pearls and Pitfalls

Education Exhibits
Location: NR Community, Learning Center

Participants
Joao Rafael Terneira Vicentini MD (Presenter): Nothing to Disclose
Danilo Giorgio Oliveira Azevedo Medrado MD: Nothing to Disclose
Marcio Ricardo Taveira Garcia MD: Nothing to Disclose
Maria Cristina Chammas MD: Nothing to Disclose
Eloisa Maria Santiago Gebrim MD: Nothing to Disclose
Regina Lucia Elia Gomes MD: Nothing to Disclose

TEACHING POINTS
- Recognize parathyroid lesions appearance in different imaging methods - Display the advantages and disadvantages of each imaging modality - How new techniques and protocols can help radiologists to study these diseases.

TABLE OF CONTENTS/OUTLINE
- Review of the radiological findings related to parathyroid diseases in ultrasound, nuclear medicine scans, computed tomography (CT) and magnetic resonance (MRI) - Practical tips to find parathyroid glands in different imaging studies, particularly using the polar artery, showed by ultrasound and four-dimensional CT (4DCT) - Sample of cases with typical and atypical presentations and ectopic locations - The differential diagnosis of parathyroid lesions - Literature review and report of our center experience with ultrasound and 4DCT protocol.

NRE345
Radial-VIBE with GRASP: Understanding the Physics and Its Applications in Head and Neck Radiology

Education Exhibits
Location: NR Community, Learning Center

Participants
Lev Bangiyev DO (Presenter): Nothing to Disclose
Maria Camilla Rossi Espagnet MD: Nothing to Disclose
Mari Hagiwa MD: Nothing to Disclose
Kai Tobias Block PhD: Nothing to Disclose
Xin Wu MD: Nothing to Disclose
Eugene Yu MD, FRCP: Nothing to Disclose
Girish Manohar Fatterpekar MBBS: Editor, Reed Elsevier
TEACHING POINTS

Radial-VIBE (Radially acquired Volume Interpolated GRE) with GRASP (Golden-angle RAdial Sparse Parallel) is a novel contrast-enhanced T1W gradient-echo sequence • Unique k-space sampling and data acquisition parameters • Excellent fat-suppressed motion robust images with exquisite illustration of the anatomy • Excellent spatial resolution allows assessment of structural permeability characteristics • An overview of the physics of Radial-VIBE and GRASP, compare it to conventional T1W-images and evaluate its role in assessing head and neck pathology

TABLE OF CONTENTS/OUTLINE

- Overview of Radial-VIBE physics and discuss its permeability characteristics
- Discuss its role in evaluating orbital anatomy and commonly seen pathology such as vascular malformations, optic neuritis and meningiomas, as well as hitherto unexplored conditions such as vitreitis
- Assess its role in evaluating skull base lesions due to its inherent fat-suppressed characteristics and excellent spatial resolution
- Discuss its role in evaluating parotid pathology obviating the need for dynamic CT acquisition
- Demonstrate unique permeability patterns of the normal structures in head and neck
- Discuss our early experience in assessing primary head and neck cancers utilizing permeability maps
- Distinguish normal and metastatic lymph nodes utilizing permeability patterns

NRE347

The Route to Expression, Taste and Salivation: The Journey of the Facial Nerve

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants

Tina Mistry MBBS, FRCR (Presenter): Nothing to Disclose
Dominic St Leger MBCh, BMedSc: Nothing to Disclose
Ravi K. Lingam MRCP, FRCR: Nothing to Disclose

TEACHING POINTS

In this educational exhibit we aim to provide: 1. A comprehensive anatomical review of the route of the facial nerve. 2. Discuss the large range of pathological problems it faces at every point in its journey. 3. Describe the best imaging modalities and findings of these pathological processes. 4. Provide a problem solving checklist to aid accurate and concise reporting.

TABLE OF CONTENTS/OUTLINE

1. The anatomical course of the Facial nerve divided into the following segments: Intracranial Meatal Labyrinthine Tympanic Mastoid Extra-temporal 2. Pathology affecting the Facial nerve and relevant imaging modalities and techniques used in their diagnosis: Infections Acute otitis media Chronic otitis media Cholesteatoma Herpes Zoster Traumatic Temporal bone fracture Iatrogenic injury Avulsion Neoplastic Facial/vestibular schhwanoma Haemangioma Lipoma Glomus tumours Parotid malignancy Congenital Vascular Infarction Idiopathic Bells Palsy Multiple sclerosis Sarcoidosis Inflammatory Guillain-Barre 3. Provide a summary checklist for the clinical presentations of suspected facial nerve pathology, highlighting the anatomical site of pathology along with the likely cause.

NRE348

Thyroid Elastography. How We Do It

Education Exhibits
Location: NR Community, Learning Center

Participants

Zoi Antoniou BMedSc: Nothing to Disclose
Athanasios N. Chalazonitis MD, MPH: Nothing to Disclose
Christina Gkali MD: Nothing to Disclose
Andromachi Zouria: Nothing to Disclose
Ioanna Tzovara MD (Presenter): Nothing to Disclose

TEACHING POINTS

1. To review the technique of both Strain Elastography (SE) and Acoustic Radiation Force Impulse Imaging (ARFI). 2. To suggest an appropriate thyroid SE and ARFI imaging examination protocol. 3. To demonstrate the elastographic imaging findings in benign and malignant thyroid nodules. 4. To review the potential elastography pitfalls. 5. To suggest an appropriate reviewing method.

TABLE OF CONTENTS/OUTLINE

Thyroid nodules were examined with SE and ARFI imaging in more than 50 consenting patients and can be displayed in details as a pictorial essay. All cases were paired with cytological or/histological confirmation. Both SE and ARFI imaging were performed in benign and malignant thyroid nodules in order to depict the hardness of the examined lesion. SE provides qualitative assessment of the tissue hardness. Strain ratio consist a quantification of this qualitative type of elastography. ARFI imaging is divided into two types: a) Virtual Touch Tissue Imaging (VTI) which provides the relative stiffness in qualitative way in the selected region of interest on a gray scale image and b) Virtual Touch Tissue Quantification (VTQ) which expresses the shear wave speed in solid materials as numeric values and describes quantitatively the hardness of tissue.

NRE349

Ultrasound of the Major Salivary Glands: Anatomy and Pathology

Education Exhibits
Location: NR Community, Learning Center

Participants
TEACHING POINTS

High frequency US allows a detailed study of the anatomy of the major salivary glands and their relationships. Neoplasms, sialolithiasis and inflammation are the most common pathologies of these glands. US as an initial study of the major salivary glands reduces the differential diagnosis and allows interventional techniques in a fast, cheap and without radiation process.

TABLE OF CONTENTS/OUTLINE

In Europe and Asia ultrasound (US) is the first step in the study of pathology of the major salivary glands. It is a radiation-free method, accessible and cheap, which will allow us to narrow the differential diagnosis and sometimes even give us a definitive one. In addition we can carry out eco-guided interventional techniques. Although there are some features that can guide us to suspect if a nodule is a pleomorphic adenoma, a Warthin tumor or a malignant lesion, US is not very specific to determine benignity or malignancy. However, US will allow us to distinguish true glandular nodes or lesions in other locations, such as pilomatrixomas or epithelial cysts. Inflammatory pathology can also be studied, lithiasis and expanded salivary ducts in sialolithiasis can be distinguished. Other diseases such as Sjogren's syndrome, cysts or lymphomatous involvement of the glands can be assessed.
TEACHING POINTS

Intramedullary spinal cord tumors are rare and constitute 4-10% of all CNS tumors. Although they constitute only 20% of intraspinal tumors in the adult and 35% in the pediatric population, the majority are malignant. It is important to understand the characteristic imaging features of each intramedullary lesion that provide support towards a specific diagnosis. Additionally, one needs to be aware of lesions that mimic intramedullary spinal cord neoplasms.

The purpose of this exhibit is to:
1. Describe the essential imaging features of common and rare intramedullary spinal cord lesions
2. Identify characteristic imaging features of each intramedullary spinal cord lesion
3. Recognize and differentiate mimics of intramedullary spinal cord neoplasms

TABLE OF CONTENTS/OUTLINE

Cases will be presented in quiz format. Key differential diagnostic points will be highlighted in the discussion of each case. The list of cases includes:
- Myxopapillary ependymoma
- Schwannoma mimicking an ependymoma
- Spinal syrinx
- Hemangioblastoma
- Meningioma
- Metastasis
- Brainstem glioma extending into the cervical spine
- Nitrous oxide toxicity
- Surfer’s myelopathy
- Infectious myelitis from coccidioidomycosis
- Intraspinal neurocysticercosis
- Severe transverse myelitis
- Spinal dural AVF

NRE356

Imaging of Idiopathic Spinal Cord Herniation

Education Exhibits

Location: NR Community, Learning Center

Participants

Ajay Agarwal MD (Presenter): Nothing to Disclose

TEACHING POINTS

To demonstrate characteristic imaging findings seen in ventral cord herniation.

TABLE OF CONTENTS/OUTLINE

Etiopathogenesis: The etiopathogenesis of idiopathic spinal cord herniation is not firmly established, but the presence of a dural defect is considered a sine qua non for the development of the condition. Clinical presentation: Clinical findings are nonspecific and patients usually present with slowly progressive Brown-Sequard syndrome or paraplegia. Imaging features: We will demonstrate MR imaging findings in four patients with surgically confirmed spinal cord herniation. The thoracic spine is commonly involved between the T4 and T7 vertebrae. Characteristic MRI findings include dural defect through which ventral displacement of the thoracic spinal cord occurs with enlargement of the dorsal subarachnoid space. "Nuclear trail" sign is also described as the characteristic sign on CT. Differentials: It is important to exclude a dorsally located cystic lesion (e.g., an intradural arachnoid cyst), which may mimic a cord herniation. Conclusion: Idiopathic spinal cord herniation is rare but is an increasingly recognized cause of progressive and potentially curable thoracic myelopathy. An early and correct diagnosis allows prompt treatment, which may reverse any neurologic deficits.

NRE357

Imaging of the Instrumented Spine

Education Exhibits

Location: NR Community, Learning Center

Participants

Banafsheh Salehi MD (Presenter): Nothing to Disclose
Farbod Asgarzadie MD: Nothing to Disclose
Allie Kieran Blackburn MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1) Review the structure of spine surgical hardware, function of the hardware expected post surgical changes, and possible postoperative complications in a case-based review. 2) Explain the practical clinical relevance of imaging findings and address the questions that the spine surgeon might have in postoperative spine imaging. Delineate the role of imaging in diagnosis of post-surgical complications. 3) Provide some pearls for postoperative spine imaging.

TABLE OF CONTENTS/OUTLINE

- Pictorial review of spinal surgical instrumentation, providing photographs of the hardware, as well as applicable imaging modalities including intraoperative fluoroscopy, radiography, CT and MRI. The instruments reviewed will include but not limited to: - Anterior plates and screws - PEEK rods - Laminoplasty - AxialLIF hardware - Cortical, pedicle and lateral mass screws - Interspinous devices - Prosthetic discs - Occipitocervical constructs - Transverse process hooks - How to report postoperative spine imaging: What does spine surgeon want to know? - Post surgical complications

NRE358

Kyphoplasty and Percutaneous Vertebroplasty: An Overview for the Non-Interventionalist

Education Exhibits

Location: NR Community, Learning Center

Participants

Jayant Boolchand MD (Presenter): Nothing to Disclose
Cody Jackson Morris MD: Nothing to Disclose
TEACHING POINTS

1. Diagnostic radiologists play a key role in evaluating the spine both before and after kyphoplasty and percutaneous vertebroplasty. 2. Imaging helps predict both the success of kyphoplasty and percutaneous vertebroplasty as well as subsequent complications. 3. Complications following kyphoplasty and percutaneous vertebroplasty include cement extrusion into the spinal canal, fracture of adjacent vertebral bodies, and cement pulmonary embolism.

TABLE OF CONTENTS/OUTLINE


NRE359

Longitudinal Extensive Transverse Myelitis - A Pattern Based Approach

Education Exhibits

Location: NR Community, Learning Center

Participants

Diego Andre Eifer PhD (Presenter): Nothing to Disclose
Angela Faistauer MD: Nothing to Disclose
Marcio Aloisio Bezerra Cavalcanti Rockenbach MD: Nothing to Disclose
Leonardo Vedolin MD, PhD: Nothing to Disclose
Juliano Adams Perez MD: Nothing to Disclose
Fernando Araujo Leira MD: Nothing to Disclose
Juliana Duarte: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:
1. Understand longitudinal extensive transverse myelitis (LETM) definition, how it differentiates from acute partial transverse myelitis and acute complete transverse myelitis.
2. Review the differential diagnosis of extensive T2 signal in the spinal cord, highlighting the classic signs and MRI findings.
3. Utilize a pattern based approach to narrow the diagnostic possibilities
4. Learn what questions must be done and what labs should be sought to further abbreviate the diagnostic conundrum.

TABLE OF CONTENTS/OUTLINE

The spinal cord
- Axial and sagittal anatomy

Longitudinal extensive transverse myelitis (LETM)
- Definition
- Diagnostic criteria
- Clinical Findings
- How it is different from short segment Acute transverse myelitis

Differential diagnosis
- Neuromyelitis optica
- Multisystem autoimmune inflammatory disease
  --- Multiple sclerosis
  --- ADEM
- Infectious causes
- Neoplastic disorders
- Vascular causes
  --- Acute spinal cord infarction
  --- Arteriovenous shunts
- Metabolic causes
  --- B12 deficiency
- Eosinophilic myelitis

Pattern based approach (fluxogram)
- Localization
  - Gray and/or white matter
- Acute X chronic
- Multiple lesions or solitary
- Brain findings

Laboratory and clinical workout
Teaching points

NRE360

Magnetic Resonance Imaging in the Evaluation of Non-compressive Myelopathy

Education Exhibits
**TEACHING POINTS**
1. To illustrate the various spectrum of etiologies for non-compressible myelopathy. 2. To illustrate the radiological features and utility of magnetic resonance imaging in management of non-compressible myelopathy.

**TABLE OF CONTENTS/OUTLINE**
Myelopathy is the clinical state of neurological deficit localized to the cord and can be consequent to compressive or non-compressive etiologies. Magnetic resonance imaging (MRI) plays a crucial role in the evaluation of myelopathy as it forms the first investigation to rule out compressive etiologies and aids in the differential diagnosis of non-compressible etiologies. In this exhibit, we cover the radiological feature of various causes of non compressive myelopathy such as transverse myelitis, demyelinating conditions like multiple sclerosis, neuromyelitis optica etc, a large spectrum of infective etiologies ranging from viral to bacterial, myelopathy associated with systemic conditions such as systemic lupus erythematosus, sarcoidosis etc, vascular causes like cavernous angioma and ischemia/infarction to toxic/metabolic insults such as subacute combined degeneration and thermal injury. MRI is critical in localizing the level of cord insult in myelopathy, in narrowing down its differential diagnosis and in documenting response to therapy.

**NRE361**
**MR Imaging of Non Compressive Myelopathy**

*Education Exhibits*

*Location: NR Community, Learning Center*

Certificate of Merit

**Participants**
Garima Agrawal MD (Presenter): Nothing to Disclose
Adam Landon Sipe MD: Nothing to Disclose
Aseem Sharma MBBS: Stockholder, General Electric Company

**TEACHING POINTS**
The goal of the exhibit is: 1. To provide a case based pictorial review of non compressive myelopathy 2. To understand clinical presentation of various myelopathies 3. To develop an approach by means of MRI imaging features that can help generate a reasonable differential diagnosis and guide further management

**TABLE OF CONTENTS/OUTLINE**
1. MR imaging in excluding compressive myelopathy and establishing intrinsic cord abnormality and excluding intrinsic cord neoplasm. 2. Case based review of clinical presentation and MR imaging features of non compressive myelopathy under following broad categories • Inflammatory o Transverse myelitis o Infectious myelitis: HIV/ CMV/ viral/ bacterial/ fungal o Granulomatous diseases: sarcoidosis o Radiation myelitis • Vascular o Arterial infarction o Venous o Cavernous malformation • Demyelination o MS o NMO • Metabolic o Vitamin B12 deficiency o Copper deficiency • CSF dysfunction o Presyrinx State o Syringomyelia

**NRE362**
**Multiple Peripheral Nerve Sheath Tumours: Diagnostic Approach**

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**
Rene Leandro Magalhaes Rivero MD, PhD (Presenter): Nothing to Disclose
Mateus Alves Benjamin MD: Nothing to Disclose
Timoteos Rong Guang Wu: Nothing to Disclose
Alan Timoteo Rodrigues Reis: Nothing to Disclose
Gabriel Lacerda Fernandez: Nothing to Disclose
Marcelo D’Andrea Rossi MD: Nothing to Disclose
Renato Adam Mendonca MD: Nothing to Disclose

**TEACHING POINTS**
Patients with a multiple peripheral nerve sheath tumours represent an imaging dilemma for the radiologist. Possible differential diagnosis are NF1 (classic or spinal neurofibromatosis variant), NF2 and schwannomatosis. Aim of this review is:

To discuss MRI characteristics of these multiple tumours with radiologic pathology correlation

To learn which clinical and imaging points are more important to formulate a diagnosis.

**TABLE OF CONTENTS/OUTLINE**
Overview of the nerve sheath tumours origin with radiologic pathology correlation Review the diseases of NF1 with multiple neurofibromas, NF2 and schwannomatosis. Discuss the more relevant clinical data and MRI findings in patients in order to establish the most likely diagnosis, which is confirmed with histopathological analysis and even gene mapping.

**NRE363**
**Return of the Back Pain: Postoperative Complications of Lumbar Decompression Surgery**
**Education Exhibits**

**Location:** NR Community, Learning Center

### Participants

- **David Rodriguez MD (Presenter):** Nothing to Disclose
- **Robert Jeffrey Freed MD:** Nothing to Disclose
- **Vikas Agarwal MD:** Nothing to Disclose

### TEACHING POINTS

Low back pain is a major cause of morbidity and disability, and lumbar spinal surgery is routinely performed in the efforts of relieving such people from their suffering. As with any surgery, there are risks associated with the procedure, and this presentation will review the common postoperative complications, specifically regarding lumbar decompression. Multiple CT and MR examples will be presented to demonstrate the pertinent findings a neuroradiologist must be familiar with when interpreting a postoperative exam. There will then be a brief overview of the different ways and urgencies in which these complications are managed.

### TABLE OF CONTENTS/OUTLINE

- Overview of surgical causes of low back pain
- Highlight the pros and cons of spine surgery
- Describe the role of lumbar decompression in the treatment of low back pain
- Review imaging findings of common postoperative complications, which include:
  - Misplaced hardware
  - Epidural collection/hematoma
  - Recurrent herniation vs epidural fibrosis
  - Arachnoiditis

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**NRE365**

**Spinal Cord Vascular Lesions: Imaging and Angiography Correlation**

**Education Exhibits**

**Location:** NR Community, Learning Center

### Participants

- **Wilmarie Rivera Hernandez MD (Presenter):** Nothing to Disclose
- **Luis Ernesto Garcia MD:** Nothing to Disclose
- **Luis Roberto Burgos-Anaya MD:** Nothing to Disclose
- **Laura Cristina Figueroa Diaz BS:** Nothing to Disclose
- **Manuel Betancourt Torres BS:** Nothing to Disclose

### TEACHING POINTS

Review essential spinal cord anatomy. Review spinal cord vascular supply. Discuss the three major categories of spinal vascular lesions, which include: neoplastic vascular lesions such as hemangioblastomas and cavernous malformations, spinal aneurysms, and spinal cord arteriovenous lesions, which are divided into arteriovenous fistulas and arteriovenous malformations (AVMs). Illustrate common imaging characteristics of spinal cord vascular lesions and their angiographic correlation. Discuss common clinical presentations and their management. Acknowledge the importance of imaging in the diagnosis and management of spinal cord vascular lesions.

### TABLE OF CONTENTS/OUTLINE

- Magnetic resonance imaging is the most useful radiological modality for detection and characterization of spinal cord vascular lesions before performing digital subtraction angiography. We will review the major categories of spinal vascular lesions, which include neoplastic vascular lesions, spinal aneurysms, and spinal arteriovenous lesions. This exhibit will describe characteristic radiological findings and angiographic correlation of hemangioblastomas, cavernous malformations and spinal aneurysms, as well as arteriovenous fistulas and malformations.

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**NRE366**

**Spinal Ligamentous Injuries MRI Evaluation**

**Education Exhibits**

**Location:** NR Community, Learning Center

### Participants

- **Vijay Shridhar Pande MD (Presenter):** Nothing to Disclose
- **Richard Ian Gray MD:** Nothing to Disclose
- **Rafal M. Kedzierski MD, PhD:** Nothing to Disclose
- **shridhar sankar:** Nothing to Disclose
- **Geoffrey Schaeffer Goodin MD:** Nothing to Disclose

### TEACHING POINTS

1) Recognition of various spinal ligamentous injuries. 2) Clinical significance and therapeutic implication of spinal ligamentous injuries.

### TABLE OF CONTENTS/OUTLINE

1) MRI anatomy of spinal ligaments. 2) Mechanisms and Patterns of spinal ligamentous injuries. 3) Traumatic disc abnormalities. 4) Other traumatic abnormalities seen in association with spinal ligamentous injuries.
NRE367

Spinal Meningeal Cysts: What Are They and Why Should I Care? An Interactive, Case-based Tutorial

Education Exhibits
Location: NR Community, Learning Center

Participants
Nicholas Ralph Turman MD (Presenter): Nothing to Disclose
Wendy R. K. Smoker MD : Nothing to Disclose
Lindell R. Gentry MD : Nothing to Disclose

TEACHING POINTS
Goals/Objectives: 1. Become acquainted with this anatomic classification of spinal meningeal cysts 2. Identify the various types of meningeal cysts 3. Recognize various meningeal cyst mimics

TABLE OF CONTENTS/OUTLINE
Spinal meningeal cysts are classified into 3 categories based upon location and presence or absence of nerve root fibers. There are a number of important differential diagnostic lesions that need to be considered. In this interactive, case-based, interactive tutorial, the reviewer is presented with a variety of intraspinal cystic lesions and led to the correct diagnosis through a step by step analysis.

NRE368

Spinal Subdural and Epidural Hematomas: Etiologies, Imaging Techniques, Characteristics and Pitfalls

Education Exhibits
Location: NR Community, Learning Center

Participants
Haatal B. Dave MD, MS (Presenter): Nothing to Disclose
Claire Kaufman : Nothing to Disclose
David Durand MD : Nothing to Disclose
Vivek Bihari Kalra MD : Nothing to Disclose
Ajay Malhotra MD : Nothing to Disclose

TEACHING POINTS
1. Spinal subdural and epidural hematomas are rare neurologic emergencies which can result from several different etiologies and have devastating neurologic sequelae. 2. Common etiologies for both subdural and epidural spinal hemorrhage include trauma, lumbar puncture, spinal surgery and spinal anesthesia.

TABLE OF CONTENTS/OUTLINE
Anatomy: • Pia, Arachnoid, Dura • Epidural and subdural spaces • Epidural venous plexus and fat MRI: • Aging of blood products- hyperacute, acute, early and late subacute, chronic • Use of gradient echo with hyperacute hemorrhage Spinal Subdural Hemorrhage: • Pathophysiology • Presentation • Etiologies with MR example of each: trauma, lumbar puncture, spinal anesthesia, spine surgery, bleeding diathesis, anticoagulation therapy, vascular malformations, non-accidental trauma, posterior fossa decompressive surgeries • MR imaging techniques and features • MR pitfalls • Complications Spinal Epidural Hemorrhage: • Pathophysiology • Etiologies with MR example of each: spontaneous, trauma, spinal anesthesia, spine or brain surgery • Presentation • MR imaging techniques and features • MR pitfalls • Complications

NRE369

T2 Hyperintense Lesions of Spinal Cord- Myelitis, Myelomalacia and More...MRI Pattern Recognition

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Zarina Abdul Assis MBBS, MD (Presenter): Nothing to Disclose
Sunitha P Kumaran MBBS, MD : Nothing to Disclose
Sanjaya Viswamitra MD : Nothing to Disclose

TEACHING POINTS
1. A systematic MRI pattern recognition approach is presented towards T2 hyperintense cord lesions. 2. Viewers will learn differential diagnosis of various T2 hyperintense lesions of spinal cord with emphasis on MRI features and clinical presentation. 3. Viewers will learn specific radiological signs to narrow down the differentials of cord lesions.

TABLE OF CONTENTS/OUTLINE
Introduction: Majority of spinal cord pathologies appear hyperintense on T2 weighted MR imaging. A systematic imaging approach helps in differentiating one from other, in a given clinical set-up. Methods: A case based approach is presented to arrive at the correct diagnosis. 1. Lesions were described on basis of following MR imaging parameters: location, longitudinal/ cross-sectional extent, T1 characteristics, post contrast enhancement, hemorrhage and appearance on follow up. 2. Clinical parameters used were: Age at presentation, duration of illness, neurological deficits, co-morbidities and clinical recovery on follow up. 3. Finally, both radiological and clinical findings were correlated to arrive at the diagnosis. Histopathological correlation was also performed whenever applicable. 4. A wide range of cord pathologies including compressive, infective,
NRE370

The Injured Spinal Cord – Problem Solving with Advanced MRI Techniques

Education Exhibits
Location: NR Community, Learning Center

Participants
Sadaf Fatima Zaidi MD (Presenter): Nothing to Disclose
Mahmud Mossa-Basha MD: Nothing to Disclose
Ken Floris Linnau MD, MS: Speaker, Siemens AG Royalties, Cambridge University Press
Quynh Nguyen: Nothing to Disclose
Sherif Osman MD: Nothing to Disclose

TEACHING POINTS
After reviewing this exhibit the reader will: • Be familiar with MR anatomy and MR imaging appearance of spinal cord injuries. • Be able to tailor an optimal MR protocol for suspected spinal cord trauma. • Have developed a diagnostic approach to acute and chronic spinal cord injuries and be able to facilitate clinical decision making and management in patients with spinal cord trauma.

TABLE OF CONTENTS/OUTLINE
Content organization: • Review normal MR soft tissue anatomy of the spine and spinal cord. • Discuss indications for conventional and advanced MR imaging techniques in the setting of acute trauma. • Discuss optimization of MR sequence protocols in the setting of suspected spinal cord injury. • Review the imaging appearance and patterns of acute and chronic spinal cord trauma on conventional and advanced MR. • To review prognostic imaging patterns of short and long term neurological outcomes emphasizing the role of the radiologist in decision making for management of patients with acute spinal cord injuries. • Discuss value and benefits of advanced spinal cord imaging techniques, including, Diffusion tensor imaging/Diffusion weighted imaging, high resolution imaging and T2* weighted gradient echo sequences.

NRE371

The RBC's of Spinal Headaches: A Review of the Autologous Epidural Blood Patch

Education Exhibits
Location: NR Community, Learning Center

Participants
William Alfred Moore MD (Presenter): Nothing to Disclose
Harold David Scott MD: Nothing to Disclose
Victor Omar Lopez MD: Nothing to Disclose
David Paul Chason MD: Nothing to Disclose
Edward Justin Stehel MD: Nothing to Disclose

TEACHING POINTS
Blood patch is an effective therapy for the treatment of headaches due to spinal CSF leaks with low complication rate. Review the indications, contraindications, technical methods, imaging, clinical results, and potential complications of the epidural blood patch. An empiric injection in the lumbar spine can potentially treat an occult spontaneous CSF leak arising from the thoracic spine. Image-guided blood patch may be of particular advantage over the blind "loss of resistance" technique in the setting of prior spinal surgery, complex anatomy, obese patients, or advanced degenerative change.

TABLE OF CONTENTS/OUTLINE

NRE372


Education Exhibits
Location: NR Community, Learning Center

Participants
Carlos Hernando Torres MD (Presenter): Nothing to Disclose
Roy Riascos MD: Nothing to Disclose
Julie Hurteau MD: Nothing to Disclose
Claudia Cotes MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To describe the ultrasound (US) technique used for the assessment of the spine in newborns. 2. To demonstrate the normal anatomy and the anatomical variants that the radiologist should recognize when imaging the spine of the newborn with high resolution US. 3. To present a variety of cases of closed spinal dysraphism with and without a subcutaneous mass as well as disorders of midline notochordal integration and disorders of notochordal formation.

TABLE OF CONTENTS/OUTLINE
1. Review the technique used to scan the spinal canal in pediatric patients, demonstrating: - Normal anatomy - Anatomical
variants that could mimic pathology such as transitory dilation, ventriculus terminalis, pseudo arachnoid cyst and pseudo mass of the cauda equina. 2. Review the up to date classification of skin covered spinal dysraphism: - with subcutaneous mass - without a subcutaneous mass. - disorders of midline notochordal integration - disorders of notochordal formation 3. Sample cases 4. Summary

NRE373

Uncommon Manifestations of Disc Pathology

*Education Exhibits*

*Location: NR Community, Learning Center*

Certificate of Merit

Selected for RadioGraphics

**Participants**

Felix E. Diehn MD (Presenter): Nothing to Disclose
Timothy J. Kaufmann MD : Nothing to Disclose
Patrick H. Luetmer MD : Nothing to Disclose
Vance Lehman MD : Nothing to Disclose
Kent Ronald Thielen MD : Consultant, Nevro Imaging, Inc
Carrie M. Carr MD : Nothing to Disclose
Jonathan Michael Morris MD : Nothing to Disclose
Amy Louise Kotsenas MD : Nothing to Disclose
Timothy P. Maus MD : Nothing to Disclose
John Thomas Wald MD : Nothing to Disclose

**TEACHING POINTS**

1. Intervertebral disc pathology can have unusual manifestations which interpreting radiologists may encounter and should be able to recognize. 2. The differential diagnosis of an intraspinal extradural cyst includes a discal cyst. 3. Intradural disc herniation, spinal CSF leak due to disc/osteophyte, and ventral cord herniation at a disc level: a spectrum of disease with similar pathology. 4. The contour and position of thoracic cord should always be scrutinized to exclude ventral spinal cord herniation, a treatable cause of myelopathy. 5. The differential diagnosis of a dorsal epidural mass includes a migrated/sequestered dorsal disc fragment. 6. Disc herniations in unusual locations/varieties typically peripherally enhance (intradural, dorsal epidural, extreme lateral, discal cyst).

**TABLE OF CONTENTS/OUTLINE**

Atypical disc pathology Discal cyst Disc-origin fibrocartilaginous embolism causing spinal cord infarct Atypical disc herniations Extreme lateral (retroperitoneal, prevertebral, intraneural) Dorsal epidural Spectrum of... Intradural disc herniation Calcified disc/osteophyte causing CSF leak Transdural spinal cord herniation at disc level Miscellaneous: giant thoracic (calcified); calcified pediatric; massive lumbar; gas-containing; FDG avid Acute intravertebral (Schmorl's node) Differential diagnosis: metastasis

NRE374

Bilateral Inferior Petrosal Sinus Sampling (BIPSS) in Diagnostic Evaluation of ACTH-dependent Cushing Syndrome (CS): A Pictorial Review

*Education Exhibits*

*Location: NR Community, Learning Center*

**Participants**

Daniel Rodriguez Bejarano MD (Presenter): Nothing to Disclose
Lucia Aja MD : Nothing to Disclose
Juan Jose Sanchez Fernandez MD : Nothing to Disclose
Evelyn Claudia Montano Claire MD : Nothing to Disclose
Lara Farras : Nothing to Disclose
Lisbeth Valoyes Guerrero MD : Nothing to Disclose

**TEACHING POINTS**

ACTH-dependent CS is a diagnostic challenge. The goal is to distinguish pituitary from ectopic ACTH secretion; BIPSS is sensitive and specific in the diagnostic evaluation of this entity and helps in location of the adenoma. An adequate knowledge of venous anatomy and a proper technique are essential to avoid complications with interpretable results.

**TABLE OF CONTENTS/OUTLINE**

CS is an uncommon endocrine disorder associating increased morbidity and mortality. Endogenous CS is mostly due to ACTH-secreting pituitary adenomas. Features of pituitary and ectopic ACTH-dependent CS (carcinoid tumors...) are undistinguishable. BIPSS is the gold standard to identify the source of ACTH secretion. Knowledge of pituitary venous drainage is essential for IPSS technique. As venous drainage from pituitary is usually unilateral, a bilateral approach is required. Our protocol includes a bilateral femoral venous access (5F sheath in each femoral vein). When catheters are placed, we started to sample ACTH from peripheral blood and from both IPS at baseline and after CRH stimulation (3, 5, 15, 30 minutes). After samples are obtained, both femoral sheaths are removed. To interpret results, the ratio of IPS/peripheral ACTH level is calculated. It’s a safe procedure, if it’s done by experienced personal. The most frequent complication is groin hematoma; neurologic complications are rare.

NRE375

Characterization of Dural Arteriovenous Fistulas of the Spine by MR and DSA: A Pictorial Review

*Education Exhibits*

*Location: NR Community, Learning Center*

Certificate of Merit
Participants
Lucia Aja Rodriguez MD (Presenter): Nothing to Disclose
Juan Jose Sanchez MD, PhD: Nothing to Disclose
Daniel Rodriguez Bejarano MD: Nothing to Disclose
Evelyn Claudia Montano Claure MD: Nothing to Disclose
Angels Camins MD: Nothing to Disclose
M. Angels De Miquel: Nothing to Disclose

TEACHING POINTS
To review imaging features and the spectrum of dural arteriovenous fistulas of the spine by MR and intraarterial angiography. To optimize technical parameters to establish an early, accurate and reliable diagnosis.

TABLE OF CONTENTS/OUTLINE
We retrospectively reviewed 23 patients with dural arteriovenous fistulas treated in our center between January 2010 and January 2014. All patients underwent MR, because of different clinical conditions and AVF was suspected. MR proved to be good in guiding the angiographic study. Procedure was shorter, less contrast media was administrated, less radiation dose was necessary and a lowe rate of complications was noticed in these patients if compared with those without a previous MR study. Imaging features of fistulas were similar in MR and DSA in most cases. MR is more available, less invasive and cheaper than angiography. DSA confirms the diagnosis and allows to perform endovascular treatment.

NRE376
CT and MR of the Carotid Artery Plaque Remodelling

Education Exhibits
Location: NR Community, Learning Center

Participants
Luca Saba MD (Presenter): Nothing to Disclose
Roberto Montisci MD: Nothing to Disclose
Michele Porcu MD: Nothing to Disclose
Roberto Sanfilippo MD: Nothing to Disclose
Pierleone Lucatelli MD: Nothing to Disclose
Eytan Raz MD: Nothing to Disclose

TEACHING POINTS
The concept of "plaque remodelling" indicates the morphological and ultra-structural variation of a plaque in the time. Several investigations have demonstrated that the carotid artery plaques change and it is possible that some determinants of instability are transitory. Moreover, some drugs (such as statins, apolipoprotein) change the composition of the plaque by increasing or reducing its volume. In this exhibit our purpose was to understand the physiopathology of plaque remodelling and to review CT and MR imaging findings of this phenomenon.

TABLE OF CONTENTS/OUTLINE
1) To review the concept of carotid artery plaque remodelling 2) histology of the plaque according the AHA classification. 3) The biomechanical effect of plaque eccentricity 4) MR, CT, and US imaging findings of carotid artery plaque follow-up that demonstrate the plaque remodelling. 5) Limits and potentialities of MR, CT and US in the follow-up of the carotid artery plaque 6) The drug-effect: how the therapies may change the plaque in terms of regression and progression. 7) Presentation of relevant cases.

NRE377
Direct Carotid Cavernous Sinus Fistulas: Evolving Endovascular Therapeutic Techniques

Education Exhibits
Location: NR Community, Learning Center

Participants
William Pedersen MD (Presenter): Nothing to Disclose
Malaykumar Manilal Patel MD: Nothing to Disclose
J. Scott Williams MD, PhD: Nothing to Disclose
Steven Thomas Reed MD: Nothing to Disclose

TEACHING POINTS
1. Review of historic and current endovascular therapies 2. Selecting the optimal endovascular treatment

TABLE OF CONTENTS/OUTLINE
Introduction: First treated surgically in early nineteenth century with carotid artery ligation, initial evolution of CCF treatment was limited to advancements in open surgical techniques. The innovation of modern endovascular techniques in the 1970s revolutionized treatment, reducing morbidity and mortality. The treatment of CCFs has evolved as catheter directed techniques have continued to advance. Pathophysiology: An arteriovenous fistula between the highly pressurized ICA and low pressure cavernous sinus results in hypertension in the cavernous sinus and the structures it drains, principally the orbit. Angiography: Initial angiography defines the anatomy and clarifies high-risk features such as cortical venous drainage, pseudoaneurysm, cavernous sinus varix and dangerous collateral pathways. Endovascular therapy: Obliteration of the fistula can be achieved by parent vessel sacrifice, embolization of the fistulous communication using a variety of materials and approaches, or through the use of an arterial covered stent. Conclusion: Endovascular intervention has evolved dramatically and is the most viable treatment option for CCF.

NRE378
Epidural Blood Patches: Review of the Technique, Applications, and Complications

Education Exhibits
Location: NR Community, Learning Center
Participants
Shamar Justin Young MD (Presenter): Nothing to Disclose
Tina S. Sanghvi MD: Nothing to Disclose
Ronald G. Quisling MD: Nothing to Disclose

TEACHING POINTS
- Understand the indications for performing an epidural blood patch, the primary treatment modality for intracranial hypotension (ICH).
- Learn proper epidural blood patch procedural techniques and identify different approaches utilized.
- Identify possible complications and pitfalls associated with the procedure.
- Review pre and post epidural blood patch imaging demonstrating objective radiologic improvement in findings of ICH after treatment and discuss factors suggesting that repeat treatment should be considered.

TABLE OF CONTENTS/OUTLINE
- Brief review of intracranial hypotension (ICH), with an emphasis on clinical presentation and radiologic findings.
- Discussion of ICH etiologies (see images 1 and 2 demonstrating dural tears/leaks in an idiopathic case of ICH) and review of pre-procedural selection criteria.
- Review epidural blood patch procedural techniques with illustrative imaging (see figure 2 which is an intra-procedural image).
- Discuss possible complications and pitfalls of the procedure.
- Review published success rates of the procedure and discuss factors which potentially limit treatment success.
- Describe pre and post epidural blood patch procedural imaging demonstrating positive treatment effect (see figures 4 and 5, pre and post-treatment respectively).
- Discuss when a repeat epidural blood patch should be considered.

NRE379
Imaging of Carotid Artery Vulnerable Plaque

Education Exhibits
Location: NR Community, Learning Center

Participants
Luca Saba MD (Presenter): Nothing to Disclose
Max Wintzermark MD: Research Grant, General Electric Company Research Grant, Koninklijke Philips NV
Bruce A. Wasserman MD: Nothing to Disclose
Michele Anzidei MD: Nothing to Disclose
Roberto Montisci MD: Nothing to Disclose

TEACHING POINTS
Carotid plaque morphology and composition play an important role in the embolic risk and should be considered as key parameters for the choice of the therapeutical approach. Nowadays, imaging techniques can identify and characterize a carotid vulnerable plaque and in particular the use molecular imaging and multi-spectral CT imaging allows to precisely distinguishing plaque components and characteristics. A "vulnerable plaque" is considered an atherosclerotic plaque with a tendency to rupture, resulting in embolization or thrombosis. In this exhibit our purpose was to understand the physiopathology of vulnerable plaque and to review CT, MR, US and Nuclear Medicine (NM) imaging findings of carotid vulnerable plaque with histological correlation.

TABLE OF CONTENTS/OUTLINE
1) Classification of plaque type
2) Elements associated to the plaque instability: type of plaque, thrombus, intra-plaque haemorrhages, ulcerations, fissured fibrous caps.
3) MR, CT, US and NM imaging findings with histological comparison of carotid vulnerable plaque.
4) Limits and potentialities of MR, CT, US and NM imaging findings with histological comparison of carotid vulnerable plaque.
5) Algorithm for the automated plaque analysis
6) Presentation of advanced techniques like molecular imaging and multi-spectral CT imaging.
7) Diagnostic flow chart in the assessment of carotid vulnerable plaque

NRE381
Multimodality Imaging of Vertebrobasilar Dolichoectasia, Clinical Presentations and Imaging Spectrum: Current Status and Further Prospect

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit
Selected for RadioGraphics

Participants
Mohammad M. Samim MD, MRCS (Presenter): Nothing to Disclose
Alan Goldstein MD: Nothing to Disclose
Michele Hackley Johnson MD: Committee member, Boston Scientific Corporation

TEACHING POINTS
The major teaching points of this educational exhibit are: 1. To review the current diagnostic criteria of vertebrobasilar dolichoectasia utilizing CT, MR, and angiography (DSA) and discuss their limitations. 2. To demonstrate the significance and different presentations of VBD. 3. To review how to optimize imaging protocols. 4. To review available treatment options and future prospects.

TABLE OF CONTENTS/OUTLINE
The current and available diagnostic criteria, including "Smoker criteria". The technique of high resolution CT and MR pulse sequences and angiography tailored for evaluation of VBD and the imaging interpretation. Multimodality imaging features of compressive and vascular complication. How to recognize imaging points of critical importance for treatment planning. How to optimize imaging methodologies. Cases of patients: various clinical presentations: compressive symptoms including hydrocephalus and cranial nerve palsies, for example vertigo, hearing loss, facial palsy, and trigeminal neuralgia; neurovascular symptoms such as transient ischemic attack, ischemic stroke, or hemorrhagic stroke. Imaging pitfalls related to thrombus, calcification and flow disturbances and strategies for imaging optimization.

NRE382
Reversible Cerebral Vasoconstriction Syndrome: Clinical and Imaging Features and Controversies in Diagnosis and Management

Education Exhibits
Location: NR Community, Learning Center

Participants
Aaron Betts MD (Presenter): Nothing to Disclose
Aaron Grossman MD: Nothing to Disclose
Joseph Serrone MD: Nothing to Disclose
Achala Sameer Vagal MD: Research Grant, F. Hoffmann-La Roche Ltd Investigator, F. Hoffmann-La Roche Ltd

TEACHING POINTS
The purposes of this exhibit are: 1. Review the various clinical presentations that encompass the broad diagnostic spectrum of reversible cerebral vasoconstriction syndrome (RCVS). 2. Present CT, MRI, and angiographic imaging findings of various clinical entities that are categorized as variants of RCVS. Image findings will be discussed and examples will be provided in a case-based format. Examples of post-therapeutic imaging will also be presented. 3. Discuss controversies in the diagnosis and management of RCVS. 4. Discuss potential complications of intra-arterial therapy in RCVS.

TABLE OF CONTENTS/OUTLINE
Conditions categorized under spectrum of reversible cerebral vasoconstriction syndrome (RCVS) - Spontaneous (Call-Fleming, benign angiopathy of the CNS, thunderclap headache with reversible vasospasm) - Related to use of vasoactive drugs - Post-partum angiopathy - Migrainous vasospasm - Other associations - Associations with PRES Complications of RCVS Imaging features - CT - MRI/MRA - Angiography Diagnosis Management Complications of treatment

NRE383
Revisiting The Cryptic Asymptomatic Parasellar High Flow on Magnetic Resonance Angiography (MRA)

Education Exhibits
Location: NR Community, Learning Center

Certificate of Merit

Participants
Santhosh Raj Seela Raj MD, FRCR (Presenter): Nothing to Disclose
Ivan Ho Mien MBBS, PhD: Nothing to Disclose
Jamie Ho: Nothing to Disclose
Louis Elliot Mcadory MD, PhD: Nothing to Disclose
Winston Eng-Hoe Lim: Nothing to Disclose
Ling Ling Chan MBBS, FRCR: Nothing to Disclose

TEACHING POINTS
Address and present prevalence of asymptomatic high parasellar flow on MRA in the literature and our institution Review origin of these incidental and false positive signs for dural arteriovenous fistulas (DAVFs), and illustrate MRA signs suggesting benignity, including modification of MRA presaturation pulses and use of 4D MRA, from our local experience Contrast with MRA signs indicative of aggressive DAVFs based on existing classification systems Formulate work-flow algorithm to manage the clinical conundrum and better select patients needing further 4D MRA or invasive angiography

TABLE OF CONTENTS/OUTLINE
1. Introduction
2. Anatomy of the Cavernous Sinus
3. Causes of Parasellar High Signal Intensity on MRA of The Circle of Willis
4. Origin of Asymptomatic Parasellar High Flow Signal
5. Dural Arteriovenous Fistulas and Their Classification
6. Imaging Findings and Techniques
7. Resolving False Positive Parasellar High Flow Signal Versus Benign and Aggressive Dural Arteriovenous Fistulas
8. Workflow Algorithm

NRE385
Vascular Anomalies of the Spine: A Simplified Approach

Education Exhibits
Location: NR Community, Learning Center

Participants
Neda Isabel Sedora-Roman MD (Presenter): Nothing to Disclose
Sachin Pandey MD: Nothing to Disclose
Ajit Thomas MD: Data Safety Monitoring Board, Boston Biomedical Associates
Gul Moonis MD: Nothing to Disclose

TEACHING POINTS
Upon completion of this educational exhibit, participants will be able to: 1. Review and describe typical imaging features of spinal vascular anomalies. 2. Review their classification, pathophysiology and treatment.

TABLE OF CONTENTS/OUTLINE
I. Background: Spinal vascular malformations represent a heterogeneous group of vascular anomalies. The clinical presentation of these malformations can be nonspecific, leading to underdiagnosis. If not treated in a timely fashion, these lesions may lead to progressive spinal cord symptoms, myelopathy and irreversible neurologic disability. The neuroradiologist is often the first to suggest this diagnostic possibility and as such a clear understanding of the classification and imaging presentation of each of...
these lesions is crucial. II. Spinal vascular anatomy review III. Types & classifications of spinal vascular anomalies: These lesions consist of congenital cavernomas, arteriovenous malformations and acquired arteriovenous fistulas. The literature on spinal vascular malformations contains multiple different classification systems based on anatomic location, angioarchitecture and morphology. Current classification schemes used in the description of spinal vascular anomalies will be reviewed. IV. Review of Imaging Findings a. MRI/MRA b. Conventional angiography V. Sample cases VI. Summary

OBE002-b

Differentiating Residual Disease in Postoperative Ovarian Cancer

Education Exhibits

Location: OB Community, Learning Center

Participants

Angela Atinga MBChir, BA (Presenter): Nothing to Disclose
Yaron J. Berkowitz MBChir, MRCS : Nothing to Disclose
Andrea Grace Rockall MRCP, FRCP : Nothing to Disclose
Nishat Bharwani MBBS, FRCP : Nothing to Disclose
Victoria Stewart : Nothing to Disclose

TEACHING POINTS

- Revise the CT findings in ovarian cancer and the role of surgery in management of patients
- Identify the expected postoperative CT findings following ovarian cancer cytoreductive/debulking surgery
- Differentiate between expected changes and those that may represent complications or residual disease.
- Highlight areas that require particular attention during interpretation

TABLE OF CONTENTS/OUTLINE

There is a well-established role for cytoreductive or debulking surgery in the management of both early and advanced ovarian cancer, and surgical targets are often imaging led. Surgery may be performed before or after chemotherapy in the first instance, in managing recurrent disease, or palliatively. CT imaging is often performed post operatively. One of the difficulties is identifying and differentiating between expected post-operative changes, surgical complications and residual disease. Our table of contents will be: - Common CT findings in ovarian cancer - Debulking surgery and expected findings in post-operative imaging - Pictorial review of surgical complications and residual disease that may mimic post-surgical change - A useful ‘tips and tricks’ checklist to help distinguish between expected post-operative changes, surgical complications and residual disease

OBE003-b

Radiologic Findings of Perineal Diseases with Perineal US, CT and MRI

Education Exhibits

Location: OB Community, Learning Center

Participants

Sun Huh MD (Presenter): Nothing to Disclose
Boem Ha Yi MD, PhD : Nothing to Disclose
Hae-Kyung Lee MD : Nothing to Disclose
Min Hee Lee MD : Nothing to Disclose
Seo-Youn Choi MD : Nothing to Disclose

TEACHING POINTS

- To explain the anatomic information about perineum and various pathologic conditions might develop in perineal region. - To know the characteristics of perineal ultrasound and other radiologic findings of perineal tumors and benign diseases. - To obtain the ability to differentiate many diseases in perineal area

TABLE OF CONTENTS/OUTLINE


OBE004-b

A Lamb in Wolf’s Clothing: Mimics of Ovarian Cancer

Education Exhibits

Location: OB Community, Learning Center

Participants

Katherine Elizabeth Maturen MD (Presenter): Research support, General Electric Company
Ashish P. Wasnik MD : Nothing to Disclose
Andrew Sciallis MD : Nothing to Disclose
Aya Kamaya MD : Nothing to Disclose

TEACHING POINTS

After reviewing the exhibit, the learner should be able to:
- Enumerate organ systems where pathology may present as an adnexal mass
- Identify anatomic clues such as vascular supply and deviation of structures that enable correct identification of disease site
• Recognize important pathologies that may mimic ovarian lesions
• Understand the management significance of correctly identifying the organ of origin in pelvic masses

TABLE OF CONTENTS/OUTLINE
This exhibit will present a multimodality review of abdominal and pelvic disorders that may mimic ovarian carcinoma, with pathologic correlation and anatomic drawings to highlight selected cases. Radiologists must be familiar with these entities in order to have an appropriately broad differential diagnosis and direct appropriate management. Organ systems giving rise to ovarian cancer mimics, and selected examples: Bowel and mesentery (lymphoma, diverticula, mucinous GI tumor, inflammatory disease) Neurogenic and presacral masses (meningocele, Schwannoma, taillight cyst) Pelvic vasculature (aneurysm, vascular malformation) Uterus (pedunculated fibroid, rudimentary horn) Intrapерitoneal conditions (leiomyomatosis, splenosis, peritoneal inclusion cyst) Retroperitoneal conditions (sarcoma, hematoMin)

OBE005-b
CT Virtual Hysterosalpingography Findings of the Normal and Abnormal Fallopian Tubes: A Comprehensive Approach

Education Exhibits
Location: OB Community, Learning Center

Participants
Patricia M. Carrascosa MD (Presenter): Research Consultant, General Electric Company
Carlos Capunay MD: Nothing to Disclose
Javier Vallejos MD, MBA: Nothing to Disclose
Mariano Baronio: Nothing to Disclose

TEACHING POINTS
• To be aware of the advantages and disadvantages of the CT-VHSG. • To be familiar with the procedure. • To recognize the normal anatomy and pathologic findings of the fallopian tubes by CT-VHSG.

TABLE OF CONTENTS/OUTLINE
A. CT-VHSG protocol: • Technical parameters • Radiation dose • Contrast injection • Patient discomfort B. Normal fallopian tube anatomy: • Normal findings • Anatomic variants C. Spectrum of fallopian tube pathology: • Tubal occlusion: proximal and distal • Contour irregularity: salpingitis isthmica nodosa • Tubal dilatation and hydrosalpinx • Filling defects: tubal polyp and intratubal adhesions • Postoperative changes

OBE006-b

Education Exhibits
Location: OB Community, Learning Center

Participants
Daisy Qinjun Huang MD (Presenter): Nothing to Disclose
Robert Nicholas Troiano MD: Nothing to Disclose

TEACHING POINTS
Many radiologists are uncomfortable with evaluating the umbilical cord on sonogram as pregnancies beyond the first trimester are often diverted to obstetrics at tertiary care centers. However, umbilical cord anomalies are not always incidental and can be associated with other structural anomalies or growth retardation, requiring further workup. A radiologist who is able to evaluate for normal umbilical cord appearance and look for classic abnormalities will greatly contribute to patient care and management. The purpose of this pictorial exhibit will review: How does a normal umbilical cord look on sonogram? Common and rare anomalies associated with the umbilical cord What does the clinician need to know? Indications for further workup

TABLE OF CONTENTS/OUTLINE
Sonographic evaluation of the normal umbilical cord - Anatomy - Sonographic landmarks Common and rare anomalies of the umbilical cord such as: - single umbilical artery - umbilical vein varix - umbilical cord cyst - velamentous insertion - vasa previa Indications for further workup

OBE007-b
Increasing Rate of Cesarean Deliveries and Fertility Treatments: Are We Conscious of the Risks?

Education Exhibits
Location: OB Community, Learning Center

Participants
Leonor Alamo MD (Presenter): Nothing to Disclose
Sabine Schmidt MD: Nothing to Disclose
Reto Antoine Meuli MD, PhD: Nothing to Disclose
Jean-Yves Meuwly MD: Nothing to Disclose

TEACHING POINTS
The increasing rate of cesareans, fertility treatments and uterine surgical procedures worldwide has resulted in a higher frequency of patients presenting with complications related to these procedures. These patients also present a higher risk of complications in case of further pregnancies, including anomalous placental implantation and placental invasion. Ultrasound (US) is the most important diagnostic method, but MR imaging (MRI) is being increasingly used as a complementary imaging technique. The main teaching points of this educational exhibit are to describe the most frequently detected complications post-cesarean and hysterotomies during pregnancy or unrelated to pregnancy and to show the MRI findings of these complications.
complications, based on demonstrative proven cases.

TABLE OF CONTENTS/OUTLINE

Ectopic Pregnancy: Common and Uncommon Implantation Sites and Mimics

Education Exhibits
Location: OB Community, Learning Center

Participants
Dana Ataya MD (Presenter): Nothing to Disclose
Bandar Osaid Safar MD : Nothing to Disclose
Frances Glorie Tardy MD : Nothing to Disclose
Tabassum Khowaja MD : Nothing to Disclose
Lulu He DO : Nothing to Disclose
Noushin Vahdat MD : Nothing to Disclose

TEACHING POINTS
After reviewing the exhibit, the participant should be able to:
- Discuss imaging findings of ectopic pregnancy
- Describe common and uncommon implantation sites of ectopic pregnancy
- Differentiate common and uncommon ectopic pregnancies from other pathologies/mimics

TABLE OF CONTENTS/OUTLINE
Background on ectopic pregnancy, appropriate imaging work up, and indications for MRI Common ectopic pregnancy implantation sites and imaging features Uncommon ectopic pregnancy implantation sites and imaging features -Cervical ectopic -Cornual interstitial ectopic -Intramyometrial ectopic -Others Differentiating ectopic pregnancies from other pathologies/mimics Management/Treatment

Role of 3D Ultrasound In Uterine Anomalies

Education Exhibits
Location: OB Community, Learning Center

Participants
Seng Thipphavong MD (Presenter): Nothing to Disclose
Dilkash Kajal MD : Nothing to Disclose

TEACHING POINTS
3D US is most useful in diagnosing arcuate and differentiating septate from bicornuate uterus. 3D US can be considered alternate adjunct to MR considering lower cost, reproducibility and patient acceptability.

TABLE OF CONTENTS/OUTLINE
The uterine anomalies affect up to 5% of women. These women can have fertility/obstetrical issues such as spontaneous abortion and preterm labor. The widely accepted classification system of uterine anomalies by the American Fertility Association (AFS) based not only on embryology but other clinical factors such as presentation and treatment. These anomalies are classified into seven groups: Class I: Uterine hypoplasia/agenesis Class II: Unicornuate uterus Class III: Uterine didelphys Class IV: Bicornuate uterus Class V: Septate/sub septate Class VI: Arcuate uterus Class VII: Diethylstilbestrol (DES) MR revolutionized the imaging scene with its non-invasiveness, safety and accuracy of near 100%. The 3 D US, like MRI has the advantage of assessing the endometrial cavity and the uterine fundus in virtually any plane. Many studies have shown more than 90% sensitivity/specificity, efficacy and positive predictive value of 3 D US.

Comprehensive Review of T2-Star Weighted Imaging of the Female Pelvis

Education Exhibits
Location: OB Community, Learning Center

participants
Eriko Maeda MD (Presenter): Nothing to Disclose
Nozomu Takahashi : Nothing to Disclose
Osamu Yoshino : Nothing to Disclose
Masanobu Nakamura : Employee, Koninklijke Philips NV
Kuni Ohtomo MD : Research Grant, Bayer AG Research Grant, DAIICHI SANKYO Group
Minoru Osuga : Nothing to Disclose
Masaaki Hori MD : Nothing to Disclose
Takeshi Tabuchi RT : Nothing to Disclose

TEACHING POINTS
1. T2-star weighted imaging contributes to differential diagnoses of T1WI-hyperintense cystic masses, solid portion within
them, and extra-ovarian endometriosis.
2. T2-star weighted imaging to routine exam improves sensitivity for pelvic adhesion, which contributes to better
preparation of surgery.
3. Hypointensity within non-endometrial cystic ovarian masses reflect chemical-shift artifact in dermoids, and subtle
endometriosis in other tumors.

TABLE OF CONTENTS/OUTLINE
Pelvic T2-star weighted imaging
- Why add T2*WI to pelvic examinations
- Setting parameters
- The normal pelvis on T2*WI
Endometriosis
- Spectrum of imaging findings
- Extra-ovarian endometriosis
- Solid part of endometriomas
Pelvic adhesion
- Prediction of dorsal adhesion: ovary and Douglas pouch
- Prediction of ventral adhesion: uterus, bladder and abdominal wall
Cystic ovarian tumors
- Dermoids
- Serous and mucinous cystadenomas
- Other cystic masses
Conclusions

OBE104
Diffuse Cystic Disease of the Ovary: A Differential Diagnosis

Participants
Nicholas H. Shaheen MD (Presenter): Nothing to Disclose
Saro Manoukian MD : Nothing to Disclose
Daniel Kowal MD : Nothing to Disclose

TEACHING POINTS
The goals of this educational exhibit are as follows:
1. Review the broad differential diagnosis of diffuse cystic disease of the ovaries, including both non-neoplastic and neoplastic
processes.
2. Review the characteristic US, CT, and MR imaging features of non-neoplastic and neoplastic processes leading to diffuse cystic
disease of the ovaries, focusing on differentiating features such as size of ovaries, number and size of cysts, as well as
extra-ovarian findings.

TABLE OF CONTENTS/OUTLINE
Ovarian metastases 3. Other less common ovarian neoplasms with cystic components 2. Summary

OBE105
Endometriosis in Atypical Sites: A Pictorial Essay

Participants
Cinthia Vanessa Mendonca Alves : Nothing to Disclose
Antonio Eiras-Araujo MD : Nothing to Disclose
Jaime Araujo Oliveira Neto MD : Nothing to Disclose
Rosana Souza Rodrigues MD, PhD : Nothing to Disclose
Edson Marchiori MD, PhD : Nothing to Disclose
Daniella Braz Parente MD (Presenter): Nothing to Disclose

TEACHING POINTS
1. Present a comprehensive review of the deep endometriosis. 2. Describe the role of pelvic MR imaging in the investigation of
endometriosis. 3. Illustrate the MR imaging features of various atypical anatomic sites of endometriosis.

TABLE OF CONTENTS/OUTLINE
MR imaging appearances of atyical endometriosis and the extension of disease a. Thorax b. Liver c. Levator ani muscle d. Round
ligament e. Bladder and ureter f. Anterior pelvic wall g. Ileal
Fallopian Tube Pathologies: A Diagnostic Conundrum

Education Exhibits
Location: OB Community, Learning Center

Participants
Marwa Gafar Mohamed Elsayed MBBS (Presenter): Nothing to Disclose
Zeid Al-Ani MBCh, MRCP: Nothing to Disclose
Tanzilah Afzal Barrow MBCh: Nothing to Disclose
Anna Clare Walsham MBChB, FRCR: Nothing to Disclose
Dina Kasir MBChB: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is:
- To describe the different encountered fallopian tube pathologies and their radiological appearances in multi-modality imaging.
- To highlight important radiological findings crucial in acute clinical settings.

TABLE OF CONTENTS/OUTLINE
- Review of fallopian tube anatomy.
- Radiological appearances of various benign and malignant fallopian tube diseases. Multimodality correlation (Ultrasound, CT and MR imaging) will be depicted. Important differentiating features/learning points will be highlighted along each case.
- Examples to include:
  - Hydrosalpinx.
  - Haemosalpinx.
  - Fallopian tubes endometriosis.
  - Fallopian tubes ectopic pregnancy.
  - Acute and chronic inflammatory diseases, such as pelvic inflammatory disease, Tuberculosis, Actinomycosis and perforated diverticulitis involving fallopian tubes.
  - Fallopian tube malignancies.

OBE107
MRI of Endometriosis: A Crash Course

Education Exhibits
Location: OB Community, Learning Center

Participants
Marta Sola MD (Presenter): Nothing to Disclose
Amaya Martin: Nothing to Disclose
Javier Horacio Del Riego MD: Nothing to Disclose
Antoni Malet-Munte MD: Nothing to Disclose
Sergi Ganau Ganau Macias MD: Nothing to Disclose
Melcior Sentis: Nothing to Disclose

TEACHING POINTS
We illustrate the anatomy of the female pelvis and describe the essential imaging protocol.
We describe and illustrate the imaging findings for endometriosis and its complications, with special emphasis on deep pelvic endometriosis.
We provide practical advice for rapid diagnosis and effective preoperative planning.

TABLE OF CONTENTS/OUTLINE
Based on our wide clinical experience and a thorough review of the literature, this poster illustrates the anatomy of the female pelvis, explains the pathogenesis and clinical presentation of endometriosis, describes and illustrates the imaging findings (MRI vs US) including uncommon locations, and stresses the importance of imaging in preoperative planning.
After viewing this educational exhibit, radiologists should know the MRI characteristics of deep pelvic endometriosis and the advantages of different techniques for defining the extension, size, and location of the implants to enable their complete excision.

OBE108
Pus in the Pelvis: A Multimodality Approach to Pelvic Inflammatory Disease with Clinical and Pathologic Correlation

Education Exhibits
Location: OB Community, Learning Center

Participants
Haatal B. Dave MD, MS (Presenter): Nothing to Disclose
Matthew Latham Macer MD: Nothing to Disclose
Claire Kaufman: Nothing to Disclose
Margarita V. Revzin MD: Nothing to Disclose
Mahan Mathur MD: Nothing to Disclose

🎉 Selected for RadioGraphics
TEACHING POINTS

1. Clinical and pathologic correlation provides a more thorough understanding of PID which can aid in disease recognition.
2. Early CT findings may be subtle and include low grade infectious/inflammatory changes of the pelvic fat and pelvic organs.
3. Knowledge of the spectrum of imaging findings in PID is paramount for the radiologist to make a prompt and accurate diagnosis.

TABLE OF CONTENTS/OUTLINE

PID Background: • Definition • Risk Factors • Clinical presentation • Diagnosis • Management • Complications Imaging Findings:
Early PID • Pelvic edema and free fluid (simple or complex), fat stranding • Obliteration of pelvic fascial planes • Thickened uterosacral ligaments • Distended, thick-walled fallopian tube(s) - salpingitis • Enlarged edematous ovaries - oophoritis • Endometritis/Cervicitis Late PID • Hydrosalpinx/pyosalpinx • Tubo-ovarian/pelvic abscess • Peritonitis • Fitz-Hugh Curtis syndrome • hepatic capsular retraction and adhesions Complications • Ectopic pregnancy • Ileus from surrounding inflammation • Bowel obstruction from adhesions • Urinary obstruction Differential Diagnosis: • Hemorrhagic ovarian cyst (+/- rupture) • Endometriosis/endometrioma • Ovarian neoplasm • Pelvic abscess/inflammation of different etiology (e.g. diverticulitis, appendicitis, Crohn’s disease)

OBE109
Rectovesical and Rectouterine Excavations: A Marker of Peritoneal Diseases

Education Exhibits
Location: OB Community, Learning Center

Participants
Daniel Baby (Presenter): Nothing to Disclose
Romulo Varella MD : Nothing to Disclose
Felipe Azevedo Costa Mattos : Nothing to Disclose
Henrique Luiz Ollani Junior : Nothing to Disclose
Leonardo Kayat Bittencourt MD, MSc : Nothing to Disclose

TEACHING POINTS

1) The rectovesical and rectouterine excavations (cul-de-sac) are the inferior drainage spot of the peritoneal cavity and one of the first affected zones involved in intraperitoneal diseases.
2) Changes in this region must direct radiologist to investigate a number of specific primary sites and, in emergency department, alert for acute life threatening conditions.
3) Although varied number of female pathologies are described in cul-de-sac, men also present typical lesions of this region.

TABLE OF CONTENTS/OUTLINE

1) Review the anatomy of the pelvis and peritoneal cavity with a focus in its recesses and variations between genders. 2) Discuss fluid in cul-de-sac and its possible source and implications. 3) Demonstrate typical conditions that affect this site seen on MRI, divided as follows: * Neoplastic: peritoneal carcinomatosis, sarcomatosis, pseudomyxoma peritonei, contiguous tumorextension. * Inflammatory / Infectious: Inflammatory pseudotumor, pelvic inflammatory disease, abscesses by diverticulitis/appendicitis, peritoneal tuberculosis. * Miscellaneous: endometriosis, splenosis, iatrogenic, peritoneal inclusion cyst. * Male conditions: mullerian cyst, extracapsular extension of prostatic carcinoma.

OBE110
Sonographic Approach to Pelvic Inflammatory Disease: Acute vs Chronic

Education Exhibits
Location: OB Community, Learning Center

Participants
Anjeza Chukus MD (Presenter): Nothing to Disclose
Nikki Tirada MD : Nothing to Disclose
Neelima Indukuru Reddy MD : Nothing to Disclose

TEACHING POINTS

To understand pathogenesis and disease progression in PID. To recognize the imaging appearance of the different phases of PID and be able to differentiate acute from chronic PID. To familiarize with other disease processes that mimic PID.

TABLE OF CONTENTS/OUTLINE

PID is an important health problem afflicting women with sequela such as chronic pelvic pain, ectopic pregnancy, and infertility. We aim to demonstrate the sonographic manifestations of disease progression in PID namely acute salpingitis, oophoritis, pyosalpinx, tubo-ovarian complex, tubo-ovarian abscess, and hydrosalpinx. Through demonstration of specific signs such as the "cogwheel"sign, tubal wall thickness/vascularity, internal debris and surrounding complex intra pelvic free fluid, we will demonstrate how acute inflammation of the tubes can be distinguished from chronic hydrosalpinx which demonstrates the "beads-on-a-string" sign. The incomplete echogenic septation in a dilated blocked fallopian tube is a useful diagnostic landmark to identify the tube and will be depicted pictorially and through radiologic images. It is of utmost importance for the radiologist to be familiar with the pathogenesis and disease progression of PID that is resulting in staggering financial implications on health care systems worldwide, when not recognized and treated in a timely fashion.

OBE111
The Imaging Findings of Typical and Atypical Gynecologic and Genital Infections

Education Exhibits
Location: OB Community, Learning Center

Cum Laude
**Participants**

Hilary L. Purdy MD (Presenter): Nothing to Disclose  
Vincent M. Melnick MD: Nothing to Disclose  
Nirvikar Dahiya MD: Nothing to Disclose  
Douglas S. Katz MD: Nothing to Disclose  
Stephanie T. Chang MD: Nothing to Disclose  
Christine O. Menias MD: Nothing to Disclose

**TEACHING POINTS**

1. Review the spectrum of gynecologic and genital infections on US, CT, MR and fluoroscopic imaging  
2. Discuss salient findings that may help develop a differential diagnosis  
3. Review potential mimickers of gynecologic infections  
4. Discuss management options

**TABLE OF CONTENTS/OUTLINE**

1. Imaging spectrum of gynecologic infections on US, CT, MR and fluoroscopy  
   - Tubo-ovarian abscesses  
   - Fitz Hugh-Curtis  
   - Salpingitis isthmica nodosa  
   - Actinomycosis in the context of an intrauterine device  
   - Emphysematous endometritis  
   - Septic pelvic thrombophlebitis  
   - Fournier gangrene  
   - Bartholinitis/Bartholin gland abscess  
2. Cases of mimickers including but not limited to: appendicitis, diverticulitis, peritoneal inclusion cyst  
3. Discussion on the clinical implications for management for each of these lesions

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**OBE112**

**Current Update on Extrauterine Pelvic Serous Carcinomas: Implications for Diagnosis and Management**

**Education Exhibits**

Location: OB Community, Learning Center

**Certificate of Merit**  
**Selected for RadioGraphics**

**Participants**

Venkata S. Katabathina MD (Presenter): Nothing to Disclose  
Farhan S. Amanullah MD: Nothing to Disclose  
Srinivasa R. Prasad MD: Nothing to Disclose  
Christine O. Menias MD: Nothing to Disclose  
Philip T. Valente MD: Nothing to Disclose  
Kedar Nath Chintapalli MD: Nothing to Disclose

**TEACHING POINTS**

Review recent advances regarding the origin and pathogenesis of extrauterine pelvic serous carcinomas (fallopian tube, peritoneum and ovary). Discuss molecular and cytogenetic abnormalities associated with these malignancies and their management implications. Describe cross-sectional imaging findings and role of different imaging techniques in diagnosis and management.

**TABLE OF CONTENTS/OUTLINE**

Introduction  
Taxonomy: Ovarian serous carcinoma, primary fallopian tube carcinoma and primary peritoneal carcinoma  
Central role of fallopian tube epithelium in pathogenesis  
Molecular abnormalities: TP53, BRCA 1 and 2, KRAS and BRAF mutations  
Pathologic Findings  
Cross-sectional imaging findings and role of imaging  
Clinical implications  
Novel therapeutic targets

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**OBE113**

**Epithelial Ovarian Cancer — Recent Advances and Implications for the Radiologists**

**Education Exhibits**

Location: OB Community, Learning Center

**Participants**

Ailbhe C. O’ Neill MBCh (Presenter): Nothing to Disclose  
Sreeharsha Tirumani MBBS, MD: Nothing to Disclose  
Bhanusupriya Somarouthu MD: Nothing to Disclose  
Akshay Baheti MBBS, MD: Nothing to Disclose  
Jyothi Priya Jagannathan MD: Nothing to Disclose  
Nikhil H. Ramaiya MD: Nothing to Disclose  
Atul Bhanudas Shinagare MD: Nothing to Disclose

**TEACHING POINTS**

1. Pathogenesis and advances in genetics: High-grade serous ovarian cancer originates in the fimbria and is associated with p53 mutations compared to low grade that is associated with BRAF or erb-B2 mutations.  
2. 2014 FIGO staging update: Positive retroperitoneal nodes moved to IIIA and IVA defined as pleural effusion with positive cytology, among other changes.  
3. Metastatic pattern: Peritoneum, lymph nodes and liver common; thoracic (pleura, lymph nodes) uncommon; rarely brain metastases.  
TABLE OF CONTENTS/OUTLINE

- Epidemiology, pathogenesis, advances in genetics
- Overview of the updated FIGO ovarian cancer staging system
- Prognostic factors
- Metastatic patterns
- Treatment options for primary, recurrent tumor
- Treatment-related complications

OBE114

Solid Ovarian Neoplasms: Imaging Spectrum with Radiologic-pathologic Correlation

Education Exhibits

Location: OB Community, Learning Center

Certificate of Merit

Participants

Venkateswar Rao Surabhi MD (Presenter): Nothing to Disclose
Verghese George MBBS: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose

TEACHING POINTS

1. To discuss the wide spectrum of solid ovarian neoplasms.
2. To review histogenesis, tumor biology and salient imaging findings of solid ovarian tumors.
3. To correlate imaging findings with gross and histopathology

TABLE OF CONTENTS/OUTLINE

There are many kinds of ovarian tumors and tumor-like conditions that present with pure solid mass on imaging. Detection of pure solid mass or predominantly solid mass on imaging has distinct differential diagnosis and adds immense value in preoperative histologic prediction. Also, detection of a pure solid mass on imaging virtually excludes the most common ovarian serous and mucinous epithelial neoplasms. Among the solid ovarian tumors detection of hyperestrogenic effects, low T2 signal, calcification and preservation of normal physiologic follicles helps in even further pinpointing to the histology of tumor. Granulosa cell tumor and thecoma are well-known estrogen-producing tumors and associated with endometrial thickening, carneous degeneration of fibroid and hepatic congestion. Among the other solid tumors, low T2 signal is typical for brenner tumor, fibroma and fibromatosis whereas calcification is common in brenner tumor, leiomyoma and dysgerminoma. Preservation of normal follicles can be seen with fibromatosis and lymphoma.

OBE116

Value of Fused PET/MRI for Gynecologic Cancer: Comparison with PET/CT and Contrast-enhanced MRI

Education Exhibits

Location: OB Community, Learning Center

Participants

Elena Alvarez MD (Presenter): Nothing to Disclose
Antonio Maldonado MD: Nothing to Disclose
Mar Jimenez De La Pena: Nothing to Disclose
Lucia Gonzalez Cortijo: Nothing to Disclose
Silvia Fuertes Cabero PhD: Nothing to Disclose
Ricardo Sainz De La Cuesta: Nothing to Disclose

TEACHING POINTS

Review the current status and clinical utility of PET/MRI in gynecological tumors. Compare the diagnostic accuracy of fused PET/MRI regarding PET/CT and MRI

TABLE OF CONTENTS/OUTLINE

FDG/PET is now accepted as a powerful imaging modality for evaluating various kinds of malignancies. However, the contrast resolution of CT for different tissues is limited, especially in pelvis, even when full-dose exposure and contrast medium are employed. In contrast, MRI has several advantages over CT, such as excellent tissue contrast and involves no radiation exposure. Most papers try to compare these techniques, but in our experience they both are complementary in the management of these patients. Meanwhile PET/CT is superior in the diagnosis of ganglionar disease; MRI with DWI presents higher accuracy in local preoperative staging and distinguishing early postradiation changes from recurrent tumor. Both techniques can be used as biomarkers of tumor response and present high accuracy in the diagnosis of local recurrence and peritoneal dissemination, with complementary roles depending on histological type, anatomic location, and tumoral volume. Fused PET/MRI, which complements the individual advantages of MRI and PET, is a valuable technique for assessment of the primary tumor and nodal staging in patients with gynecological cancer.

OBE117

Cervical Cancer Staging and Beyond — A Residents Primer

Education Exhibits

Location: OB Community, Learning Center

Selected for RadioGraphics

Participants

Anish Raithatha MBBS, BSC (Presenter): Nothing to Disclose
Ioanna Papadopoulo MD: Nothing to Disclose
Victoria Stewart: Nothing to Disclose
Tara Diane Barwick MBChB: Nothing to Disclose
Andrea Grace Rockall MRCP, FRCR: Nothing to Disclose
Nishat Bharwani MBBS, FRCR: Nothing to Disclose
TEACHING POINTS
Imaging plays an important role in the staging of these patients at diagnosis, and significantly influences multidisciplinary treatment decisions. This educational exhibit will: - Review the epidemiological and clinical features of cervical cancer. - Explore the role of MRI in the loco-regional staging of cervical cancer. - Discuss the indications for FDG-PET/CT at diagnosis. - Discuss the treatment options available based on cancer stage.

TABLE OF CONTENTS/OUTLINE
- Background
- MR imaging in staging cervical cancer (discussion and pictorial demonstration) a. MRI protocol b. FIGO (2009) staging c. Nodal assessment d. Imaging pearls and pitfalls • FDG-PET/CT imaging (indications and evidence base) • Treatment options and examples of post procedural imaging appearances (where appropriate) a. Cone biopsy b. Trachelectomy c. Surgery d. Chemoradiotherapy • Summary

OBE118
Gestational Trophoblastic Disease: A Current Update on Imaging and Management

Education Exhibits
Location: OB Community, Learning Center

Participants
Susan Catherine Lee MD (Presenter): Nothing to Disclose
Nicole Antonia Lamparello MD: Nothing to Disclose
Alampady Krishna Prasad Shanbhogue MD, MBBS: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose
Neeraj Lalwani MD: Nothing to Disclose
Srinivasa R. Prasad MD: Nothing to Disclose

TEACHING POINTS
1. To provide a current update on diagnosis and management of gestational trophoblastic disease (GTD). 2. US has low sensitivity but high positive predictive value in diagnosing molar pregnancy. MR can accurately show degree of uterine myometrial and extraterine invasion in malignant GTD, although patients with low b-hCG levels (<500 mIU/mL) often have normal MR findings. 3. 18F-FDG PET can assess tumor after chemotherapy, and confirm treatment response or recurrent tumor.

TABLE OF CONTENTS/OUTLINE
GTD is a relatively uncommon, yet almost completely curable, pregnancy-related entity arising from uncontrolled growth of placental tissue. Hydatidiform mole constitutes benign but premalignant disease. With the advent of routine US in first trimester, most molar pregnancies now present with findings of early pregnancy failure rather than classic "cluster of grapes". Malignant forms invasive mole, choriocarcinoma, placental site trophoblastic tumor and epithelioid trophoblastic tumor. A current update on epidemiology, etiopathogenesis, natural history, clinical and pathological manifestations of GTD will be presented. A comprehensive update on the role of imaging in the diagnosis and staging of GTD will be presented with implications on management.

OBE119
Gestational Trophoblastic Neoplasia: Spectrum of Disease, Multimodality Imaging, and Management

Education Exhibits
Location: OB Community, Learning Center

Participants
Nasim R. Khadem MD (Presenter): Nothing to Disclose
Daphne Kim Walker MD: Nothing to Disclose

TEACHING POINTS
Review pathophysiology, imaging, treatment, and mimics of gestational trophoblastic neoplasia (GTN) Review incidence, diagnostic criteria, imaging, and treatment of persistent GTN (pGTN) Discuss roles of US, CT, MRI, and PET CT in detection, surveillance, and staging

TABLE OF CONTENTS/OUTLINE
GTN -Spectrum: hydatiform molar pregnancy (complete/partial), invasive mole, choriocarcinoma, placental site trophoblastic tumor, ecticopic mole -Treatment -Mimics (e.g. leiomyomas, Breus mole) pGTN -Diagnostic criteria -Treatment Radiologists’ role in diagnosis/management -US, CT, MR, and PET CT for detection, staging, and surveillance -Future directions Select case examples from our institution to include: -Metastatic choriocarcinoma on US/PET CT/MR -Invasive mole status post dilation and curettage, complicated by uterine arteriovenous fistula on US/CT -Mole mimic (degenerative fibroids) on US/CT/MR -Pathologically proven ecticopic molar pregnancy on US -pGTN as invasive mole with theca lutein cysts on US/CT Summary GTN/pGTN is commonly encountered in clinical practice. Our goals: 1) Increase awareness of the pathophysiology and management of this disease to help the radiologist to continue to play a major role in diagnosis and surveillance; 2) Review the appropriateness of various imaging modalities in the management of GTN/pGTN.

OBE120
Hypervascular Lesions of the Endometrial Cavity: The Diagnostic Impact of 3D DCE-MRI

Education Exhibits
Location: OB Community, Learning Center

Participants
Mayumi Takeuchi MD, PhD (Presenter): Nothing to Disclose
Kenji Matsuzaki MD, PhD: Nothing to Disclose
Masafumi Harada MD, PhD: Nothing to Disclose

TEACHING POINTS
1. The endometrial cavity may demonstrate various imaging manifestations: reactive, inflammatory, and benign and malignant tumors. 3D DCE-MRI is useful for characterizing lesions by evaluating vascularity, volume of the extra-cellular space, and presence of degenerated or necrotic areas.

2. DCE-MRI may be helpful for the diagnosis of high grade malignancies with angiogenesis such as type II endometrial cancers, however, some low grade tumors or benign lesions may occasionally show hypervascularity.

3. Peritumoral CE may reveal the attachment site of tumors and be helpful in evaluating the tumor extent, however, may occasionally cause overestimation of myometrial invasion due to the disruption of SEE.

4. 3D DCE-MRI can clearly demonstrate small hypervascular foci of gestational lesions within clots or necrotic tissue in the endometrial cavity.

### TABLE OF CONTENTS/OUTLINE

- Imaging techniques of 3D DCE-MRI
- Causes of hypervascularity: Tumor angiogenesis; peritumoral CE; gestational reaction
- Malignant tumors:
  - High grade: Type II cancer /Carcinosarcoma
  - Low grade: Type I cancer with squamous differentiation
  - Secondary involvement: Metastasis /Lymphoma
- Benign lesions:
  - Gestational lesions: Retained products of conception /Placental polyp /Gestational trophoblastic disease
  - Myometrial origin: Submucosal leiomyoma

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**OBE121**

**Imaging after Surgery in Patients with Gynecological Malignancies: Normal Postoperative MRI and CT Appearance of the Female Pelvis and Spectrum of Most Common Complications**

**Education Exhibits**

**Location:** OB Community, Learning Center

**Participants**

- Maura Micco MD (Presenter): Nothing to Disclose
- Anna Lia Valentini MD: Nothing to Disclose
- Benedetta Gui MD: Nothing to Disclose
- Michela Giuliani: Nothing to Disclose
- Viola Zecchi: Nothing to Disclose
- Lorenzo Bonomo MD: Nothing to Disclose

**TEACHING POINTS**

Familiarity with the normal anatomic findings is essential to distinguish expected post-operative changes from surgical complications or recurrent disease in patients with gynecologic disease. The major objectives of this exhibit are to:

- Summarize the technical advances in gynecologic surgery
- Review normal expected radiological findings in patients with gynecological cancers undergone major surgery
- Illustrate CT and MRI broad spectrum of postoperative complications in early and late post-operative periods, including mimickers of recurrence
- Describe the usefulness of CT and MRI in the diagnosis and follow-up of postoperative complications in patients treated for ovarian, cervical and uterine cancer

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**OBE122**

**MR Imaging Appearances in Uterine Malignancies Simulating Benign Conditions**

**Education Exhibits**

**Location:** OB Community, Learning Center

**Participants**

- Ayako Ono MD (Presenter): Nothing to Disclose
- Takashi Koyama MD, PhD: Nothing to Disclose
- Emiko Morimoto MD: Nothing to Disclose
- Taku Maekura MD: Nothing to Disclose
- Toshiki Shiozaki MD: Nothing to Disclose
- Giro Todo MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is 1. to review MRI features of uterine malignancies, 2. to show how some of uterine malignancies can simulate benign conditions and be a diagnostic pitfall, 3. to discuss the differential points to accurately distinguish these malignancies from benign conditions. Teaching Points: 1. Leiomyosarcomas (LMS) with extensive hemorrhagic necrosis or myxoid change may be confused with degenerated myoma. 2. Infiltrative myometrial tumors, such as endometrial stromal sarcomas (ESS) and secondary tumors including lymphomas and metastatic tumors may masquerade adenomyosis. Involvement of the adnexa or pelvic nodes is a clue to suspect malignancy. 3. Endometrial tumors arising from adenomyosis or polyp should be distinguished from preexisting benign conditions. 4. Adenocarcinomas often cause diagnostic challenge for both radiologists and pathologists as they closely resemble polyp. 5. Diffusion-weighted images may also play a role in determining the nature of uterine malignancies.

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**OBE123**

**MR Imaging of Uterus: Novel Imaging Techniques, Quantitative Imaging, and Role in Management**

**Education Exhibits**

**Location:** OB Community, Learning Center
Participants

Masatoshi Hori MD (Presenter): Nothing to Disclose
Tonsok Kim MD : Nothing to Disclose
Hiromitsu Onishi MD : Nothing to Disclose
Makoto Sakane MD : Nothing to Disclose
Takahiro Tsuboyama MD : Nothing to Disclose
Noriyuki Tomiyama MD, PhD : Nothing to Disclose
Mitsuaki Tatsumi MD, PhD : Nothing to Disclose

TEACHING POINTS

Major teaching points of this exhibit are: 1. Novel MRI techniques, such as three-dimensional (3D) TSE sequences, diffusion-weighted imaging, and reduced field-of-view (FOV) diffusion-weighted imaging using spatially selective radio-frequency excitation, are useful for staging and characterizing uterine tumors. 2. Quantitative MRI are promising techniques in evaluating patients with uterine malignancy. 3. It is important to know the role of MRI in the management of patients with uterine malignancies.

TABLE OF CONTENTS/OUTLINE


OBE124

MRI and PET/CT Correlation in the Imaging Assessment of Cervical and Endometrial Cancer

Education Exhibits

Location: OB Community, Learning Center

Selected for RadioGraphics

Participants

Hailey Allen MD (Presenter): Nothing to Disclose
Joanna Ewa Kusmirek MD : Nothing to Disclose
Kristin A. Bradley MD : Author, UpToDate, Inc
Elizabeth A. Sadowski MD : Nothing to Disclose
Jessica B. Robbins MD : Nothing to Disclose

TEACHING POINTS

1. Review the epidemiology and risk factors for cervical and endometrial cancer. 2. Provide an overview of the current FIGO Staging Systems for cervical and endometrial cancer. 3. Discuss the indications for MRI and PET/CT in the assessment of cervical and endometrial cancer and the limitations of the two modalities. 4. Review illustrative MRI and PET/CT cases demonstrating different disease stages and common pitfalls in imaging assessment.

TABLE OF CONTENTS/OUTLINE

Description of risk factors and common clinical presentations of cervical and endometrial cancer Current FIGO staging system for cervical cancer Current FIGO staging system for endometrial cancer Indications for MRI and PET/CT Overview of key features of dedicated MRI protocols for cervical and endometrial cancer at the authors' institution Illustrative cases with MRI and PET/CT correlation, integrated with key imaging findings and most common imaging pitfalls for each modality

OBE125

My Oh Myoma! Treatment Implications of Uterine Fibroid MR Imaging Characteristics

Education Exhibits

Location: OB Community, Learning Center

Participants

Victor Frank Sai MD (Presenter): Nothing to Disclose
Maitraya K. Patel MD : Nothing to Disclose
Simin Bahrami MD : Nothing to Disclose

TEACHING POINTS

1. To review the spectrum of MR imaging characteristics of different fibroid subtypes and fibroid mimics
2. To highlight imaging characteristics and patient factors that have specific treatment implications
3. To review an MRI interpretation approach with specific emphasis on fibroid treatment implications

TABLE OF CONTENTS/OUTLINE


OBE126

Post-radiotherapy Appearances in Cervical Cancer — the Good, the Bad and the Ugly

Education Exhibits
Participants
Ioanna Papadopoulou MD (Presenter): Nothing to Disclose
Neil Soneji BSc, MBBS: Nothing to Disclose
Tara Diane Barwick MBChB: Nothing to Disclose
Victoria Stewart: Nothing to Disclose
Andrea Grace Rockall MRCP, FRCR: Nothing to Disclose
Nishat Bharwani MBBS, FRCR: Nothing to Disclose

TEACHING POINTS
Imaging plays an important role in planning management in women with advanced cervical cancer. Radiotherapy is an integral part of treatment but is associated with significant complications. The purpose of this exhibit is 1. To illustrate and discuss response monitoring of the primary tumor to radiotherapy. 2. To familiarize the reader with the expected post-radiotherapy appearances of the pelvic organs and bony pelvis. 3. To highlight radiotherapy-related complications, the optimal imaging modalities and differentiation from recurrent disease.

TABLE OF CONTENTS/OUTLINE
- Background Aim of Cervical cancer - Radiotherapy planning
- Response of the primary tumor to radiotherapy
- Good treatment response - Refractory disease - Recurrent disease
- Expected post-radiotherapy pelvic appearances (soft tissue and bony pelvis)
- Complications (to include illustrations and discussion of optimal imaging techniques)
- Cervical (stenosis, necrosis) - Fistula formation - Gastro-intestinal (typhlitis, enteritis, stricture)
- Urological (cystitis, ureteral stenosis) - Skeletal (sacral insufficiency fractures, osteonecrosis, avascular necrosis, osteomyelitis) - Radiotherapy induced neoplasms
- Conclusion

OBE127
The Ins and Outs of Endometrial Carcinoma: A Guide to Gynecologic Oncology Tumor Board

Education Exhibits
Location: OB Community, Learning Center

Participants
Christina Ma MD (Presenter): Nothing to Disclose
Nina Woldenberg MD: Nothing to Disclose
Shaden F. Mohammad MD: Nothing to Disclose
Gail Carol Hansen MD: Nothing to Disclose
Cecilia Matilda Jude MD: Author, UpToDate, Inc
Maitraya K. Patel MD: Nothing to Disclose

TEACHING POINTS
Endometrial carcinoma (EC) is the most common malignancy of the female reproductive tract. Radiologists have a central role in the diagnostic workup and subsequent staging and follow-up of patients with EC. Preoperative staging is indicated per the National Comprehensive Cancer Network (NCCN) when extra-uterine disease is suspected by clinical symptoms, physical findings, or abnormal laboratory values. The 2009 FIGO staging system allows for significant imaging contribution to the pre-operative evaluation and informs clinical management.

TABLE OF CONTENTS/OUTLINE
1. Descriptive review of endometrial carcinoma including epidemiology, clinical presentation, diagnostic workup, and histopathology.
2. Review of the 2009 FIGO staging guidelines and staging implications.
3. Multimodal (US, CT, PET-CT, MR) imaging review of the imaging characteristics of EC and imaging findings relevant to staging and/or treatment.

OBE128
The Wide Spectrum of Uterine Cervical Adenocarcinoma: Radiologic-pathologic Correlation and Miscellaneous Pathology

Education Exhibits
Location: OB Community, Learning Center

Participants
Junko Takahama MD (Presenter): Nothing to Disclose
Nagaaki Marugami: Nothing to Disclose
Ryosuke Tajii: Nothing to Disclose
Aki Takahashi MD: Nothing to Disclose
Hiroshi Okada: Nothing to Disclose
Megumi Takewa MD: Nothing to Disclose
Takahiro Itoh MD: Nothing to Disclose
Kimihiko Kichikawa MD: Nothing to Disclose
Kiyoyuki Minamiguchi: Nothing to Disclose

TEACHING POINTS
1. To review the latest classification of uterine cervical adenocarcinoma.
2. Radiologic-pathologic correlation of the lesions.
3. To understand the Bethesda classification system of the cytodiagnosis (AGC, AIS) and clinical feature contrast with squamous carcinoma.
4. To discuss the latest diagnostic challenge for cervical cystic lesions (minimal deviation of adenocarcinoma; MDA, Lobular endocervical glandular hyperplasia; LEGH).

TABLE OF CONTENTS/OUTLINE
1. Radiopath correlation of lesions in the spectrum of cervical adenocarcinoma.
   • Mucinous adenocarcinoma (Endocervical type, Intestinal type, Signet-ring cell type, MDA, Villoglandular type)
   • Endometrioid adenocarcinoma
   • Clear cell adenocarcinoma
   • Serous adenocarcinoma
   • Mesonephric adenocarcinoma
   • Adenosquamous carcinoma
   • Glassy cell carcinoma
3. Radiologic feature and diagnostic challenge of the uterine cervical cystic lesion
   • Malignant (Mucinous adenocarcinoma, MDA)
   • Benign (Deep nabothian cyst, Tunnel clusters,
**OBE129**

Value of PET-CT for Gynecological Tumor in Addition to MRI

*Education Exhibits*

Location: OB Community, Learning Center

**Participants**

Yuko Iraha (Presenter): Nothing to Disclose  
Masahiro Okada MD: Nothing to Disclose  
KIMEI AZAMA: Nothing to Disclose  
Gyou Iida: Nothing to Disclose  
Rin Iraha: Nothing to Disclose  
Sadayuki Murayama MD, PhD: Nothing to Disclose  
Itaru Chiba: Nothing to Disclose

**TEACHING POINTS**

1. To recognize the uptake pattern of FDG in gynecological PET-CT.  
2. To understand optimal planning for radiation therapy of uterine cervical cancer by using fusion of PET and MRI.  
3. To understand the pitfalls of gynecological PET-CT and MRI.

**TABLE OF CONTENTS/OUTLINE**

1. Anatomy of uterus, ovary and other intrapelvic organs.  
2. Differentiation between malignant and benign ovarian tumor using MRI and PET-CT A) Importance of the preoperative diagnosis of ovarian tumor B) How can the PET-CT play a role for the differential diagnosis of ovarian tumor in addition to MRI C) Usefulness of PET-CT for determination of cancer staging and therapeutic response A) 3D reconstruction of PET-CT and MRI B) Ovarian cancer and other adnexal malignancies C) Uterine cervical cancer D) Uterine corpus cancer  
3. Usefulness of PET-CT for determination of cancer staging and therapeutic response A) 3D reconstruction of PET-CT and MRI B) Physiological FDG uptake in the female reproductive tract C) Uterine fibroid uptake D) Misreading of ureteral uptake of FDG; Is it LN metastasis or not? E) Physiologic bowel activity F) Attenuation correction and misregistration G) How to overcome the pitfalls of PET-CT and MRI  
4. Pitfalls and coping technique in pelvic PET-CT and MRI A) MRI artifacts B) Physiological FDG uptake in the female reproductive tract C) Uterine fibroid uptake D) Misreading of ureteral uptake of FDG; Is it LN metastasis or not? E) Physiologic bowel activity F) Attenuation correction and misregistration G) How to overcome the pitfalls of PET-CT and MRI  
5. Image-guided radiotherapy for uterine cervical cancer

**OBE130**

A Plethora of Problematic Placental Pathology: Ultrasound and MR Review of Placental Variants, Masses, Bleeds, and Implantation Abnormalities

*Education Exhibits*

Location: OB Community, Learning Center

**Participants**

Luyao Shen MD (Presenter): Nothing to Disclose  
Rinat Masamed MD: Nothing to Disclose  
Nagesh Ragavendra MD: Nothing to Disclose  
Michael Douek MD: Nothing to Disclose  
Katrina Richards Beckett MD: Nothing to Disclose  
Daniel Jason Aaron Margolis MD: Research Grant, Siemens AG  
Shaden F. Mohammad MD: Nothing to Disclose  
Maitraya K. Patel MD: Nothing to Disclose  
Ethan Estkol: Nothing to Disclose  
William Hsu PhD: Nothing to Disclose  
Steven Satish Raman MD: Consultant, Bayer AG Consultant, Covidien AG

**TEACHING POINTS**

After reviewing this exhibit, the viewer should be able to:

1. Understand the imaging appearance of normal placenta and placental implantation on US and MR.  

**TABLE OF CONTENTS/OUTLINE**


**OBE131**

At Your Cervix! What Radiologists Need to Know about Imaging the Cervix in Pregnancy

*Education Exhibits*

Location: OB Community, Learning Center

Certificate of Merit  
Selected for RadioGraphics

**Participants**

Lindsey Janicki MD (Presenter): Nothing to Disclose
TEACHING POINTS
The purpose of this exhibit is: 1: To illustrate cervical measurement by transabdominal and transvaginal ultrasound, show pitfalls that may compromise measurement and provide an algorithm for referral. 2: To demonstrate findings in the ‘dynamic’ cervix. 3: To illustrate cervical cerclage and show how to report cervical length post cerclage.

TABLE OF CONTENTS/OUTLINE
Anatomy: Cervical tissue, plicae palmitae, internal os, external os, vaginal fornix, bladder neck, cerclage appearance. Imaging modalities: Transabdominal, transperineal, transvaginal ultrasound. Elastography. Measurement technique: Poor technique (resolution, transducer pressure, incorrect measurement, failure to demonstrate dynamic change) Nabothian cyst Gartner duct remnants Mullerian duct anomalies Fibroids Post operative cervix (LEEP, septal resection, trachelectomy) Importance: The preterm birth rate in the US is >12% with resulting neonatal morbidity and mortality. A shortened mid-trimester cervical length is one of the most consistent and significant risk factors. Interventions including vaginal progesterone and cervical cerclage have been shown to reduce the risk of spontaneous PTB. Thus, it is imperative that cervical insufficiency be recognized and appropriately addressed.

OBE133
Complex Genitourinary Anomalies in the Female Fetus: Sex Matters

Participants
Carmen Timberlake MD: Nothing to Disclose
Karen Y. Oh MD: Nothing to Disclose
Brian Shaffer MD: Nothing to Disclose
Roya Sohaey MD (Presenter): Nothing to Disclose

TEACHING POINTS
This exhibit will stress that the differential diagnosis for hydrenephrosis and abdominal masses is different for a female fetus than a male fetus. Also, anomalies exclusively seen in female fetuses will be stressed, such as urogenital sinus and cloacal malformations, so they are not mistaken for bladder outlet obstruction which is much more common in male fetuses.

TABLE OF CONTENTS/OUTLINE
Introduction: We will present epidemiologic data that some anomalies are exclusively seen in female fetuses (i.e. cloaca, ovarian cysts, urogenital sinus) or are more common in female fetuses (i.e. duplication anomalies) and therefore should rise to the top of the differential diagnosis when genitourinary anomalies are diagnosed in the female fetus. Case examples will be shown: Complications of renal duplication (ectopic ureterocele, partial cystic dysplasia), hydrocolpos (distended vagina presents as cystic mass), Cloaca/urogenital sinus (imaging of perineum shows one orifice versus two), Ovarian cyst (hemorrhage and torsion complications), clitoromegaly (from congenital adrenal hyperplasia). Summary: Differentiationg features of above diagnoses will be stressed with tables and flow charts.

OBE134
First Trimester Pregnancy Ultrasound: Normal and Abnormal Findings

Participants
Pouya Ziai MD: Nothing to Disclose
Mohammadreza Hayeri MD (Presenter): Nothing to Disclose
Oleg Teytelboym MD: Nothing to Disclose

TEACHING POINTS
Become familiar with normal imaging findings and sonographic features of the first trimester pregnancy Understand sonographic features of first trimester pregnancy complications Understand common imaging pitfalls and become aware of practical patient management tips

TABLE OF CONTENTS/OUTLINE
Sonographic appearance of normal intrauterine pregnancy Estimation of gestational age Review serum Beta-HCG levels variability during the first trimester, discriminatory levels, and their reliability. Early pregnancy failure Sonographic diagnosis of embryonic demise Non-viability cut-offs recommended by the American College of Radiology Sonographic predictors of poor pregnancy outcome Gestational sac diameter and crown rump length discrepancy Subchorionic hemorrhage Amniotic sac abnormalities Yolk sac size and shape Fetal heart rate Ectopic pregnancy Gestational age and Beta-HCG cutoffs for visualization of intrauterine pregnancy Signs of rupture Features affecting management Methotrexate treatment exclusion criteria

OBE136
Imaging of the Gestational Trophoblastic Disease Spectrum: Its Complications and Mimics — Pearls and Pitfalls

Participants
Mohammadreza Hayeri MD (Presenter): Nothing to Disclose
Oleg Teytelboym MD: Nothing to Disclose

TEACHING POINTS
Sonographic appearance of normal intrauterine pregnancy Estimation of gestational age Review serum Beta-HCG levels variability during the first trimester, discriminatory levels, and their reliability. Early pregnancy failure Sonographic diagnosis of embryonic demise Non-viability cut-offs recommended by the American College of Radiology Sonographic predictors of poor pregnancy outcome Gestational sac diameter and crown rump length discrepancy Subchorionic hemorrhage Amniotic sac abnormalities Yolk sac size and shape Fetal heart rate Ectopic pregnancy Gestational age and Beta-HCG cutoffs for visualization of intrauterine pregnancy Signs of rupture Features affecting management Methotrexate treatment exclusion criteria

Certificate of Merit
Participants

Priya Krishnarao MD (Presenter): Nothing to Disclose
Katherine Elizabeth Maturan MD: Research support, General Electric Company
Carolyn Lee Wang MD: Nothing to Disclose
Terry S. Desser MD: Nothing to Disclose
Erika Rubesova MD: Nothing to Disclose
John C. Lau MD: Nothing to Disclose
Aya Kamaya MD: Nothing to Disclose

TEACHING POINTS

Teaching Points: 1. Gestational Trophoblastic Disease is an aberrant proliferation of placental trophoblastic tissue and encompasses a wide range of benign and malignant disease processes. 2. Imaging has played a crucial role in the early diagnosis of Gestational Trophoblastic Disease with ultrasound being the initial modality of choice. 3. MR and CT enable evaluation of myometrial invasion and extra-uterine extension of disease. 4. Characteristic radiographic signs can help differentiate the spectrum of Gestational Trophoblastic disease and its mimics. These signs will be illustrated in the exhibit.

TABLE OF CONTENTS/OUTLINE


OBE137

Imaging the Placenta: Not as Simple as You Might Think!

Education Exhibits

Location: OB Community, Learning Center

Certificate of Merit

Participants

Zachary Bowman MD, PhD: Nothing to Disclose
Paula J. Woodward MD: President, Amirsys, Inc
Anne M. Kennedy MD (Presenter): Nothing to Disclose

TEACHING POINTS

After reviewing this exhibit the learner should 1) Understand placental development, anatomy and anatomic variants. 2) Know how to avoid mistakes in the evaluation of the placenta particularly with respect to vasa and placenta previa and morbidity adherent placentation. 3) Know the differential diagnosis for placental thickening and placental masses.

TABLE OF CONTENTS/OUTLINE

Embryology: Development of placenta, membranes and umbilical cord. Anatomy: Placental location, trophotropism, marginal sinus, succenturiate lobe, circumvallate placenta, variants in placental cord insertion. Normal appearance and changes with gestational age. Imaging techniques: Ultrasound transabdominal and transvaginal, Doppler. Pitfalls in transducer selection, transducer pressure, scan planes, gain settings. MRI: T1, T2, diffusion weighted. Pitfalls with normal anatomy, artifacts Abnormal placentation: Placenta previa, placental abruption, morbidity adherent placentation, placentomegaly, placental mass Clinical relevance: Radiologists interpreting obstetric imaging studies need to be aware of current nomenclature for placental location in order to prevent unnecessary follow up imaging or Cesarean section. Placental hemorrhage and morbidity adherent placentation are a significant cause of morbidity and mortality.

OBE138

Incarcerated Uterus: A review of MRI and Ultrasound Imaging Appearances

Education Exhibits

Location: OB Community, Learning Center

Participants

Carly Susan Gardner MD (Presenter): Nothing to Disclose
Barbara Spector Hertzberg MD: Nothing to Disclose
Ramin Javan MD: Nothing to Disclose
Tracy Anne Jaffe MD: Nothing to Disclose
Lisa Mei-ling Ho MD: Nothing to Disclose

TEACHING POINTS

Incarcerated uterus is a rare but serious complication of pregnancy in which the repositioned gravid uterus becomes trapped in the posterior pelvis. Characteristic MR and ultrasound imaging features enable definitive diagnosis of incarcerated uterus and reduce risks of complications that may lead to maternal and fetal morbidity and mortality.

TABLE OF CONTENTS/OUTLINE

Predisposing factors: we will show examples of pelvic masses such as posterior or fundal fibroids that predispose to this disease. Characteristic imaging appearance: we will show ultrasound and MR examples of incarcerated uterus. Pitfalls in imaging diagnosis: we will show examples of ectopic pregnancy, abdominal pregnancy, and placenta previa that appear similar to incarcerated uterus. Complications of uterine incarceration: examples of acute urinary retention and uterine sacculcation/rupture. Treatment of uterine incarceration: discussion of treatment options. Summary: Early recognition of this condition facilitates prompt treatment and reduces risks of complications that can lead to maternal and fetal morbidity and mortality.

OBE139

Magnetic Resonance Imaging of Vasa Previa: Spectrum of Imaging Findings

Education Exhibits
TEACHING POINTS

Prenatal diagnosis of vasa previa is very important because cesarean delivery dramatically improve the prognosis of the fetus. Although it is important for radiologists to diagnose vasa previa using Magnetic resonance imaging (MRI), there are only a few previous reports about MRI of vasa previa. Thus, we will describe vasa previa with MRI findings of actual cases. The purpose of this exhibit is: 1. To describe the pathophysiology of vasa previa. 2. To discuss the radiological MRI features of vasa previa. There are some variations of vasa previa that cannot be classifiable into typical two types previously reported. 3. To discuss MRI features of the abnormalities of placenta and umbilical cord insertions related to vasa previa. It is important to include entire uterus to evaluate abnormalities of placenta and attachment of umbilical cord.

TABLE OF CONTENTS/OUTLINE

Pathophysiology of vasa previa - Types of umbilical cord insertion - Types of vasa previa - Risk factor Review of imaging findings - Classifiable into two types - Unclassifiable type - Comparison between findings of MRI and ultrasonography Summary of the cases Discussion

OBE143

Multidisciplinary Approach to the Diagnosis and Management of Placenta Accreta at a Busy Community Hospital

Education Exhibits

Location: OB Community, Learning Center

Participants

Irene Hotalen (Presenter): Nothing to Disclose
Anna Derman MD : Nothing to Disclose
Shaun Mathew Honig MD : Nothing to Disclose
Fady Khoury Collado : Nothing to Disclose
Maryanne Ruggiero MD : Nothing to Disclose
Shoshana Haberman MD : Nothing to Disclose
Mark A. Flyer MD : Speakers Bureau, Bayer AG

TEACHING POINTS

1. Imaging features on US and MRI based on the current literature and experience at our institution
2. Team approach to diagnosing patients with placenta accreta at our institution including identification and risk stratification
3. Role of interventional radiology and gynecologic surgery in patient treatment
4. Role of uterine artery embolization in treatment of patients with placenta accreta who wish to avoid hysterectomy and maintain their reproductive status
5. To review case outcomes with uterine artery embolization for treatment of placenta accreta

TABLE OF CONTENTS/OUTLINE

•Pathogenesis of placenta accreta •The spectrum severity of placenta accreta •Complications and Prognosis •US and MRI features •Discussion of imaging pitfalls •Discussion of collaborative effort with high risk OB, IR, and Diagnostic Radiology to diagnose and manage these patients •Discussion of multidisciplinary team approach to diagnosing and managing the patients with placenta accreta •Discussion of both surgical and image-guided minimally invasive techniques for treatment of patients with placenta accreta •Discussing the role of uterine artery embolization for treatment of placenta accreta in patients who wish to preserve their reproductive function •Discussing outcomes in patients who had undergone uterine artery embolization for treatment of placenta accreta

OBE144

Normal and Abnormal Ultrasound of Early First Trimester Pregnancy: Review of SRU 2012 Consensus Panel Recommendations with Imaging Examples

Education Exhibits

Location: OB Community, Learning Center

Participants

Crystal Chang MD : Nothing to Disclose
Shuchi Kiri Rodgers MD (Presenter): Nothing to Disclose
John Thomas Debardeleben MD : Nothing to Disclose
Mindy Meislich Horrow MD : Spouse, Director, Merck & Co, Inc

TEACHING POINTS

1. To describe the issues related to proper (safe) interpretation of first trimester pregnancy ultrasound including definitely normal, definitely abnormal and indeterminate studies requiring follow up. 2. To list the findings diagnostic of pregnancy failure on ultrasound. 3. To review the findings suspicious for, but not diagnostic of, pregnancy failure on ultrasound. 4. To discuss the management of pregnancy of unknown location with normal or near normal adnexa.

TABLE OF CONTENTS/OUTLINE

1. Normal early intrauterine pregnancies (IUP) will be shown focusing on pregnancies ranging between 4-8 weeks gestational age 2. Abnormal early IUP will be shown ranging from definitive failure based on a single ultrasound, to examples with poor
prognostic indicators that require follow up. Management of pregnancy of unknown location with normal or near normal adnexa will be discussed, focusing on patients with sac-like structures in the uterus and those without fluid in the uterus.

**OBE147**

**Ultrasound and the Fetal Lower Extremity: A Step in the Right Direction**

*Education Exhibits*

*Location: OB Community, Learning Center*

**Participants**

Kristina Elizabeth Hoque MD, PhD (Presenter): Nothing to Disclose

Daphne Kim Walker MD: Nothing to Disclose

**TEACHING POINTS**

Ultrasound can be a powerful tool in providing definitive diagnosis of fetal musculoskeletal system (MSK) anomalies of the lower extremity. This exhibit explores the benefits of using ultrasound to evaluate fetal MSK anomalies. Through exploration of ultrasound of fetal MSK anomalies we explore clinical applications and detail pathophysiology.

**TABLE OF CONTENTS/OUTLINE**

I. Discussion of ultrasound as a tool for fetal MSK assessment
   a. Indications for fetal ultrasound
   b. Fetal ultrasound and techniques
      i. Measurement techniques of the fetal lower extremity
      ii. Limitations of evaluation including fetal motion and low amniotic fluid
      iii. Utility of humerus length in diagnosis
   iv. Algorithm for progression to other imaging modalities
II. Discussion of normal fetal MSK developmental anatomy
III. Ultrasound evaluation of fetal MSK anomalies
   a. Fetal limb anomalies caused by malformation
      i. Including: Phocomelia, polydactyly, syndactyly
   b. Fetal limb malformation caused by deformation
      i. Including: Talipes equinovarus
   c. Skeletal dysplasias
      i. Including: Micromelia, rhizomelia, acromelia, achondrogenesis
   d. Fetal limb anomalies caused by disruption
      i. Including: Amniotic band syndrome and terminal transverse limb defects

**OBE148**

**A Pictorial Essay of Torsion in Obstetrics and Gynecology**

*Education Exhibits*

*Location: OB Community, Learning Center*

**Participants**

Hamada Aya (Presenter): Nothing to Disclose

Toshihide Yamaoka MD: Nothing to Disclose

Yusaku Moribata MD: Nothing to Disclose

Saori Nagata RT: Nothing to Disclose

Aki Kido MD: Nothing to Disclose

Kaori Togashi MD, PhD: Research Grant, Bayer AG Research Grant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd Research Grant, FUJIFILM Holdings Corporation Research Grant, Nihon Medi-Physics Co, Ltd Research Grant, Shimadzu Corporation Research Grant, Toshiba Corporation Research Grant, Coviden AG

**TEACHING POINTS**

Precisely identifying pelvic anatomy in obstetrics and gynecology may be the most important way to ensure a correct diagnosis. To reveal key findings to help with the detection of twisted pedicle and understandings of torsion in obstetrics and gynecology. To review representative cases and pitfalls.

**TABLE OF CONTENTS/OUTLINE**

A) Introduction
B) Overview of female pelvis
   1. Ligaments supporting the uterus
   2. Ligaments supporting the ovary
C) Adnexal torsion
   1. Ovarian torsion
   2. Combined tubo-ovarian torsion
   3. Isolated fallopian tube torsion
   4. Pitfall of ovarian torsion
   5. Pitfall of tubo-ovarian torsion
   6. Uncommon presentation of adnexal torsion
   7. Auto-amputation of the twisted ovary
   8. Massive ovarian edema
D) Torsion of uterine fibroid
E) Uterine torsion
F) Conclusion

**OBE149**

**A Potpourri for Women: Interventional Radiology in Obstetrics and Gynaecology**

*Education Exhibits*

*Location: OB Community, Learning Center*

**Participants**

Husein Imtiaz Poonawala MD: Nothing to Disclose

Horacio R. D'Agostino MD: Inventor, Vibrynt, Inc Consultant, Boston Scientific Corporation

John Robinson MS: Nothing to Disclose

Meghna Chadha MD, MBBS: Nothing to Disclose

Chaitanya Ahuja MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

1. Gain awareness of the benefits of minimally invasive Interventional Radiology (IR) procedures currently used to treat several clinical conditions unique to women.
2. Review the imaging findings of OB/GYN pathology amenable to IR treatment.
3. Familiarize physicians with the positive outcomes in addition to preservation of fertility.

**TABLE OF CONTENTS/OUTLINE**

1. Pictorial review of female pelvic anatomy.
2. Brief clinical and imaging findings of certain OB/GYN conditions.
3. IR management of the following:
   - Obstetrics: Post partum hemorrhage - Hemorrhage from high risk ectopic pregnancy - Embolization procedures in Gestational trophoblastic disease - Balloon occlusion in placenta accreta - Recanalization for fallopian tube obstruction
   - Gynecology: Pelvic congestion syndrome - Uterine AV malformations - Uterine fibroids and Adenomyosis - Endovaginal / percutaneous management of ovarian cysts and tubo-ovarian abscesses
4. Patient outcomes
### Acute and Chronic Complications of Vaginal Delivery: Role of Imaging and Implications on Management

**Education Exhibits**

**Location:** OB Community, Learning Center

**Participants**
- Nicole Antonia Lamparello MD (Presenter): Nothing to Disclose
- Susan Catherine Lee MD: Nothing to Disclose
- Alampady Krishna Prasad Shanbhogue MD, MBBS: Nothing to Disclose
- Neeraj Lalwani MD: Nothing to Disclose
- Christine O. Menias MD: Nothing to Disclose

#### TEACHING POINTS
1. Discuss the spectrum of postpartum (immediate and delayed) and long term complications following vaginal delivery. 2. Illustrate the characteristic imaging appearances of these complications on US, CT and MRI with emphasis on differential diagnosis. 3. Discuss the implications on management.

#### TABLE OF CONTENTS/OUTLINE
A comprehensive update on epidemiology, natural history, clinical manifestations, and imaging features of a wide spectrum of complications associated with vaginal delivery with discussion on implications on management. Acute complications: obstetric trauma (perineal, cervical, vaginal lacerations, tears, uterine rupture), post-partum hemorrhage, endometritis, retained products of conception, uterine inversion, venous thromboembolic disorders, ovarian vein thrombosis/ thrombophlebitis, cardiomyopathy, amniotic fluid embolism. Chronic complications: gestational trophoblastic neoplasia, retained foreign body, uterine synechia, pelvic floor weakness/ prolapse (MR defecogram). Each year more than half a million women die worldwide as a result of complications related to pregnancy or childbirth. Imaging plays a crucial role in diagnosis and management of complications related to vaginal delivery. In select cases, interventional radiology provides an armamentarium of new therapeutic options for treatment of these complications.

### OBE151

**Acute Pelvic Pain in Women of Reproductive Age: Imaging Review of Gynecological Causes**

**Education Exhibits**

**Location:** OB Community, Learning Center

**Participants**
- Bryce Kelly Young MD (Presenter): Nothing to Disclose
- Timothy J. Ziemlewicz MD: Nothing to Disclose
- Jessica B. Robbins MD: Nothing to Disclose
- Jill Masana: Nothing to Disclose
- Elizabeth A. Sadowski MD: Nothing to Disclose

#### TEACHING POINTS
1. Provide an overview of common gynecological causes of acute pelvic pain in women of reproductive age. 2. Develop an approach to imaging women with acute pelvic pain during their reproductive years. 3. Review imaging features of common gynecological causes of acute pelvic pain in women of reproductive age.

#### TABLE OF CONTENTS/OUTLINE

### OBE152

**Adenomyosis: Common and Uncommon MRI Findings and its Mimics**

**Education Exhibits**

**Location:** OB Community, Learning Center

**Participants**
- Matias Landi MD (Presenter): Nothing to Disclose
- Carlos Alfredo Capiel MD: Nothing to Disclose
- Carlos Bouzas: Nothing to Disclose
- Sebastian Alberto Costantino MD: Nothing to Disclose
- Sebastian Atilio Rossini: Nothing to Disclose
- Javier Perez: Nothing to Disclose

#### TEACHING POINTS
To review the MRI findings of common and uncommon forms of adenomyosis. To highlight the unusual presentation of adenomyosis called cystic adenomyosis. To correlate the MRI characteristics of adenomyosis with histopathology features. To show the main differential diagnosis of adenomyosis at MRI. To discuss the utility of MRI in the diagnosis of adenomyosis.

#### TABLE OF CONTENTS/OUTLINE
Correlation between histopathology and MRI features of adenomyosis Review of common and uncommon MRI findings of adenomyosis - conventional MRI - contrast enhanced MRI - diffusion weighted imaging Sample cases and mimics Summary
Beyond Leiomyomata: An Approach to the Bulky Uterus

Education Exhibits
Location: OB Community, Learning Center

Participants
Kathryn Darras MD (Presenter): Nothing to Disclose
Triona M. Walshe FFR(RCSI): Nothing to Disclose
Kristy Lee MD: Nothing to Disclose
Anne R. (Jean) Buckley MD: Nothing to Disclose
Silvia D. Chang MD: Nothing to Disclose
Alison Clare Harris MBChB: Nothing to Disclose

TEACHING POINTS
1. To review the anatomy of the uterus and adnexa.
2. To provide an approach to evaluating an enlarged uterus.
3. To present the pathogenesis, imaging findings, differential diagnosis and management of an enlarged uterus in the reproductive age, menopausal, and pregnant patient.
4. To highlight latest imaging techniques for investigating the uterus, including 3D ultrasound.

TABLE OF CONTENTS/OUTLINE
1. Anatomy review
   1.1. Original illustrations
   1.2. Ultrasound anatomy
   1.3. MRI anatomy
2. Differential diagnosis of uterine enlargement by patient characteristics
   2.1. Reproductive age
   2.2. Menopausal
   2.3. Pregnant
3. Pathologic entities
   3.1. Adenomyosis
   3.2. Sarcoma
   3.3. Fibroids
   3.4. Lymphoma
4. Work-up and management
   4.1. Follow-up imaging
   4.2. Need for surgical consultation
5. Pearls and pitfalls in imaging of suspected uterine enlargement

OBE154

Common Adnexal Masses Gone Awry

Education Exhibits
Location: OB Community, Learning Center
Certificate of Merit

Participants
Bryan Robert Foster MD (Presenter): Nothing to Disclose
Aaron Kirsch MD: Nothing to Disclose
Joanna Hatfield MD: Nothing to Disclose
Karen Y. Oh MD: Nothing to Disclose
Akram Mohamed Shaaban MBCh: Contributor, Amirsys, Inc
Roya Sohaey MD: Nothing to Disclose
Fergus V. Coakley MD: Nothing to Disclose

TEACHING POINTS
Whether encountered incidentally, or in symptomatic patients, adnexal masses are common enough that their characteristic findings on ultrasound, CT, and MRI are familiar to most radiologists. Although the fate of many of these masses is often stability or resolution, natural history occasionally diverts from what is familiar, and complications ensue. While some of these complications are rare, radiologists should be aware of their imaging characteristics in order to direct appropriate treatment. We aim to present commonly encountered adnexal masses that have a complicating feature.

TABLE OF CONTENTS/OUTLINE
I. Complications of common adnexal masses
   a. Ectopic pregnancy: rupture
   b. Ovarian torsion: c. Corpus luteum: rupture
   d. Endometrioma: rupture, malignant degeneration, decidualization
   e. Dermoid: rupture, fistula, malignant degeneration, anti-NMDA receptor encephalitis
   f. Pedunculated Fibroid: torsion
   g. Tuboovarian Abscess: Fitz Hugh Curtis (Perihepatitis)
II. Practical points for diagnosis and decision making
   a. Discussion of modality choice
   b. Integrating clinical information into your imaging diagnosis

OBE155

CT in the Diagnosis of Acute Gynecological Disorders: Pearls and Pitfalls

Education Exhibits
Location: OB Community, Learning Center

Participants
Lauren Pringle MD: Nothing to Disclose
Stephanie Frances Coquia MD: Nothing to Disclose
Pamela Tecca Johnson MD: Research funded, Becton, Dickinson and Company
Sheila Sheth MD (Presenter): Consultant, Star Scientific, Inc

TEACHING POINTS
1. Recognize CT appearances of gynecological conditions presenting with acute pelvic pain.
2. Formulate appropriate diagnosis or differential diagnosis, minimizing need for additional imaging studies whenever possible
3. Provide guidelines to regarding further management.

TABLE OF CONTENTS/OUTLINE
Background: increasing use of CT as first imaging modality in woman with negative pregnancy test presenting with acute
abdominal pelvic pain in the emergency department.
CT technique including importance of multiplanar reconstruction
CT appearance of ovarian cysts and their complications such as acute hemoperitoneum
Acute presentation of endometriosis
Pelvic inflammatory disease and its mimics
Ovarian torsion with emphasis on specific findings such as abnormal position of the enlarged adnexa and visualization of the engorged adnexal pedicle.
Acute presentation of ovarian tumors including torsion, rupture and acute abdominal distention
Ovarian vein thrombosis
Uterine disorders presenting primarily with acute pain such as acute degeneration of myoma and acute uterine obstruction

OBE156
Diagnostic and Interventional Radiology in Pregnant and Lactating Patients—Fetal and Neonatal Risks

Education Exhibits
Location: OB Community, Learning Center

Participants
Thoraya Ammar MRCP, FRCR (Presenter): Nothing to Disclose
Pauline Anne Kane MBBS, FRCR : Nothing to Disclose
Paul Singh Sidhu MRCP, FRCR : Speaker, Bracco Group Speaker, Siemens AG Speaker, Hitachi, Ltd
C. Jason Wilkinson MD : Nothing to Disclose
Dean Yi-Hsiang Huang MBBS, FRCR : Nothing to Disclose
Stephen Gregory MBBS : Nothing to Disclose
David Evans MBBS : Nothing to Disclose

TEACHING POINTS
Imaging of pregnant women is a subject most clinicians and radiologists regard with hesitation through this exhibit we will present the scientific background and use data from our institution to quantify the risks to the fetus and the neonate in the following areas 1- Fetal doses and risks in diagnostic imaging; diagnostic radiographs, computed tomography and MRI. 2- Fetal doses and risks in intervention radiologic procedures nephrostomies, renal artery stenos, prophylactic occlusion balloon insertion pre cesarian section, and trauma. 3- Contrast media and their risk in pregnancy and during lactation. This exhibit should address any misconceptions and give clinicians the necessary information needed in imaging and intervening in pregnant women and for pre-procedural counselling and consent.

TABLE OF CONTENTS/OUTLINE
• What are the challenges in calculating accurate feral dose and risk calculations • Historical data of effects of radiation on the fetus. • Deterministic and stochastic effects • Diagnostic imaging, fetal doses, and associated risks • Interventional radiology in pregnancy, fetal doses and associated risks with our own IR data • Post Exposure counselling • MRI evidence and current recommendations • Contrast agents in pregnancy • Contrast agents in lactating females

OBE157
Diagnostic Value of 3D Saline Infusion Hysterography (3D-SIS)

Education Exhibits
Location: OB Community, Learning Center

Selected for RadioGraphics

Participants
Ahmed Saied Abdelaziz Sabry MD (Presenter): Nothing to Disclose
Shaimaa Abdelhassib Fadi MD : Nothing to Disclose
Hanan Sherif MD : Nothing to Disclose
Amal Elabdaly MD : Nothing to Disclose
Ahmed Emad Mahfouz MD : Nothing to Disclose

TEACHING POINTS
1. 3D-SIS is a widely-accepted, safe, less expensive, less painful, and less invasive than D/C, endometrial biopsy and hysteroscopy.
2. 3D-SIS provides excellent depiction of the uterine cavity with good characterization and localization of endometrial lesions.
3. 3D-SIS is invaluable in demonstrating congenital anomalies, both in the preoperative and postoperative assessment.
4. 3D-SIS with the use of foam gel ultrasound contrast agent aids visualization of the fallopian tube patency.
5. 3D-SIS may be the only imaging method to diagnose synechiae, which may be missed on ultrasonography and MRI without distention of the uterine cavity.

TABLE OF CONTENTS/OUTLINE
Technique Indications and contraindications Congenital anomalies Mass lesions of the endometrium and uterine cavity. Synechiae Fallopian tube patency

OBE158
Endometrial Ablation: Normal Imaging Appearance and Delayed Complications

Education Exhibits
Location: OB Community, Learning Center
Participants
Jacob Alan Sepmeyer MD (Presenter): Nothing to Disclose
Christopher Allen Daub MD : Nothing to Disclose
Vivian Halhuc DO : Nothing to Disclose
Michelle Diane Sakala MD : Nothing to Disclose
Melanie P. Casetta MD : Nothing to Disclose
Jennings Cingan MD - Nothing to Disclose
Keyanoosh Hosseinzadeh MD : Consultant, Bayer AG

TEACHING POINTS
1. Review the treatment options for ovulatory menorrhagia with a special focus on non-resectoscopic (second generation) endometrial ablation techniques. 2. Review the pathologic basis for the delayed complications of endometrial ablation. 3. Review the imaging appearance of the delayed complications of endometrial ablation.

TABLE OF CONTENTS/OUTLINE

OBE159
Female Pelvic Floor Repair: Normal Radiological Post-operative Appearances and Common Complications: What the Radiologist Needs to Know

Education Exhibits
Location: OB Community, Learning Center

Participants
Argyro Xyda MD, PhD (Presenter): Nothing to Disclose
Penelope Laura Moyle MBChB : Nothing to Disclose
Rohna Kearney MD, MRCPI : Nothing to Disclose
Susan Freeman MRCP, FRCR : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review stress urinary incontinence (SUI) and pelvic organ prolapse (POP) repair techniques. 2. To present the typical imaging findings following pelvic floor repair surgery. 3. To enhance basic understanding and interpretation of pelvic imaging on CT and MRI. 4. To discuss common complications associated with pelvic floor surgery. 5. To present the new specific terminology related to mesh complications according to the International Urogynaecology Association. 6. To highlight the importance of dedicated multiplanar and post i.v. gadolinium MRI sequences in the evaluation of pelvic floor surgery complications.

TABLE OF CONTENTS/OUTLINE
• Brief introduction to SUI and POP • Main surgical pelvic floor repair techniques; procedures and postoperative anatomy • Review of expected post-operative appearances on MRI and CT. What the radiologist needs to know to avoid misinterpretation • Recommended MRI imaging protocol • Pelvic floor repair complications: Early and late complications • Sample cases • Summary

OBE161
Hang Tight: A Review of the Uterine Supporting Ligaments Based on MR Imaging

Education Exhibits
Location: OB Community, Learning Center

Participants
Deborah Monteiro Soares MD (Presenter): Nothing to Disclose
Natalia Saraiva Coelho MD : Nothing to Disclose
Romulo Varella MD : Nothing to Disclose
Leonardo Kayat Bittencourt MD, MSc : Nothing to Disclose

TEACHING POINTS
• Lateral Cervical (Cardinal) Ligament: Extends from the cervix and superior vagina to the walls of the pelvis, transmits neurovascular structures, has an important supporting function. • Uterosacral Ligaments: anchor the uterus to the sacrum, include autonomic nerves, also with important supporting function. • Round Ligaments: Arise from uterine cornu, attached to the labia major, limiting their mobility, ensuring the orientation of the organ. • Broad ligament: Created from the two sheets of covering peritoneum, extends laterally to pelvic sidewall, transmits autonomic nerves, helps to ensure the position of the organ. As a result of the peritoneum enveloping all abdominal structures, there are two blind ending invaginations around the uterus: • Vesico-Uterine Pouch is used as an extraperitoneal surgical cleavage plane. • Recto-Uterine Pouch a very common location for drop metastases and endometriotic implants.

TABLE OF CONTENTS/OUTLINE
• MR Imaging Protocol • Anatomical review of the pelvic floor with emphasis on ligaments and spaces using Magnetic Resonance Imaging. • Defining supporting structures and the main compartments. • Identifying key alterations in supporting elements and spaces of the pelvis: Leiomyoma, endometriosis, herniation, infection, hematoma, neoplastic invasion and metastases. • Pitfalls and technical issues.

OBE162
Hysterosalpingography: Technique, Findings and Results from Our Experience

Education Exhibits
Location: OB Community, Learning Center
Selected for RadioGraphics

Participants
Jonathan Hernandez MD (Presenter): Nothing to Disclose
Rosa Pineda MD: Nothing to Disclose

TEACHING POINTS
1. Review the current role of hysterosalpingography (HSG) in the study of infertile patients. 2. Review indications and technique to perform a correct study. 3. Understand the normal anatomy, as well as non-pathological and pathological findings that may appear on a HSG. 4. Know the results from our experience with 400 consecutive patients and the relevance of the most important pathologies in the infertile patient.

TABLE OF CONTENTS/OPTION
1. Introduction We describe the epidemiology of infertility, as well as the initial approach in the study in infertile patients. 2. Indications and Contraindications We proceed to explain the current indications and contraindications of HSG. 3. Technique Explain, step by step, how the procedure should be performed. 4. Normal Anatomy Show the normal uterine and fallopian anatomy seen on a HSG. 5. Non-Pathologic Findings Expose occasional findings which aren't relevant in the fertility study and that should not be confused with pathologic conditions. 6. Pathologic Findings Review the most common uterine and tubaric pathologic anomalies that may justify infertility. 7. Results From Our Experience Compare the results from 400 consecutive HSGs performed in our center with the results described in the literature. 8. Conclusions

OBE163
Imaging Evaluation of Hypervascular Endometrium: A Case-based Review

Education Exhibits
Location: OB Community, Learning Center

Participants
Humera Mukhtar Chaudhary MBBS (Presenter): Nothing to Disclose
Jesus Edmundo Calleros - Macias MD : Nothing to Disclose

TEACHING POINTS
List common and uncommon endometrial pathologies that show focal or diffuse increased vascularity on pelvic ultrasound. Discuss imaging findings of each with differential diagnosis in appropriate clinical scenario in case based format.

TABLE OF CONTENTS/OPTION
Dysfunctional uterine bleeding is one of the most popular requisition in ultrasound department. Pelvic ultrasound remains the gold standard for endometrial evaluation. Endometrial etiologies compromise major cause of dysfunctional uterine bleeding in pre and post menopausal women. Clinical history and endometrial biopsy is mandatory for accurate diagnosis, however there are few conditions where endometrial biopsy may lead to catastrophic event like in cases of acquired and congenital AV malformations. This exhibit will illustrate cases of abnormal endometrium with focal and diffuse increased vascularity as seen on pelvic ultrasound, characterize the underlying etiology and identify cases which need additional imaging like CT, MRI or diagnostic/therapeutic angiography. An imaging algorithm will be discussed at the end for imaging evaluation of hypervascular endometrium.

OBE164
Imaging Features of Tamoxifen Therapy on the Endometrium and Uterus

Education Exhibits
Location: OB Community, Learning Center

Certificate of Merit

Participants
Nirvikar Dahiya MD : Nothing to Disclose
Christine O. Menias MD (Presenter): Nothing to Disclose
Mariam Moshiri MD : Consultant, Reed Elsevier Author, Reed Elsevier
Maitray D. Patel MD : Nothing to Disclose
Cary Lynn Siegel MD : Nothing to Disclose

TEACHING POINTS
Purpose/Aim: - To familiarize radiologists with different imaging manifestations of Tamoxifen induced changes in the uterus of women who are being treated for breast cancer - To review indications, post treatment changes, complications, management implications, and role of the radiologist in such patients - To discuss various imaging options for follow-up, and implications of each for management

TABLE OF CONTENTS/OPTION
Content organization: - Introduction role and use of tamoxifen therapy - Discuss the potential changes of tamoxifen therapy to the endometrium and uterus o Endometrial hyperplasia o Endometrial polyp o Endometrial cystic change o Endometrial carcinoma o Coexisting Leiomyomas, adenomyosis - Discuss imaging modalities and features of tamoxifen therapy o Transvaginal ultrasound and sonohysterogram o Role of MRI o Hysteroscopic correlation - Summary and Conclusion Summary: The purpose of this exhibit is to review the spectrum of uterine and endometrial findings at transvaginal US, hysterosonography, CT and MRI in women with breast cancer undergoing tamoxifen therapy. Various pathologic conditions produced within the uterus by this therapy will be discussed and illustrated. Potential pitfalls and mimics will also be reviewed.

OBE165
Imaging Features of Vaginal Masses and Cysts

Education Exhibits
Participants

Priya Krishnarao MD (Presenter): Nothing to Disclose
Snehal Adodra MD: Nothing to Disclose
John C. Lau MD: Nothing to Disclose

TEACHING POINTS

1. The majority of vaginal masses are benign, however a small number of cases may be attributed to primary and secondary malignancies of the vagina. 2. Benign masses are usually incidental cystic lesions of female lower genitourinary tract which can be distinguished by key anatomic relationships and characteristic radiographic signs described in this exhibit. 3. Advances in MRI imaging have contributed to the high-resolution, noninvasive, cross-sectional imaging of this region. 4. Primary and secondary vaginal malignancies have characteristic imaging features depending on histologic type of malignancy.

TABLE OF CONTENTS/OUTLINE


OBE166

Imaging Findings of Gynecologic Malignancies After Treatment

Education Exhibits

Location: OB Community, Learning Center

Participants

Satomi Kitai (Presenter): Nothing to Disclose
Tohru Sekiya: Nothing to Disclose
Kunihiko Fukuda MD: Nothing to Disclose

TEACHING POINTS

Diagnostic imaging is useful not only for the preoperative diagnosis of gynecologic malignancies, but also for the evaluation of postoperative complications and for follow up after treatment. To select the most suitable imaging modalities in diagnosis of the postoperative complications and the recurrences from a different primary site is essential for the radiologist. To be familiar with imaging features of the common complications after gynecological surgery will facilitate the diagnosis. To be acquainted with the pattern and imaging features of recurrence, after treatment of gynecological malignancies, will be useful for daily practice.

TABLE OF CONTENTS/OUTLINE

Treatment strategy and follow up of gynecologic malignancies cervical cancer endometrial cancer ovarian cancer Imaging after treatment and pitfalls in interpretation normal post surgical anatomy cervical carcinoma after radiation therapy Frequent complications after surgery for gynecologic malignancies clinical aspects imaging findings Imaging of recurrent tumors common site of recurrence in each gynecological malignancy imaging modality of choice: US, CT, MRI and PET imaging features The role of radiologists in the diagnosis after treatment of gynecological malignancies

OBE167

Imaging in Dysmenorrhoea, Usual to Unusual Causes: Pictoral Essay and Approach to Diagnosis

Education Exhibits

Location: OB Community, Learning Center

Participants

Nishchint Jain MBBS: Nothing to Disclose
Ritu Verma MBBS, MD (Presenter): Nothing to Disclose
Umesh Chandra Garga MBBS, MD: Nothing to Disclose
Sachin Kumar Jain MD: Nothing to Disclose

TEACHING POINTS

To understand various causes of dysmenorrhea and their imaging appearance on USG and MRI. To explain the utility of USG and MRI in evaluation of severe, intractable medically resistant dysmenorrhea.

TABLE OF CONTENTS/OUTLINE

Dysmenorrhoea is a chronic and recurring problem in females of reproductive age group. Apart from functional dysmenorrhoea, imaging plays a pivotal role in evaluation of other causes of dysmenorrhoea. CAUSES: May be acquired like PID, endometriosis, pelvic congestion syndrome, leiomyoma, adenomyosis and ovarian cyst or congenital including cervical stenosis and mullerian anomalies. Rare mullerian anomalies that are associated with severe, intractable, medically resistant yet surgically curable dysmenorrhoea are unicorunate uterus with hematometra of the rudimentary horn and juvenile cystic adenomyoma. IMAGING: USG pelvis and MRI plays a pivotal role in patient evaluation. The radiologist must carefully assess the uterine or adnexal mass if present, size and shape of the uterine cavity, junctional zone, endo-myometrial interface, bilateral ovaries, both uterine cornu and pelvic vasculature. CONCLUSION: USG and MRI are essential tools for correct diagnosis and management in patients with dysmenorrhoea, especially the ones with medically resistant dysmenorrhoea.

OBE168

Imaging the Post-Cesarean Uterus: Acute and Chronic Sequelae

Education Exhibits

Location: OB Community, Learning Center

Participants
TEACHING POINTS

- Cesarean section delivery (C-section) accounts for nearly 1 in 3 births in the United States. This surgery induces anatomical changes to the uterus that may lead to complications acutely and alterations in the imaging appearance of the uterus years later. Our aim is to provide an understanding of the short and long-term complications affecting uterine integrity, implantation, and anatomy following C-section. Identification of acute complications in the post-surgical uterus may affect patient care. Familiarity with expected post-surgical anatomic changes on follow-up imaging will allow imagers to reassure patients and providers when these findings are encountered.

TABLE OF CONTENTS/OUTLINE

1. Review spectrum of acute complications of C-section delivery: hematomas, uterine dehiscence and rupture, and pelvic thrombophlebitis. 2. Review imaging modalities: US, CT, and MRI, to diagnose acute findings. 3. Introduce cesarean scar defects (CSDs) and imaging findings that may indicate formation of CSDs. 4. Review imaging of C-section scar complications: cesarean scar ectopic pregnancy, scar dehiscence, and endometrial implants. 5. Demonstrate imaging appearance of post surgical anatomic changes on TVUS, sonohysterography, hysterosalpingography, and MRI.

OBE170

Mesh Related Complications of Sacrocolpopexy: A Pictorial Review

Education Exhibits
Location: OB Community, Learning Center

Participants
Sailaja Reddy MBBS, FRCR (Presenter): Nothing to Disclose
Preeti Arora MBBS: Nothing to Disclose
Balashanmugam Rajashanker MRCP, FRCR: Nothing to Disclose
Ayesha Nasrullah: Nothing to Disclose

TEACHING POINTS

1. The aim of this presentation is to describe the normal MRI appearances of mesh following sacrocolpopexy and various mesh related complications. 2. Sacrocolpopexy is a surgical procedure performed to treat pelvic organ prolapse and is very effective at symptom control. However the mesh related complications are common and a cause for postoperative pain and recurrent prolapse. After viewing our exhibit the reader can have increased awareness of various mesh related complications. 2. MRI is the imaging modality of choice for assessing mesh related complication following sacrocolpopexy, with good intra operative correlation of imaging findings. We discuss our large experience in imaging of sacrocolpopexy, with relevant intraoperative correlation.

TABLE OF CONTENTS/OUTLINE

1. Background of pelvic organ prolapse.
2. Sacrocolpopexy
3. Our experience of sacrocolpopexy at a tertiary referral center for urogynaecology services.
4. MRI of sacrocolpopexy: Normal imaging and examples of mesh related complications, with relevant intraoperative correlation.

OBE171

MR Characterization of Ultrasound-Indeterminate Adnexal Masses: A Radiologist’s Primer

Education Exhibits
Location: OB Community, Learning Center

Participants
Neil Soneji BSC, MBBS (Presenter): Nothing to Disclose
Anish Railatha MBBS, BSC: Nothing to Disclose
Tara Diane Barwick MBChB: Nothing to Disclose
Victoria Stewart: Nothing to Disclose
Andrea Grace Rockall MRCP, FRCR: Nothing to Disclose
Nishat Bharwani MBBS, FRCR: Nothing to Disclose

TEACHING POINTS

Adnexal masses are common incidental findings in women. The majority are benign and radiological characterization is crucial to plan management and avoid inappropriate surgery. Ultrasound is the first line imaging modality however some lesions cannot be categorized as benign or malignant. In these indeterminate cases, MRI is employed as it provides higher specificity with excellent soft tissue contrast. Aims: - To establish the basic principles of adnexal mass characterization using conventional MRI sequences - To develop these principles further by exploring contemporary techniques such as diffusion-weighted (DW) MRI and dynamic contrast-enhanced (DCE) MRI and their added diagnostic value - To test these interpretive skills with real-life cases from the MDT

TABLE OF CONTENTS/OUTLINE

Background Normal adnexal anatomy on MRI MRI protocol Conventional MRI sequences with interpretation pearls and pitfalls - T2W - T1W - Fat suppressed - Delayed post-contrast Contemporary MRI sequences with interpretation pearls and pitfalls - DW-MRI - DCE-MRI and time intensity curve interpretation "Test your skills" - Multi-modality cases with an emphasis on the added value of MRI giving explanations and surgical/clinical correlation and outcome Summary

OBE173

MR Manifestations of Various Physiologic Environmental Changes in the Benign Gynecologic Pathologies

Education Exhibits
TEACHING POINTS

1. Normal gynecologic organs may show dynamic morphologic changes due to various physiologic states and may mimic pathologies, whereas imaging manifestations of benign gynecologic pathologies may also be influenced by various physiologic states. Radiologists should check physiologic states of patients before interpreting the images.

2. Decidualization of ectopic endometrium in endometrioma or adenomyosis, usually associated with pregnancy or occasionally with exogenous hormonal stimulation, may mimic malignancy such as ovarian cancer or endometrial stromal sarcoma of the uterus. DWI with ADC measurement may be helpful in distinguishing hypercellular malignant tumors with decreased ADC and edematous decidualized lesions with increased ADC.

3. Changes in MR appearance of normal gynecologic organs and benign lesions may be the first manifestation of exo-/endogenous hormonal abnormality.

TABLE OF CONTENTS/OUTLINE

Physiologic changes during menstrual cycle: Endometrioma /Lung endometriosis
Pregnancy-related changes: Decidualized endometrioma; adenomyosis /Red degeneration of leiomyoma /Torsion of ovarian tumors
Exo-/ Endogenous hormone-related changes:
-Response to the therapy /Menopause: Adenomyosis/ Leiomyoma
-Stepwise carcinogenesis of endometrium /hyperplasia: Tamoxifen/ Functioning ovarian tumors/ PCO
Infection and inflammatory changes

OBE174

MR Necrosis Imaging of the Female Pelvis: Diagnostic Impact for High Grade Malignant Tumors

Education Exhibits
Location: OB Community, Learning Center

TEACHING POINTS

1. Conventional MRI may occasionally fail to diagnose highly malignant tumors with necrosis due to the reduction of viable tumor cells. The presence of necrosis revealed by MR necrosis imaging using a multi-sequence imaging approach combining DWI, high resolution (HR) CE images and MR spectroscopy (MRS) may be the clue to the diagnosis.

2. Small unenhanced areas on HR CE images and DWI-low /high ADC areas may reflect small macroscopic necrosis in malignant tumors and lymph node metastasis.

3. Lipid peak on MRS reflects mobile lipid droplets resulting from cellular death due to rapid cellular turnover, and be sensitive for microscopic necrosis in malignant tumors, or necrotic materials in abscess.

4. Combination of macroscopic and microscopic MR necrosis imaging may reveal necrotic tendency of malignant tumors and be useful for the diagnosis, and may be applied to assessment of therapeutic response of gynecologic malignancies.

TABLE OF CONTENTS/OUTLINE

Imaging techniques of MR necrosis imaging:
- Macroscopic necrosis detection on HR CE images and DWI with ADC map
- Microscopic necrosis detection by MRS: mobile lipid droplets accumulation
Diagnostic impacts in clinical cases:
- Uterine cancers and sarcomas
- Ovarian tumors
- Lymph node metastasis
- Abscess
Assessment of therapeutic response of gynecologic malignancies

OBE176

Multi-modality Imaging in the Study of Deep Pelvic Endometriosis

Education Exhibits
Location: OB Community, Learning Center

TEACHING POINTS

Deep endometriosis corresponds to an infiltration (> 5 mm in depth) of the peritoneum and progressive extension into the Douglas pouch and beyond, with the endometriosis infiltrating the upper posterior part of the cervix, the uterosacral ligaments (USLs), the vagina, and/or the colon or, less often, the bladder and ureter. The purpose of this work is to review histology and physiopathology of endometriosis and to discuss and analyze imaging techniques to study deep pelvic endometriosis : CT, MR and US

TABLE OF CONTENTS/OUTLINE

1) Physiopathology and pathology of deep endometriosis 2) Anatomy of female pelvis. 3) MR technique, by underlining sensitivity, specificity, PPV and NPV according to the recent literature and imaging findings of involvement of uterosacral ligaments, torus uteriniim, uterosacral ligaments, rectovaginal cul-de-sac, the posterior vaginal cul-de-sac, the rectum, and the
Name That Polyp: Diagnosis of Endometrial Polyps and Other Endometrial Pathology with Saline Infusion Sonography (SIS)

Participants
Jennifer Flanagan (Presenter): Nothing to Disclose
April Alexander Bailey MD: Nothing to Disclose
Elysia Moschos MD: Nothing to Disclose

TEACHING POINTS
In women with abnormal uterine bleeding and thickened endometrium, saline infusion sonography (SIS) can aid in detection and differentiation of endometrial masses, guide targeted endometrial sampling (SISES) and increase sensitivity for atypia and malignancy. Endometrial cancer is the most common gynecologic malignancy and patient obesity further increases risk, adding to the urgency of early and accurate diagnosis of endometrial pathology. Traditional blind endometrial biopsy (EMB) has low sensitivity for endometrial lesions. Endometrial polyps possess a small, but real, chance of malignant transformation. Intracavitary submucosal leiomyomata are an important differential diagnosis for endometrial masses and can be better assessed with SIS to aid surgical planning for possible hysteroscopic removal. Therefore, differentiating endometrial masses is imperative. This exhibit will review endometrial disease and focus on SIS procedure and SIS imaging characteristics of different endometrial masses (hyperplasia, endometrial polyps, polyps with atypia, intracavitary submucosal leiomyomata, and endometrial carcinoma).

TABLE OF CONTENTS/OUTLINE
1. Introduction to endometrial disease
2. Indications for imaging and preliminary clinical evaluation
3. SIS procedure and technique
4. SIS diagnosis of endometrial disease (imaging presentation and differential diagnoses)

Pitfalls of Female Pelvis on Cross Sectional Imaging

Participants
Khaled M. Elsayes MD (Presenter): Nothing to Disclose
Akram Mohamed Shaaban MBCh: Contributor, Amirsys, Inc
Kareem Ahmed: Nothing to Disclose
Nicolaus A. Wagner-Bartak MD: Nothing to Disclose
Rafael Andres Vicens-Rodriguez MD: Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose

TEACHING POINTS
- Describe most commonly encountered imaging pitfalls of the female pelvis on cross sectional imaging.
- Describe relevant technical background, pathophysiology and hemodynamics of these pitfalls.
- Correlate cross-sectional imaging of these masses with clinical and pathologic findings.

TABLE OF CONTENTS/OUTLINE
- Diagnostic pitfalls
  - Mistaking benign lesions for malignant lesions
  - Mistaking malignant lesions for benign lesions
- Technical pitfalls
  - CT, US, MR specific issues that create difficulties in diagnosis
  - Technique pitfalls
  - Atypical presentations of common benign lesions
  - Atypical presentations of common malignant lesions
- Anatomical Pitfalls
  - Organization according to imaging findings

Role of Imaging in Fertility-sparing Options for Gynecological Malignancies

Participants
Mahrukh Qureshi MBBS (Presenter): Nothing to Disclose
Nicholas Oliver Butterfield MBBS, MRCP: Nothing to Disclose
Nichiat Bhanwani MBBS, FRCR: Nothing to Disclose
Andrea Grace Rockall MRCP, FRCR: Nothing to Disclose

TEACHING POINTS
Gynecological malignancies predominantly affect the older female population. The standard surgical management may involve radical hysterectomy, salpingo-oophorectomy or combinations of both. A significant number of patients however, are of child-bearing age and in this group, preservation of fertility is a key management consideration. Imaging is effective, and essential, in assisting with patient selection for fertility-sparing surgical procedures via staging of disease in accordance with the FIGO staging system. The recognition of the radiological appearances (and pitfalls) is vital in order to ensure successful
oncologic and obstetric outcomes in this cohort of patients.

**TABLE OF CONTENTS/OUTLINE**

Discussion of fertility-sparing surgical / non-surgical options and eligibility in cervical, ovarian and endometrial cancers and gestational trophoblastic disease / placent al site trophoblastic tumors Radiological findings (MR, CT, US) with an emphasis on MR imaging Post-surgical radiological appearances and pitfalls Example cases from our tertiary referral center Summary

**OBE180**

Sonographic Evaluation of the Cervix with Multimodality Imaging Correlation: Normal Appearance, Pathology and Diagnostic Pitfalls

**Education Exhibits**

Location: OB Community, Learning Center

Selected for RadioGraphics

**Participants**

Benjamin L. Yam MD (Presenter): Nothing to Disclose
Jill Eve Langer MD: Consultant, BioClinica, Inc
Parvati Ramchandani MD: Nothing to Disclose
Anil Chauhan MD: Nothing to Disclose
Maria Carolina Reyes MD: Nothing to Disclose
Lisa Po-Lan Jones MD, PhD: Nothing to Disclose

**TEACHING POINTS**

1. Review the normal sonographic appearance of the cervix
2. Provide technical pearls for sonographic evaluation of the cervix
3. Illustrate the sonographic appearance of cervical pathology, mimics and pitfalls

**TABLE OF CONTENTS/OUTLINE**

1. Embryology, anatomy, and physiology of the cervix
2. Sonographic technique, including color Doppler and real-time maneuvers
3. Normal sonographic appearance with MRI/CT correlation
   a. Pitfall - normal mucosa mistaken for pathology
4. Non-obstetric pathology
   a. Congenital abnormalities (septa, duplication, agenesis)
   b. Infectious/inflammatory lesions (cervicitis)
   c. Benign lesions, spectrum of appearances
      i. Nabothian cyst
      ii. Endocervical polyp
      iii. Endocervical hyperplasia
   iv. Myoma
   d. Malignant lesions
      i. Cervical carcinoma
      ii. Secondary invasion of the cervix
   e. Pitfalls
      i. Sonographically occult lesions
      ii. Overlapping appearances and differentiating features
   f. Obstetrical-related imaging
      a. Ectopic pregnancy, abortion in progress, pedunculated products of conception, aneurysm
      b. Cervical incompetence and pitfalls in length measurements

**OBE181**

Sonographic Evaluation of the Pelvis Following Methotrexate Administration in a Patient with Ectopic Pregnancy: What the Radiologist Should Know

**Education Exhibits**

Location: OB Community, Learning Center

**Participants**

Jae W. Song MD, MS (Presenter): Nothing to Disclose
Margarita V. Revzin MD: Nothing to Disclose
Regina J. Hooley MD: Nothing to Disclose
Leslie M. Scoutt MD: Consultant, Koninklijke Philips NV

**TEACHING POINTS**

The purpose of this exhibit is to familiarize the radiologist with the expected ultrasound findings of an ectopic pregnancy after treatment with Methotrexate (MTX) and to increase the radiologist’s awareness of potential complications of MTX therapy and possible pitfalls.

**TABLE OF CONTENTS/OUTLINE**

1. How to determine which patients with ectopic pregnancy can best be treated with methotrexate (MTX) will be discussed as well as treatment protocols. Alternative treatments for ectopic pregnancy will also be reviewed (including surgery, sonographically guided percutaneous treatment, and expectant management).
2. Side effects of MTX therapy will be discussed.
3. A review of expected ultrasound findings in patients with ectopic pregnancy following MTX administration with specific regard to a) the location of the ectopic (tubal, adnexal, cornual, and cesarean section scar) b) the variable appearance of the post-treatment ectopic, and c) natural regression/changes of a MTX-treated ectopic pregnancy on serial follow up examinations.
4. Complications associated with MTX treatment including failure with continued growth of an ectopic pregnancy, hemorrhage, and adverse reaction to the MTX will be presented.
5. Pitfalls of post-treatment evaluation will be discussed.

**OBE182**

**T2 Dark Adnexal Ovarian Lesions: Detailed MRI Characterization**

*Education Exhibits*

*Location: OB Community, Learning Center*

**Participants**

- Rita Nobre Lucas MD: Nothing to Disclose
- Teresa Margarida Cunha MD (Presenter): Nothing to Disclose
- Joao Lopes Dias MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: 1. To highlight the role of MRI in the characterization of ultrasound indeterminate adnexal lesions. 2. To review the imaging findings of the different pathological entities that present with low signal on T2-weighted sequences. 3. To emphasize the need of an adequate MR protocol to clarify the origin of the lesions. 4. To explain the potential role of diffusion-weighted imaging (DWI) in the correct identification of misclassified lesions based only on the T2 signal intensity within the solid component.

**TABLE OF CONTENTS/OUTLINE**

- Technical aspects of MR imaging protocol for low-T2 signal adnexal lesions characterization.
- Imaging and pathological features of the lesions presenting with low-T2 signal of solid component.
- Possible DWI presentations of both benign and malignant low-T2 lesions.

**OBE183**

**Test Your Knowledge: Uncommon and Atypical Presentations of Common Obstetrical and Gynecologic Diseases**

*Education Exhibits*

*Location: OB Community, Learning Center*

**Participants**

- Susan Elizabeth Gall Sims MD: Nothing to Disclose
- Rachel Shields MD (Presenter): Nothing to Disclose
- Katherine Anne Kapoth-Joslin MD, PhD: Nothing to Disclose
- Shweta Bhatt MD, MBBS: Nothing to Disclose
- Bing Ren MD: Nothing to Disclose
- Bradley Turner MD: Nothing to Disclose
- Deborah J. Rubens MD: Nothing to Disclose

**TEACHING POINTS**

1. To think outside the common obstetrical and gynecological diseases through a fun and interactive quiz format.
2. Emphasize the key imaging characteristics and typical clinical presentations which differentiate similar disease entities.
3. Provide pathologic correlates to reinforce the diseases presented.

**TABLE OF CONTENTS/OUTLINE**

Pelvic ultrasound and CT are extremely common examinations for the evaluation of a myriad of symptoms. Knowledge of the multiple pathologic processes which affect the female reproductive system is a part of day-to-day radiologic practice, not just the domain of the Ob-Gyn specialist.

The cases will be presented in a fun and interactive quiz format with teaching points and description of the imaging/clinical findings following the cases. The cases are to focus on uncommon or atypical presentations of common Obstetrical and Gynecologic diseases. In addition, several pathologic images will be included for completeness in describing the disease entity. Some examples of cases include:

- Cervical Lymphoma
- Cornual Choriocarcinoma
- Well Differential Peritoneal Mesothelioma
- Complex Nabothian Cysts Presenting as a Pelvic Mass
- Uterine AVM
- Broad ligament fibroid
- Urethral Diverticulum
- Pelvic Inflammatory Disease
- Adnexal Torsion
- Cesarean Section Scar Endometriosis.

**OBE184**

**The Fallopian Tubes: Spectrum of Disease, Multimodality Imaging, and Interventions**

*Education Exhibits*

*Location: OB Community, Learning Center*
Participants
Ashley Elizabeth Prosper MD (Presenter): Nothing to Disclose
Christina Earnhart MD: Nothing to Disclose
Daphne Kim Walker MD: Nothing to Disclose

TEACHING POINTS
• Review the spectrum of fallopian tube pathology and comorbid disease • Discuss the role of multimodality imaging in the diagnosis of fallopian tube pathology • Review image-guided and surgical interventions for fallopian tube disease

TABLE OF CONTENTS/OUTLINE
Table of Contents/Outline • Schematic review of fallopian tube anatomy • Typical imaging appearance of the fallopian tube on ultrasound/CT/MRI/HSG • Spectrum of fallopian tube disease with case examples including: Torsion Tuboovarian abscess Ectopic pregnancy Infertility Neoplasm - primary fallopian tube cancer, the connection with BRCA and metastatic disease • Image guided interventions for fallopian tube disease including: HSG evaluation of fallopian tube patency for desired fertility Transcervical occlusion of fallopian tubes for desired sterility Draining tuboovarian abscesses Controlling hemorrhage - postsurgical/ectopic • Surgical intervention for fallopian tube pathology and postsurgical imaging

OBE186
The Uterus at Multidetector CT— Normal, Abnormal, What Next?

Education Exhibits
Location: OB Community, Learning Center
Certificate of Merit

Participants
Sheila Sheth MD (Presenter): Consultant, Star Scientific, Inc
Stephanie Frances Coquia MD: Nothing to Disclose
Linda Chi Hang Chu MD: Nothing to Disclose
Ulrike M. Hamper MD, MBA: Nothing to Disclose

TEACHING POINTS
1. Understand the normal enhancement patterns of the uterine cervix, endometrium and myometrium on contrast enhanced CT
2. Recognize the CT appearances of pathological processes affecting the endometrium and myometrium.
3. Recognize when additional imaging or referral to Gynecology is advised

TABLE OF CONTENTS/OUTLINE
Although CT is not the initial imaging modality recommended to evaluate women with suspected gynecological diseases, the female reproductive organs are often imaged on CT performed for a variety of other indications.
By illustrating the spectrum of pathological processes affecting the endometrium and myometrium, this exhibit will help radiologists make appropriate diagnoses and recommendations when necessary.
1. Normal enhancement pattern of endometrium and myometrium
2. Myomas with emphasis on abnormal enhancement patterns and locations that may be symptomatic. Adenomyosis. Unusual other benign tumors of the myometrium
3. Abnormal endometrium including endometrial cancer and endometritis
4. Pregnancy related pathological processes including gestational trophoblastic diseases and retained products of conception

OBE187
Vaginal Fistulas: Secrets of the Barium Enema and Vaginogram

Education Exhibits
Location: OB Community, Learning Center

Participants
Susana Candia MD (Presenter): Nothing to Disclose
Francis Joseph Scholz MD: Owner, FSpoon Company
Christopher D’Arcy Scheirey MD: Nothing to Disclose

TEACHING POINTS
1. Describe types of vaginal fistulas and common etiologies 2. Learn proper fluoroscopic technique to evaluate vaginal fistulas emphasizing dual-phase barium enema or vaginogram 3. Understand unique role of vaginogram in delineating vaginal fistulas 4. Recognize key findings of various vaginal fistulas on barium enema and vaginogram

TABLE OF CONTENTS/OUTLINE
- Background of vaginal fistulas including incidence and etiologies - Rectovaginal anatomy - Description of standard barium enema examination for vaginal fistulas and its limitations - Description of useful double-stage technique to examine upper and lower vaginal or rectal segments sequentially - Explanation of when and why to perform vaginogram in evaluation of fistulas - Illustrative images of fluoroscopic studies demonstrating common and less common vaginal fistulas - Summary emphasizing importance of correct technique during barium enema or vaginogram
Problem-solving MR Techniques

Education Exhibits
Location: OB Community, Learning Center

Participants
Mayumi Takeuchi MD, PhD (Presenter): Nothing to Disclose
Kenji Matsuzaki MD, PhD: Nothing to Disclose
Masafumi Harada MD, PhD: Nothing to Disclose

TEACHING POINTS
1. For the diagnosis of C-section scar sequelae, rapid T2WI (SSFSE/FIESTA) in evaluating anatomical details of placentation abnormality, DCE-MRI in demonstrating hypervascular products of conception, and fat-saturated T1WI in detecting hemorrhagic contents are useful MR sequences.
2. For the diagnosis of abdominal wall scar sequelae, combination of fat-saturated T1WI and SWI/SWAN is sensitive for hemorrhagic foci in abdominal wall scar endometriosis. In distinguishing soft tissue malignant tumors of the abdominal wall from benign abdominal wall scar endometriosis, DWI may be helpful.

TABLE OF CONTENTS/OUTLINE
Clinical, pathological and imaging features of C-section delivery sequelae
- Acute/subacute complications: Uterine rupture, Hemorrhage/Hematoma, Infection/Abscess formation/Peritonitis
- C-section scar sequelae: Ectopic pregnancy, Diverticulum, Endometriosis, Placenta accreta/increta/percreta, Retained products of conception
- Abdominal wall scar sequelae: Abscess, Endometriosis
Advanced MR techniques: Fat-saturation; DWI; SWI/SWAN; DCE-MRI

OBE189
Wait, There's a Baby in There — Do You Know What to Do?

Education Exhibits
Location: OB Community, Learning Center

Participants
Rustain Lee Morgan MD, MS (Presenter): Nothing to Disclose
Jacqueline Hill MPH: Nothing to Disclose
Shelby Jean Fishback MD: Nothing to Disclose

TEACHING POINTS
It is important to understand the risks and benefits of diagnostic imaging as it relates to a pregnant patient for non-pregnancy related symptoms, to ensure minimal fetal risk while optimizing diagnostic ability. The purpose of this exhibit is to examine the current recommendations regarding imaging of common non-obstetric conditions, while also reviewing both anatomic changes of pregnancy and consequences of fetal radiation. Through this exhibit, we hope to improve the knowledge of practicing radiologists in order to best advise clinical colleagues on appropriate imaging. We will achieve this by presenting pictorial patient scenarios with a focus on anatomic changes of pregnancy, fetal radiation dose, appropriate imaging, and additional aspects of imaging, such as contrast exposure.

TABLE OF CONTENTS/OUTLINE
Review of how pregnancy affects anatomy
Review radiation dose limits for a fetus based on gestation age
Present multiple clinical scenarios in which the radiologist must make recommendations to clinical colleagues, including:
- Current recommendations on how to image common non-obstetric conditions, such as pulmonary embolism, acute appendicitis, urolithiasis and trauma
- Potential fetal and maternal complications requiring patient informed consent

OBE190
What a Mesh! A Radiologist’s Guide to Imaging of Surgical Repair for Pelvic Floor Dysfunction

Education Exhibits
Location: OB Community, Learning Center
Certificate of Merit
Selected for RadioGraphics

Participants
Gaurav Khatri MD (Presenter): Nothing to Disclose
Beth A. Furey MD, BEng: Nothing to Disclose
April Alexander Bailey MD: Nothing to Disclose
Maude Carmel MD: Nothing to Disclose
Melissa Foreman: Nothing to Disclose
Philippe E. Zimmern MD: Nothing to Disclose
Cecelia Brewington MD: Research Grant, Toshiba Corporation
Ivan Pedrosa MD: Shareholder, Humana Inc

TEACHING POINTS
1. Review surgical approaches for stress urinary incontinence and pelvic organ prolapse. 2. Describe female pelvic anatomy with original illustrations to emphasize surgical landmarks utilized to identify mesh. 3. Discuss imaging appearance of various types of surgical mesh, correlating with MRI and US. 4. Review imaging appearance of surgical mesh complications, including infection and mesh failure.

TABLE OF CONTENTS/OUTLINE
OBE191

Why MRI? Evaluating Acute Abdominal and Pelvic Pain During Pregnancy

Education Exhibits
Location: OB Community, Learning Center

Participants
Matthew C. McDermott MD (Presenter): Nothing to Disclose
Courtney Ann Coursey Moreno MD: Nothing to Disclose
Kiran Kumar Maddu MBBS: Nothing to Disclose
Juan Camilo Camacho: Nothing to Disclose
Bobby Thomas Kalb MD: Nothing to Disclose
Pardeep Kumar Mittal MD: Nothing to Disclose

TEACHING POINTS

1. Causes of abdominopelvic pain during pregnancy are often the same as those in non-pregnant patients, although the presentation or findings may be altered by pregnancy
2. Other conditions are unique to pregnancy and the peripartum period

TABLE OF CONTENTS/OUTLINE

A. Indications and protocol
B. Causes of abdominopelvic pain not unique to pregnancy
   - Pelvic infection
   - Pelvic masses
   - Gastrointestinal disease including inflammatory bowel disease, appendicitis, bowel obstruction
   - Urinary tract disease
   - Vascular disease
   - Other diseases including biliary colic, pancreatitis and adrenal hemorrhage
C. Conditions unique to pregnancy
   - Placental abnormalities
   - Uterine and cervical abnormalities, including developmental abnormalities that may complicate pregnancy
D. Peripartum considerations
   - Endometritis and retained products of conception
   - C-section complications
   - Ovarian vein thrombosis
E. Summary: MRI is superior to CT and US in evaluating many causes of abdominopelvic pain during pregnancy due to excellent soft tissue contrast, multiplanar capabilities and safety, despite the necessity to withhold gadolinium during pregnancy

PDE001-b

Top 10 Common Pediatric Musculoskeletal Imaging Measurements: What the Orthopedic Surgeons Wants to Know

Education Exhibits
Location: S101B

Participants
Mohamed A. Aggag MD (Presenter): Nothing to Disclose
Kelly Elizabeth Ainsworth MD: Nothing to Disclose
Heba Takrouni MBBS: Nothing to Disclose
Devine Peterson: Nothing to Disclose

TEACHING POINTS

* To familiarize the radiologist with the top musculoskeletal measurements of the lower limbs and the clinical relevance of each measurement and diseases related to abnormal measurements.
* Radiologist will be able to perform and interpret each measurement, understand the normal and abnormal values, and have a working knowledge of the clinical relevance from an orthopedic perspective.

TABLE OF CONTENTS/OUTLINE

Table of content:
1. Aim of the exhibit.
2. Top 10 common lower limb measurements in pediatric MSK imaging

Pelvis and hips:
- Alpha and beta angles.
- Acetabular index.
- Femoral neck shaft.
..
Knee
- Tibial tuberosity trochlear groove distance.
- Patella alta and Patella baja.
- Tibio-femoral angle.

Leg/Foot
- Metaphyseal-diaphyseal angle.
- Talocalcaneal angle.
- Scanogram.
- Calcaneal pitch.

3. References.

PDE002-b
Pediatric Orthopedic Hardware: Correlating Photographs and Radiographic Images to Allow for Appropriate Identification

Education Exhibits
Location: S101B

Participants
- Aman Jivraj MD (Presenter): Nothing to Disclose
- Ying Tang MD : Nothing to Disclose
- Ron El-Hawary MD : Nothing to Disclose
- Naeem Khan : Nothing to Disclose

TEACHING POINTS
1. To review commonly used pediatric orthopedic hardware, along with the correct nomenclature and common uses. 2. To correlate photographs of pediatric orthopedic hardware with their radiographic appearance, to allow for correct identification.

TABLE OF CONTENTS/OUTLINE

PDE004-b
Radiographic Appearance of Contemporary Pediatric Cardiac Assist Devices

Education Exhibits
Location: S101B

Participants
- William Jefferson Rieter MD, PhD (Presenter): Nothing to Disclose
- Justin J Elhoff MD : Nothing to Disclose
- Paul Gene Thacker MD : Nothing to Disclose
- Jeanne Griffin Hill MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: to review the utility of pediatric cardiac assist devices to describe the types of contemporary pediatric cardiac assist devices to summarize the radiologic appearance of cardiac assist devices so imagers may recognize, and accurately describe the positioning of associated cannulae. to provide multiple radiographic examples of pediatric cardiac assist devices, including variations in cannulae appearance.

TABLE OF CONTENTS/OUTLINE
Utility of cardiac assist devices Types of devices Review of radiographic findings and cannulae positioning Radiographic examples. Berlin left ventricular assist device Berlin biventricular assist devices PediMag CentriMag Heartware

PDE006-b
The Challenging Inguinal Canal Evaluation in Neonates and Children: An Update of Differential Diagnosis on Gray-scale and Color Doppler Sonography Assessment

Education Exhibits
Location: S101B

Participants
- Yoshino Tamaki Sameshima MD : Nothing to Disclose
- Mauricio Yamanari : Nothing to Disclose
- Daniel Calich Luz MD (Presenter): Nothing to Disclose
- Mariana Athaniel Silva Rodrigues MD : Nothing to Disclose
- Miguel Jose Francisco Neto MD : Nothing to Disclose
- Marcelo Buarque Gusmao Funari MD : Nothing to Disclose
- Erika Tae Koshimura : Nothing to Disclose

TEACHING POINTS
1. This paper presents an update of the most common pathologies that may affect the inguinal canal in neonates and infants, especially those related to the closure failure of the processus vaginalis, using ultrasonography as the imaging modality of choice. 2. Depending on the degree of processus vaginalis obliteration failure, different conditions may develop, such as non-communicating and communicating hydroceles, funicular hydrocele, spermatic cord cyst, cyst of the canal of Nuck,
cryptorchidism and indirect inguinal hernia, conditions that will be shown in our presentation. 3. Despite being a less common in children, we also selected a case of direct inguinal hernia. 4. In some cases, early and accurate diagnosis is urgent to avoid possible complications, for example, incarcerated or strangulated inguinal hernia, or ovary herniation into the inguinal canal.

TABLE OF CONTENTS/OUTLINE
- Introduction
- Normal anatomy of the inguinal canal
- Embriology of the inguinal canal
- Inguinal Hernia a. Indirect inguinal hernia b. Direct inguinal hernia
- Cryptorchidism

PDE007-b
Lonely Madness: Pediatric Pelvic Masses Occurring in Association with a Congenital Solitary Kidney

Education Exhibits
Location: S101B

Participants
- Patricia Trinidad Chang MD (Presenter): Nothing to Disclose
- Rama S. Ayyala MD: Nothing to Disclose
- Jeanne S. Chow MD: Nothing to Disclose

TEACHING POINTS
- 1. To review the abnormal embryologic development of the genitourinary system, which can result in unilateral renal agenesis and anomalies affecting other mesonephric duct and mullerian duct derivatives.
- 2. To discuss multiple cases of associated genital anomalies that can occur with a congenital solitary kidney, presenting as a pelvic mass.

TABLE OF CONTENTS/OUTLINE
- Introduction
- Embryology of renal agenesis and associated genital anomalies
- Review of imaging findings
- Ultrasound
- Cross-sectional imaging
- Sample cases
- Summary

PDE008-b
Intracranial Calcifications in the Pediatric Age Group: A Radiographic Review

Education Exhibits
Location: S101B

Participants
- Jonathan K. Vincent MD (Presenter): Nothing to Disclose
- Anthony Dinizio MD: Nothing to Disclose
- Thierry Huisman MD: Nothing to Disclose
- Joshua Paul Nickerson MD: Nothing to Disclose

TEACHING POINTS
- 1. Review both common and rare causes of intracranial calcification in the pediatric age group.
- 2. Provide a framework for creating an accurate differential diagnosis when intracranial calcifications are encountered in clinical practice.

TABLE OF CONTENTS/OUTLINE
- Appearance of intracranial calcification on cross-sectional imaging
- Causes of intracranial calcifications in pediatrics
  - Neoplastic
  - Infectious
  - Vascular
  - Iatrogenic
  - Metabolic
  - Genetic
  - Phakomatoses
- Case examples
- Formulating a differential diagnosis
- Summary

PDE009-b
Imaging Pediatric Sub-mental Space Lesions

Education Exhibits
Location: S101B

Participants
- Subramanian Subramanian MD (Presenter): Nothing to Disclose
- Saurabh Guleria MD: Nothing to Disclose
- Mia S. Kelly BA: Nothing to Disclose
- Hervey D. Segall MD: Nothing to Disclose
- Mohit Maheshwari MD: Nothing to Disclose
- Teresa Gross Kelly MD: Nothing to Disclose

TEACHING POINTS
- 1. Familiarize radiologist with normal anatomy and spectrum of lesions that can arise in submental space in pediatric patients.
- 2. Facilitate accurate diagnosis of submental space pathologies and thereby improve management of lesions in this area.
Facilitate accurate diagnosis of submental space pathologies and thereby improve management of lesions in this area.

**TABLE OF CONTENTS/OUTLINE**

Submental space pathologies can be categorized as: (1) Congenital lesions: Dermoid / epidermoid cysts, vascular malformations, thyroglossal duct cysts, etc (2) Infectious/Inflammatory lesions: Abscess or inflammatory lymphadenopathy (3) Neoplasm: Lymphoma, hemangiomas, teratomas etc. Reactive lymphadenopathy is the most common cause of submental swelling. Submental abscesses can develop secondarily to either extension of infection from lower incisor teeth or from an infected lymph node. Thyroglossal cysts are most often located posteriorly in submental space close to hyoid bone. Epidermoid cysts commonly show restricted diffusion while dermoid cysts and teratoma may show fat density and calcification. Vascular malformation usually involve multiple neck spaces. Ultrasonogram is the primary imaging modality for initial evaluation of submental lesions. CT is useful in setting of trauma or acute submental swelling. MRI is useful to further characterize the lesion and relationship of the lesion to mylohyoid muscle for presurgical planning evaluation (transoral or submental surgical approach).

**PDE010-b**

**Whole-body MRI and Possible Role of PET/MRI in Pediatric Oncology**

_Education Exhibits_

_Location: S101B_

**Participants**

- Sergios Gatidis MD : Nothing to Disclose
- Ilias Tsiflikas MD : Nothing to Disclose
- Juergen F. Schaefer MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

Whole body MRI plays an increasingly important role in the primary diagnosis and follow-up of pediatric patients with oncologic disorders. High anatomical resolution, excellent soft tissue contrast and functional imaging techniques enable accurate local staging of primary tumors as well as sensitive detection of distant metastases. However, image quality and patient compliance depend on the chosen protocol, which should be composed carefully according to the clinical question. Recently, combined simultaneous PET/MRI was introduced adding metabolic information for tumor characterization. Patient preparation and imaging protocols are of higher complexity due to tracer injection and parallel acquisition of PET and MR data. Furthermore, radiation doses should be kept to a minimum. This educational poster shall give an overview over clinical indications and technical aspects of pediatric oncologic whole body MRI and PET/MRI with respect to patient preparation, imaging protocols and specifics in image analysis.

**TABLE OF CONTENTS/OUTLINE**

- Clinical indications for whole body MR imaging in pediatric oncology - Differential indications for MRI and PET/MRI - Patient preparation - Choice of tracer in PET, choice of contrast agents for MRI - Composition of imaging protocols with regards to diagnostic and time efficiency - Data analysis and interpretation

**PDE011-b**

**F18-FDG PET CT Characterization and Histopathological Correlation of Non –CNS (Central Nervous System) Neoplasms in the Pediatric Population**

_Education Exhibits_

_Location: S101B_

**Participants**

- Sajeev Rajan Ezhapilli MBBS (Presenter): Nothing to Disclose
- Mary McGrath MD : Nothing to Disclose
- Michele Lisi MD : Nothing to Disclose
- Andrij Roman Wotowycz MD : Nothing to Disclose
- Nelli Lakis MD : Nothing to Disclose
- David H.I. Feiglin MD : Nothing to Disclose

**TEACHING POINTS**

F18-FDG PET CT allows detection of non CNS malignant tumors in the pediatric population with great accuracy and helps in initial staging and treatment planning of tumors. F18-FDG PET-CT outscores conventional imaging in detection of residual/recurrent tumor as well as lymph node and distant metastases by its ability to whole body at a single time to detect viable tumor , thus determining treatment response.

**TABLE OF CONTENTS/OUTLINE**

- Clinical indications for whole body PET imaging in pediatric oncology - Differential indications for MRI and PET/MRI - Patient preparation - Choice of tracer in PET, choice of contrast agents for MRI - Composition of imaging protocols with regards to diagnostic and time efficiency - Data analysis and interpretation

**PDE013-b**

**Sacrococcygeal Teratomas in Newborns: Let’s Talk Details**

_Education Exhibits_

_Location: S101B_

- Cum Laude
- Selected for RadioGraphics
TEACHING POINTS

Sacrococcygeal teratomas are relatively common in the newborn infants detected by the tail mass itself or by prenatal screening ultrasound. The diagnosis is not difficult in many cases; however, there should be additional information on imaging studies in order to manage those infants properly. Details include classification, histology, complications such as rupture or bleeding, mass effects on the adjacent structures causing hydronephrosis, bowel obstruction, or even hip dislocations. When the tumor is too big for a baby to be delivered safely, prenatal radiofrequency ablation could be one of treatment options.

TABLE OF CONTENTS/OUTLINE

1. Principle of diagnostic imaging of sacrococcygeal teratoma Imaging features according to morphologic classification and pathologic types of sacrococcygeal teratoma 2. Effects on Adjacent Structures on initial presentation Bilateral or unilateral hip dislocation Obstructive hydronephrosis and hydroureter Inguinal hernia and hydrocele Hydrocolpos and colonic distension Rupture Malignant transformation Other associated anomaly 3. Clinical Management Prenatal radiofrequency ablation Postnatal surgical excision Preoperative embolization

PDE014-b

Neuroimaging of Cerebral Edema in Pediatric: A Pictorial Review

Education Exhibits

Location: S101B

Participants

Faizah Mohd Zaki MD (Presenter): Nothing to Disclose
Prakash Muthusami MBBS, MD : Nothing to Disclose
Ramy Ashmawy MBBCh, MSc : Nothing to Disclose
Helen Maree Branson MBBS, FRCR : Nothing to Disclose

TEACHING POINTS

At the end of this exhibit, viewers will be able to: 1. understand the different types/ classification of cerebral edema based on basic pathology. 2. know the different causes of cerebral edema which are often seen and more unique in children. 3. correlate the imaging characteristics for each type of cerebral edema in children on CT, conventional MRI as well as advanced MRI technique such as DWI, MRS and DTI.

TABLE OF CONTENTS/OUTLINE

1. Classification of cerebral edema and correlation with basic pathology. 2. Causes of cerebral edema to be discussed that are more common in children than adult include toxic-metabolic derangement, infection/inflammation, vascular, neoplastic, traumatic amongst others. 3. Certain neuroimaging features in the diagnosis of early and complication of cerebral edema in children. 4. Imaging characteristics of cerebral edema of CT and MRI findings including advanced MRI sequences such as diffusion weighted, MR spectroscopy and diffusion tensor imaging.

PDE100

Atypical Vascular Rings of the Aortic Arch: Subtle Findings on CT and MRI That Lead to Definitive Diagnoses and Guide Surgical Management

Education Exhibits

Location: S101B

Participants

David W. Swenson MD (Presenter): Nothing to Disclose
Jamie Frost DO : Nothing to Disclose
Laureen Marie Sena MD : Nothing to Disclose

TEACHING POINTS

Purpose: 1. Review embryology of aortic arch development. 2. Draw on examples from 137 patients over 14 years with aortic arch anomalies to highlight CT and MRI findings that will accurately classify aortic arch anomalies and vascular ring status. 3. Focus on subtle but reproducible CT and MRI findings that aid understanding atypical vascular rings and guide surgical management. Particular attention will be paid to the location and significance of Kommerell’s diverticulum, and to both direct and indirect signs of the presence of ligaments that complete atypical rings.

TABLE OF CONTENTS/OUTLINE

1. Edward’s Model of Arch Development 2. Imaging Examples of typical vascular rings - E.g. Double aortic arch, and right aortic arch with aberrant left subclavian 3. Focus on CT and MRI findings that confirm atypical aortic arch anatomy and vascular ring status - Double aortic arch with atretic left arch segment - Right aortic arch with aberrant left subclavian artery - Circumflex aortic arch 4. Signs of ligamentous tethering - Diverticulum of Kommerell - Mass effect and location of ductal ligament - Displacement, angulation, and/or tethering of vessels - Direct visualization of the tethering ligament on high resolution imaging - Tracheal and/or bronchial narrowing

PDE101

Breathtaking Views: Imaging Acute Airway Obstruction in Children

Education Exhibits

Location: S101B
Participants

Kathryn Darras MD (Presenter): Nothing to Disclose
Lila Yewchuk: Nothing to Disclose

TEACHING POINTS

1. To better understand normal and abnormal airway anatomy. 2. To provide an approach for evaluating acute airway obstruction in the pediatric population. 3. To discuss the pathogenesis, imaging findings, differential diagnosis and management of acute airway obstruction in children.

TABLE OF CONTENTS/OUTLINE

1. Review of upper and lower airway anatomy in children 1.1. Illustrations 1.2. Radiographs 2. Approach to airway obstruction 2.1. Upper airway 2.1.1. Acute 2.1.1.1. Croup 2.1.1.2. Epiglottitis 2.1.1.3. Retropharyngeal abscess 2.1.1.4. Foreign body 2.1.2. Chronic 2.1.2.1. Inflammatory (tonsilar enlargement) 2.1.2.2. Congenital (choanal atresia) 2.1.2.3. Neoplasms (RMS and SG hemangioma) 2.2. Lower airway 2.2.1. Acute 2.2.1.1. Asthma / reactive airway disease 2.2.1.2. Bronchiolitis 2.2.1.3. LRTI 2.2.2. Chronic 2.2.2.1. Intrinsic 2.2.2.1.1. Bronchial foreign body 2.2.2.1.2. Tracheomalacia 2.2.2.1.3. Intrinsic masses 2.2.2.2. Extrinsic 2.2.2.2.1. Vascular rings 2.2.2.2.2. Extrinsic masses 3. Pearls and pitfalls in imaging the pediatric airway

PDE102

Chest Radiography Findings in Congenital Heart Disease

Education Exhibits

Location: S101B

Participants

Naim Ceylan MD, PhD (Presenter): Nothing to Disclose
Selen Bayraktaroglu: Nothing to Disclose
Petek Bayindir MD: Nothing to Disclose
Recep Savas MD: Nothing to Disclose

TEACHING POINTS

1. To classify congenital heart disease on the basis of pulmonary vascularity 2. To demonstrate characteristic radiographic findings of the congenital heart diseases

TABLE OF CONTENTS/OUTLINE

Classification of congenital heart disease Review of chest radiography findings Sample cases Summary

PDE103

Congenital Anomalies of the Aorta and Their Evaluation by Last Generation CT in Pediatric Patients

Education Exhibits

Location: S101B

Participants

Valeria Piagneri MD (Presenter): Nothing to Disclose
Marta Zangani: Nothing to Disclose
Daniele Della Latta PhD: Nothing to Disclose
Carla Susini: Nothing to Disclose
Alberto Clemente: Nothing to Disclose
Tommaso Trapuzzano: Nothing to Disclose
Dante Chiappino MD: Nothing to Disclose

TEACHING POINTS

- Congenital anomalies of the aorta are caused by an embryogenetic disorder and have a low incidence in general population (2/1,000 live births). They can be classified in: obstructions of the left ventricular outflow (subvalvular stenosis, valvular malformation, supravalvular stenosis like as in Williams syndrome), vascular rings (duble aortic arch, rightsided aortic arch), aortic coarctation, interrupted aortic arch and patent ductus arteriosus (see fig.from 1 to 4).
- Congenital anomalies of the aorta are often symptomatic, especially when associated with other cardio-vascular disorders, and difficult to study in new born or pediatric patients with hemodynamic and respiratory instability.
- Last generation CT (in our cases 320 slides CT) represete nowadays a non invasive technique that allows rapid imaging acquisitions, decreasing the sedation time, with a relatively good evaluation of vascular anatomy thanks to post-processing reconstructions of the angiographic images. The disadvantage of x-ray exposure can be reduced using low dose CT protocols and with modulation of radiation beam (table 1).

TABLE OF CONTENTS/OUTLINE

- A review of congenital aortic anomalies;
- Advantages of last generation CT in pediatric patients: rapid acquisition, good evaluation of vascular anatomy by post-processing reconstructions; modulations of radiation dose.

PDE104

Cystic and Cavitary Lung Diseases in Children: Radiologic Findings with Pathologic Correlation

Education Exhibits

Location: S101B
Participants
Mondher Golli MD (Presenter): Nothing to Disclose
said Hidouri: Nothing to Disclose
Mezri Maatouk MD: Nothing to Disclose
Walid Mnar MD: Nothing to Disclose
Ahmed Zrig MD: Nothing to Disclose
Nedal Jazaerli: Nothing to Disclose
Badii Hmida: Nothing to Disclose
Abdellatif Nouri: Nothing to Disclose
AbdelFatteh Zakhama MD: Nothing to Disclose

TEACHING POINTS
To provide an overview of the diseases most commonly associated with Pulmonary Cystic and Cavitary Diseases (PCCD) in children. To review radiologic signs and emphasize the value of Chest CT with pathologic correlation of the PCCD

TABLE OF CONTENTS/OUTLINE
BACKGROUND
CONGENITAL LUNG DISEASES
Congenital Lobar Emphysema
Congenital Cystic Adenomatoid Malformation
Bronchogenic Cyst
Pulmonary Sequestration
AIRWAY DISEASES
Congenital Bronchial Atresia
Bronchiectasis
Cystic Fibrosis
Interstitial emphysema
INFECTIOUS DISEASES
Bacterial Infections
Hydatidosis
Fungal Infections
PULMONARY INFARCTION
PNEUMATOCHELES
PULMONARY PSEUDOCYST
CONCLUSION: Low-dose MDCT of the chest is helpful in the diagnosis and follow-up of PCCD. Identification of pathologic entities correlating with radiologic findings and clinical courses is important in the evaluation of PCCD in order to avoid unnecessary surgical procedures

PDE105
Dynamic Volumetric Computed Tomography for Pediatric Airway Assessment: How to Get Adequate Images with Reduced Radiation Dose

Education Exhibits
Location: S101B
Cum Laude

Participants
Jyuichi Mori (Presenter): Nothing to Disclose
Yasuhiro Ogawa RT: Nothing to Disclose
Kiyoko Tateishi: Nothing to Disclose
Atsuko Fujikawa MD: Nothing to Disclose
Brandon D. Lohman: Nothing to Disclose
Junichi Matsumoto MD, PhD: Nothing to Disclose
Hideki Shima: Nothing to Disclose
Yasuyuki Kobayashi MD, PhD: Nothing to Disclose
Tatsuo Yoshikawa: Nothing to Disclose
Yasuo Nakajima MD: Nothing to Disclose

TEACHING POINTS
Dynamic volumetric CT with wide-detector is becoming alternative examination to bronchoscopy in cases with persistent stridor or wheezing in children. The advantages of dynamic volumetric CT are rapid short examination time, no requirement of deep sedation and intubation, less need for patient cooperation, and extra-airway structure evaluation. It is essential to get adequate image quality at reduced radiation dose in dynamic volumetric CT. The teaching points of this presentation are; 1. The optimal scanning protocol of dynamic volume scan with proper radiation dose for each patient 2. Techniques to reduce varius artifacts 3. Four-dimensional reconstruction from volumetric CT data.

TABLE OF CONTENTS/OUTLINE
1. Principles of dynamic volume scan 2. How to get adequate image quality at the optimal reduced radiation dose for each patient 3. Techniques for reducing various artifacts 4. How to reconstruct 4D-CT images

PDE106
Endobronchial Tumors and Tumorlike Lesions in Children

Education Exhibits
Location: S101B

Participants
Ana Coma RT: Nothing to Disclose
Amparo Castellote MD (Presenter): Nothing to Disclose
Ignacio Delgado MD: Nothing to Disclose
Joan Carles Ferreres: Nothing to Disclose
Gabi Guillen: Nothing to Disclose
Pilar Garcia-Pensa: Nothing to Disclose
TEACHING POINTS

1.- To review clinical aspects, imaging features and pathologic findings of endobronchial tumors and tumorlike lesions in children. 2.- To discuss the differential diagnosis. 3.- To highlight the imaging clues that enable prompt diagnosis and treatment.

TABLE OF CONTENTS/OUTLINE

Endobronchial lesions are rarely seen in children and may pose a diagnostic challenge. The differential diagnosis includes foreign bodies, mucus plug, infections and neoplasms. Foreign body aspiration is the most frequent pediatric cause of airway obstruction in children. In some cases, however, the classical triad of choking, coughing and wheezing is absent and many children present recurrent pneumonia, atelectasis and other complication. Most endobronchial tumors in children are malignant. Imaging plays a key role in the diagnosis. Diagnostic methods include radiography, MDCT with 2D and 3D reconstructed images, virtual bronchoscopy and MR. We will show a review of endobronchial lesions seen in our hospital in the last 15 years.

Our series includes: Endobronchial tumors Malignant: Carcinoid Mucoepidermoid carcinoma Benign: Papilloma Hamartoma Leiomyoma Teratoma Hemangioma Tumorlike lesions Foreign body Mucus plug Infectious disease (bronchial tuberculosis, fungal)

PDE107

How to Assess Visceroatrial Situs

Education Exhibits
Location: S101B

Participants

Guillaume Chassagnon (Presenter): Nothing to Disclose
Mathilde Meot: Nothing to Disclose
Elodie Carpentier: Nothing to Disclose
Dominique Sirinelli MD: Nothing to Disclose

TEACHING POINTS

- Situs solitus refers to normal viscerocentral situs, situs inversus is a fully inverted viscerocentral situs, and situs ambiguous is defined as a situs that does not correspond to either of the two previous categories. - Visceroatrial situs depends on the abdominal, the pulmonary and the atrial situs. - Abdominal situs is only dictated by the position of the liver, the stomach and the spleen. - The position of the heart and the great vessels should not be considered during assessment of viscerocentral situs. - Several conditions are associated with situs inversus and viscerocentral isomerism, including congenital heart diseases and primary ciliary dyskinesia. - Visceroatrial situs abnormalities should be systematically sought in cases of dextrocardia, asplenia, polysplenia, primary ciliary dyskinesia, atrioventricular septal defects and in case of anomalous pulmonary/systemic venous return.

TABLE OF CONTENTS/OUTLINE

- Definition of viscerocentral situs.
- How to assess abdominal situs.
- How to assess pulmonary situs.
- How to assess atrial situs.
- Assessment of viscerocentral situs: practical exercises supported by illustrated cases of viscerocentral situs abnormalities:
  - Situs inversus
  - Right isomerism
  - Left isomerism

PDE108

Lesion in Thymus: Imaging and Differential Considerations in Pediatric Patients

Education Exhibits
Location: S101B

Participants

Ayda A. Youssef MD (Presenter): Nothing to Disclose
Yahia Labib: Nothing to Disclose
Amal M. Refaat MD: Nothing to Disclose
Madiha Elwakil: Nothing to Disclose
Maged EL-Shafiey: Nothing to Disclose
Tarek Rafaat: Nothing to Disclose

TEACHING POINTS

The thymus is an important lymphatic organ; plays an essential vital role in the development and maturation of the immune system during childhood. • Our Objectives in this exhibit are :- - To review the normal anatomy and embryology of the thymus gland. - To enumerate the differential diagnosis of the focal and diffuse lesions of thymus gland in the pediatric patient. - To illustrate the imaging features of such lesions and increase awareness and recognition of uncommon lesions.

TABLE OF CONTENTS/OUTLINE

- 1. Embryological development of the thymus gland : 2. Normal anatomy of the thymus gland throughout the different age stages of life: - 3. Imaging features of the different disorders affecting the thymus at the pediatric age group: A. congenital lesions as:- Congenital absence of the thymus ( Di-Goarge syndrome.) B: Benign lesions including:- - Thymic cyst, - Thymilipoma, - Rebound thymic hyperplasia - Ectopic parathyroid adenoma within the thymus. C: Malignant thymic lesions including:- - Germ cell tumor, - Thymic lymphoma. - Deposits within the thymus. In conclusion: - Lesions of the thymus, both diffuse and focal, in a pediatric patient encompass wide range of differential diagnosis; Thus the proper orientation and accurate diagnosis help in proper treatment of these patients.
Participants

Lauren Ashley May MD : Nothing to Disclose
Prakash Mohan Masand MD : Nothing to Disclose
Matthew R. Minor MD (Presenter): Nothing to Disclose

TEACHING POINTS

Pediatric vascular imaging is particularly challenging secondary to the anatomic size and unique physiology of pediatric patients. Current contrast enhanced MR angiography techniques utilizing conventional gadolinium based contrast agents are limited by the need to acquire images relatively quickly during the first pass of contrast material through the vessels of interest. This is to achieve adequate enhancement of vascular structures, for diagnosis, and post-processing. However Gadofosveset trisodium (Ablavar®), a blood pool intravascular contrast agent, has proven to be excellent in this regard. This agent allows first-pass and equilibrium phase imaging of the arterial and venous structures. This exhibit reviews the added benefit of using blood pool contrast in the evaluation of various vascular anomalies, both congenital and acquired.

TABLE OF CONTENTS/OUTLINE

1) Physiology and Pharmacology of Gadofosveset Trisodium a) Indications and Usage b) Adverse Reactions 2) Suggested MR Imaging Protocol a) First pass and Equilibrium Phase Imaging (Steady state imaging) 3) Applications a) Congenital Heart Disease Imaging, including evaluation of Fontan baffle (post Norwood procedure) b) Congenital Portocaval Shunts c) Paget-Schroetter Syndrome d) Portal Hypertension e) Klippel-Trenaunay Syndrome f) Vascular Malformation imaging

PDE112

New Uses for Thoracic Ultrasound in the Neonatal Intensive Care Unit: Old Dog, New Tricks

Participants

David T. Saul MD (Presenter): Nothing to Disclose
Samuel Ajayi MD : Nothing to Disclose
David Schutzman MD : Nothing to Disclose
Mindy Meislich Horrow MD : Spouse, Director, Merck & Co, Inc

TEACHING POINTS

1. Neonates, especially premature, are especially sensitive to ionizing radiation. 2. Small size, inability to breath-hold for chest radiographs (CXR), and lack of skeletal ossification make neonates ideal for thoracic ultrasound (US) with high-frequency probes. 3. High-resolution anatomical detail of the neonatal chest is easily displayed in real time. 4. In addition to established uses (e.g., pleural effusion), US has utility for evaluation during and after placement of peripherally inserted central venous catheters (PICC), umbilical arterial and venous catheters (UA&C), nasogastric tubes (NGT), and endotracheal tubes (ETT)

TABLE OF CONTENTS/OUTLINE


PDE113

Pediatric Coronary CT Angiography

Participants

Elizabeth George MD (Presenter): Nothing to Disclose
Kanako Kunishima Kumamaru MD, PhD : Nothing to Disclose
Jane Newburger : Nothing to Disclose
Frank John Rybicki MD, PhD : Research Grant, Toshiba Corporation
Ruth M. Dunne MBBC : Nothing to Disclose
Ron Blankstein MD : Nothing to Disclose
Prashant Nagpal MD : Nothing to Disclose
Ayaz Aghayev MD : Nothing to Disclose

TEACHING POINTS

1. Radiologists should be familiar with the emerging role of CT angiography in coronary artery imaging in the pediatric population. 2. The indications, protocol, and findings are distinct from the adult population. 3. Comparison with other imaging modalities and clinical implications are significant to assess the risk-benefit ratio and to select the appropriate imaging modality of choice.

TABLE OF CONTENTS/OUTLINE

PDE114

Pre and Postnatal Images of Congenital Pulmonary Airway Malformation: Ultrasonography, Computed Tomography and Magnetic Resonance Imaging

Education Exhibits

Location: S101B

Participants
Bianca Guedes Ribeiro MD (Presenter): Nothing to Disclose
Tatiana M. Fazecas MD: Nothing to Disclose
Renata Amaral Nogueira MD: Nothing to Disclose
Taisa Davaus Gasparetto MD, PhD: Nothing to Disclose
Heron Werner MD: Nothing to Disclose
Pedro Daltro MD: Nothing to Disclose
Vitor Moreira Sardenberg MD: Nothing to Disclose

TEACHING POINTS

The CPAMs has been detected more frequently in routine prenatal ultrasound. They are a heterogeneous group of pulmonary cystic lesions that result from an abnormality in the development of airways. This study aims to review the most recent classification of CPAMs and discuss the imaging features of congenital malformations of the respiratory tract in different imaging methods: fetal US and MRI and postnatal CT. This study includes patients with CPAMs of our archive images of prenatal US, fetal MRI and postnatal CT. These images were analyzed retrospectively and were correlated with clinical features and the postnatal development of the disease. With advances in fetal ultrasound and MRI, chest abnormalities are increasingly being diagnosed earlier, allowing to anticipate treatment and appropriate management of patients. The postnatal evaluation of CPAMs in CT allows correct classification, thus impacting the treatment and improving the prognosis.

TABLE OF CONTENTS/OUTLINE

1- Spectrum of Congenital Lung Lesions 2- Pathophysiology of CPAMs 3- Stocker newer classification 4- Discussion and illustration of many cases of CPAMs from our teaching file, on the obstetric US, fetal MRI and post natal CT 5- CPAMs and malignity - Pleuropulmonary Blastoma 6- Discussion and Conclusions

PDE115

Puzzling Hearts: Magnetic Resonance Imaging in Cardiac Malpositions and Heterotaxy Syndromes

Education Exhibits

Location: S101B

Participants
Carlos Marin MD (Presenter): Nothing to Disclose
Angel Lancharro MD: Nothing to Disclose
Yolanda Ruiz MD: Nothing to Disclose
Alejandro Rodriguez MD: Nothing to Disclose
Enrique Maroto: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:
1. To review the definitions of cardiac position, visceroatrial situs, heterotaxy and isomerism.
2. To describe the segmental approach to the Cardiac Magnetic Resonance (CMR) of cardiac malpositions and heterotaxy syndromes.
3. To discuss the associations between situs abnormalities and venous, ventricular, conotruncal and arterial anomalies.
4. To show the CMR protocol for a comprehensive evaluation of heterotaxy syndromes.

TABLE OF CONTENTS/OUTLINE

Cardiac malpositions are estimated to occur in 0.1/1000 live births, and heterotaxy syndromes affect 0.8% of patients with congenital heart disease. A comprehensive imaging examination is mandatory to guide the appropriate medical management and surgical correction. Systematic segmental approach must be used, including abdominal viscera, lungs, atria, ventricles and great vessels. Certain associations exist between isomerisms and cardiac segment malformations, albeit a great diversity of combinations has been reported. Treatment choices for these patients vary from medical follow up to complex surgical procedures, including systemic-to-pulmonary palliative surgery, such as Kawashima or Fontan procedure. To accomplish a comprehensive MR examination, morphologic and functional data should be included in the radiology report.

PDE116

Radiologic Approach to Respiratory Distress in Infant and Children: A Case Based Review

Education Exhibits

Location: S101B

Participants
Irene Maria Olivia Borzani MD (Presenter): Nothing to Disclose
Mauro Campoleoni BS: Nothing to Disclose
Pietro R. Blondetti MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To review clinical presentation of the common and uncommon causes of severe respiratory symptom in children 2. To discuss the utility of radiograph, US, CT and MRI in the assessment of respiratory distress in children and in narrowing the differential diagnoses 3. To correlate clinical data and multimodality imaging findings to formulate the more appropriate diagnosis
TABLE OF CONTENTS/OUTLINE
This exhibit will be displayed in a case-based format containing: • Introduction • Clinical presentation of common and uncommon disease causing respiratory distress • Comparison of pearls and pitfalls of radiograph, US, CT and MRI in investigating the pathology with particular interest in radiation protection • Presentation of multiple cases, highlighting radiological findings and comparing different imaging modalities (radiograph, US, CT, MRI) • Representative cases will include pleural empyema, pneumothorax, pulmonary AVM, broncho-esophageal fistula, pulmonary tuberculosis, airways obstruction (foreign body aspiration, retro-parapharyngeal abscess, vascular rings, endobronchial tumor), among others

PDE117
Role of Multidetector CT Angiography (MDCTA) in the Diagnosis of Congenital and Adquired Aortic Pathology in Pediatric Patients

Education Exhibits
Location: S101B

Participants
Maria Jose Martinez-Sapina Llanas MD : Nothing to Disclose
Alba Rois Siso MD (Presenter): Nothing to Disclose
Jorge Rodriguez Antuna MD : Nothing to Disclose
Pablo Fernandez Armendariz MBBS : Nothing to Disclose
Concepcion Crespo Garcia : Nothing to Disclose
Fernando Rueda Nunez MD : Nothing to Disclose

TEACHING POINTS
To describe the semiology of different aortic pathologies in children and their findings at MDCT-Angiography. To know the indications of this technique and discuss their advantages and disadvantages in the evaluation of the aorta anomalies.

TABLE OF CONTENTS/OUTLINE
Aortic pathology in children is usually a congenital condition, and it can be an isolated anomaly or associated with Complex Congenital Heart Disease (CHD). Aortic arch anomalies with all its variants, aberrant vessel anatomy, aortic coarctation, seudocoartation and aortic interruption are the most common isolated abnormalities. Acquired aortic pathology is uncommon in children, and trauma, infections, inflammatory and connective diseases can affect the aorta. The echocardiography is diagnostic for aortic valve, but it is limited to assess aortic pathology. MR angiography is a good technique, but often is not available, requires anesthesia and occasionally is contraindicated. MDCTA with axial and 2D and 3D reformatted images depicts the aorta non-invasively, fast, and in exquisit detail, establishing the primary diagnosis. MDCTA also can be used in patients with known or suspected CHD for which further imaging is needed to evaluate aortic arch and great vessels. In the postoperative of CHD, MDCTA facilitates fast and comprehensive assessment of cardiovascular structures.

PDE119
Third Generation Dual Source Scanner for Pediatric Thoracic and Cardiac CT: Technological Improvements and Challenges in Robust Protocol Design

Education Exhibits
Location: S101B
Certificate of Merit

Participants
Ronald Booij RT (Presenter): Nothing to Disclose
Marcel L. Dijkshoorn RT : Consultant, Siemens AG
Marcel Van Straten PhD : Research collaboration, Siemens AG
Nanko De Graaf MD : Nothing to Disclose
Mohamed Ouhlous MD, PhD : Nothing to Disclose
Gabriel P. Krestin MD, PhD : Consultant, General Electric Company Research Grant, General Electric Company Research Grant, Bayer AG Research Grant, Siemens AG Speakers Bureau Siemens AG

TEACHING POINTS
Purpose/aim: • To provide guidelines with examples from a third generation dual source CT to obtain low dose CT examinations with sufficient image quality • To learn how to optimize and utilize CT exams for pediatrics when scanning with a third generation dual source CT scanner • To understand the ways to handle intravenous contrast material injection and timing in vascular CT imaging • Demonstrate improved image quality in challenging clinical cases when using a state-of-the-art CT scanner

TABLE OF CONTENTS/OUTLINE
Anatomy, anomalies and congenital vascular disease
- Thorax (native and contrast-enhanced)
- Cardiac
Technological improvements and accompanying challenges
- High speed scanning
- X-ray spectrum and filtration
- Iterative reconstruction technique
Scan protocol optimization
- Patient preparation
- Scan parameter optimization and radiation dose reduction
- Contrast timing and dosage
- Image reconstruction and post-processing
Clinical cases, including
- Cardiovascular anomalies
- Pulmonary vascular anomalies
PDE121

Unilateral Persistent Pulmonary Interstitial Emphysema: Value of Multidetector Computed Tomography

Education Exhibits
Location: S101B

Participants
Mondher Golli MD (Presenter): Nothing to Disclose
saidi hidouri : Nothing to Disclose
Mezri Maatouk MD : Nothing to Disclose
Ahmed Zrig MD : Nothing to Disclose
Waliid Mnari MD : Nothing to Disclose
Badii Hmida : Nothing to Disclose
Nedal Jazaerli : Nothing to Disclose
abellatif nouri : Nothing to Disclose
abdel zakhama : Nothing to Disclose

TEACHING POINTS
Unilateral Persistent pulmonary interstitial emphysema (PPIE) must be differentiated from congenital cystic malformation of the lung (particularly congenital lobar emphysema and cystic adenomatoid malformation), because in the case of PPIE conservative therapy is recommended prior to lobectomy. Multi-detector Computed Tomography (MDCT) is helpful in the diagnosis of PPIE and in determining the anatomic distribution of lobar involvement.

TABLE OF CONTENTS/OUTLINE
Background
Epidemiology
Clinical presentation
Pathology: Macroscopy and histology
Imaging: chest radiograph and MDCT
Treatment and prognosis
Differential diagnosis
Conclusion
PPIE should be considered in premature infants with cystic malformation of the lung with or without respiratory distress. It may or may not be associated with hyaline membrane disease. It can usually be distinguished from congenital cystic malformation of the lung by MDCT. Chest MDCT is helpful in differentiating PPIE from other lesions, such as congenital cystic adenomatoid malformation or congenital lobar emphysema Conservative therapy is recommended. Operative treatment should be considered when the diagnosis is unclear or for progressive respiratory distress, ventilator dependence, or complications such as recurrent pneumonia or recurrent pneumothoraces.

PDE122

When Chest Radiography Is Insufficient: The Role of Cross-sectional Imaging in the Diagnosis and Management of Childhood Pneumonia

Education Exhibits
Location: S101B

Participants
Ulysses Santos Torres MD : Nothing to Disclose
Eduardo Portela de Oliveira : Nothing to Disclose
Fernanda Del Campo Braojos Braga MD : Nothing to Disclose
Maria E. Ucar MD : Nothing to Disclose
Jose Domingo Arcs MD : Nothing to Disclose
Pedro Daltro MD (Presenter): Nothing to Disclose
Leise Rodrigues : Nothing to Disclose
Antonio Soares Souza MD : Nothing to Disclose

TEACHING POINTS
Although chest radiography is the standard approach for imaging evaluation of respiratory infections in children, cross-sectional imaging is required in some specific cases, usually in the setting of suspected suppurative lung parenchymal, pleural or pericardial complications, or when ruling out a noninfectious etiology is necessary. The purposes of this education exhibit are: 1) To review the clinical usefulness of ultrasound, computed tomography and magnetic resonance imaging examinations for the assessment of complicated pneumonia in children, also discussing the implications of such methods for the management of these patients. 2) To illustrate and discuss the main imaging findings in such spectrum of complications and in cases of noninfectious diseases mimicking pneumonia on chest radiographs.

TABLE OF CONTENTS/OUTLINE
This exhibit will use a case-based approach to demonstrate characteristic US, CT and/or MRI imaging findings in a range of complicated childhood pneumonias and noninfectious pathological processes mimicking pneumonia. Representative cases will include empyemias, cavitary necrosis, lung abscesses, purulent pericarditis, pneumatoceles, bronchopleural fistulas, exogenous lipid pneumonia, airway obstruction due to foreign bodies or neoplasms, among others.

PDE123

Acquired Lesions of Fetal CNS: Prenatal MRI Role

Education Exhibits
Location: S101B

Participants
Ignacio Delgado MD (Presenter): Nothing to Disclose
Angel Sanchez-Montanez : Nothing to Disclose
Elena Carreras MD : Nothing to Disclose
Teresa Higueras : Nothing to Disclose
Amparo Castellote MD : Nothing to Disclose
Elida Vazquez MD : Nothing to Disclose
**TEACHING POINTS**

Acquired lesions of fetal CNS are those fetal CNS lesions caused by disruptive process, not for abnormal embryogenesis. They represent the third indication of fetal cerebral MRI after ventriculomegaly and CNS malformations. The aim of this exhibit is: To show the spectrum of fetal acquired lesions, to describe the most frequent found imaging findings and to discuss the role of prenatal MRI in the diagnosis and follow-up of these entities.

**TABLE OF CONTENTS/OUTLINE**

For didactic purposes, we classify acquired lesions of fetal CNS in: 1. Intracranial hemorrhage. In the fetal intracranial hemorrhage, predisposing factors are maternal trauma, fetal coagulation disorders (alloimmune thrombocytopenia) and maternal anticoagulant therapy. In this educational poster representative cases of intraventricular hemorrhage, infratentorial hemorrhage and subdural hematoma will be presented. 2. Hypoxic-ischemic injury. We will present representative cases of porencephalic cysts, schizencephaly, microcephaly, cerebral atrophy and hydranencephaly. We also will discuss cases of fetofetal transfusion. 3. Vascular malformations. Particularly, vein Galen malformation. 4. Infections. Mainly cytomegalovirus, causing white matter lesions, microcephaly, polymicrogyria, calcifications and cerebellar hypoplasia. 5. Tumors / cysts

### PDE124

**Cystic Masses and Pseudomas in the Fetal Pelvis: A Differential Diagnosis Based on Fetal MRI and US Findings**

*Education Exhibits*

*Location: S101B*

**Participants**

- Styliani Archontaki MD (Presenter): Nothing to Disclose
- Yvan Vial MD : Nothing to Disclose
- Reto Antoine Meuli MD, PhD : Nothing to Disclose
- Leonor Alamo MD : Nothing to Disclose

**TEACHING POINTS**

The differential diagnosis of a cystic imaging in a fetal pelvis includes firstly true cystic lesions lesions, including also congenital cysts or tumor lesions and secondly, anomalous accumulation of liquid in a pelvic hollow organ, creating a "pseudocyst". The differential diagnosis changes according not only to the characteristics of the lesions, but also to the fetal sex and the pelvic anatomic space in which the cyst is located. The purpose of this pictorial essay is to develop a practical approach to the interpretation of pelvic cystic masses observed in utero, with emphasis on prenatal MRI studies, based on demonstrative proven cases detected and followed-up in our Institution.

**TABLE OF CONTENTS/OUTLINE**

1. Cysts in the fetal pelvis: differential diagnosis and classification (Table 1). 2. Prenatal imaging studies of the fetal pelvis. - Limits of US. - Indications for additional MRI. Protocols. - Normal anatomy of the fetal pelvis in MRI. Division in spaces for males and females (fig. 2-3). - Differential diagnosis in each pelvic space for males and females (fig. 2-3). 3. Demonstrative cases of a wide spectrum of fetal cystic lesions diagnosed in our institution, with prenatal US and MRI images and final diagnosis, obtained from autopsies, pathologic exams and/or postnatal imaging studies. (Examples; fig. 4-5)

### PDE125

**Fetal Imaging of Congenital Lung Malformations, with Pathologic Correlation**

*Education Exhibits*

*Location: S101B*

👩‍⚕️ Magna Cum Laude

**Participants**

- Christopher Ian Cassady MD (Presenter): Nothing to Disclose
- Amy Robben Mehollin-Ray MD : Nothing to Disclose

**TEACHING POINTS**

The learner will be able to 1. Distinguish the various types of congenital lung malformations (CLMs). 2. Understand the pathologic differences among CLMs as described and revised by Langston in 2003. 3. Correlate pathologic features with key distinguishing fetal and neonatal imaging features among CLMs. 4. Understand the role of fetal imaging in prenatal work-up, treatment, delivery planning, and postnatal surgical management of CLMs.

**TABLE OF CONTENTS/OUTLINE**


### PDE126

**Fetal Meconium on MR Imaging: Impact on Diagnosis of GI Abnormalities**

*Education Exhibits*

*Location: S101B*

👩‍⚕️ Selected for RadioGraphics

**Participants**
PDE127

Perinatal Imaging of Developmental Malformation of the Corpus Callosum

Education Exhibits
Location: S101B

Participants
Roberto Llorens Salvador (Presenter): Nothing to Disclose
Francisco Menor: Nothing to Disclose
Marvin Dale Nelson MD: Nothing to Disclose

TEACHING POINTS

TABLE OF CONTENTS/OUTLINE
The CC is the largest brain commissure and is related to cognitive functions, social skills, problem solving, and attention. Callosal development starts in 13th week of gestational life and from this time on the CC grows reaching its final shape in week 20, but is still small and grows by addition of fibers and later by myelination,reaching the target volume at the age of 6-9 years.

Agenesis and Hypoplasia of the CC constitute the most common pathology. Suspected defects of the corpus callosum should be confirmed by MRI because in 80% of cases they coexist with other CNS pathologies. Assessment of sulcation of the fetal brain is mandatory using prenatal MRI. Callosal abnormalities are found in a great number of other brain malformations (Chiari II malformation, holoprosencephaly,Dandy-Walker). Although brain sonography can detect callosal disorders, MRI is the method of choice in the assessment of the corpus callosum and its congenital lesions in the perinatal period.

PDE128

Post-mortem Magnetic Resonance Imaging (MRI) of the Central Nervous System (CNS) Foetuses

Education Exhibits
Location: S101B

Cum Laude

Participants
Laura Oleaga (Presenter): Nothing to Disclose
Carmen Sebastian Cerqueda MD: Nothing to Disclose
Amaya Sagasta: Nothing to Disclose
Alfonso Nadal: Nothing to Disclose
Olga Gomez: Nothing to Disclose
Nuria Bargallo PhD: Nothing to Disclose

TEACHING POINTS

TABLE OF CONTENTS/OUTLINE
In February 2012 we started performing post-mortem MRI studies in dead and still born foetuses in cases of parent refusal or as an adjunct to autopsy.

We show the normal findings in CNS after demise due to the post-mortem status.

We present the MRI findings in a variety of pathological CNS processes with intrauterus sonography (IUS) and histopathological correlation.

We include cases of periventricular leucopathy, ventriculomegaly, periventriculitis; cystic periventricular lesions associated to cytomegalovirus infection, haemorrhage, aqueduct stenosis due to a dysembrioplasic neuroepithelial tumour (DNET) in mesencephalon and neuronal migration disorders.

MRI provides useful morphologic information of the CNS in dead foetuses. We found a close correlation between MRI structural findings and autopsy.

Post-mortem MRI could represent an adjunct tool in cases where autopsy cannot be performed.
**PDE129**
The Spectrum of Cloacal Malformations; How to Differentiate Each Entity Prenatally with Fetal MRI

**Education Exhibits**
Location: S101B

**Participants**
Kimberly Dannull MD (Presenter): Nothing to Disclose

**TEACHING POINTS**
1. To gain an awareness of the spectrum of cloacal malformations.
2. Understand and identify the key features which differentiate each component of the cloacal malformation spectrum.
3. To describe the key images necessary for proper diagnosis.
4. To briefly describe a differential diagnosis.

**TABLE OF CONTENTS/OUTLINE**
Cloacal malformations are a spectrum of anatomical pelvic malformations resulting from failure of cloacal division in early embryogenesis. Depending on the timing of the developmental arrest, a spectrum of abnormalities result, which range from urogenital sinus to cloacal dysgenesis. With the level of detail currently provided by fetal MRI, the spectrum of cloacal abnormalities can be confidently distinguished prenatally in order to guide postnatal therapy. The below subsets of cloacal malformations will be presented, including the key imaging findings:

1. Urogenital sinus
2. Posterior cloaca variant
3. Persistent/classic cloaca
4. Cloacal dysgenesis

**PDE130**
Ultrasound and MRI of Fetal Hepatobiliary Anomalies with Postnatal Correlation

**Education Exhibits**
Location: S101B

**Participants**
Arnold Carlson Merrow MD (Presenter): Author, Amirsys, Inc Editor, Amirsys, Inc Employee, Amirsys, Inc
Judy Hereford Squires MD : Nothing to Disclose
Maria A. Calvo-Garcia MD : Nothing to Disclose
Beth M. Kline-Fath MD : Nothing to Disclose

**TEACHING POINTS**
Understand advances in prenatal imaging regarding the hepatobiliary system, including review of established normal patterns based on gestational age. Recognize prenatal sonographic and MRI findings of congenital hepatobiliary anomalies, which can generally be divided into primary lesions (including benign and malignant hepatic tumors and hepatobiliary malformations) and secondary manifestations of systemic problems (including transient and permanent sequelae of pregnancy-related disorders and genetic).

**TABLE OF CONTENTS/OUTLINE**
Background of prenatal hepatobiliary imaging
Available techniques
Normal findings by gestational age
Primary hepatic masses
Benign tumors
Malignant tumors
Cystic malformations
Primary biliary malformations
Choledochal cyst
Gallbladder duplication
Biliary atresia
Secondary hepatic parenchymal abnormalities (calcifications, edema, enlargement, multifocal masses)
Genetic/metabolic disorders
Infectious disorders
Metastatic disease
Cardiovascular anomalies
Secondary hepatic morphologic anomalies
Diaphragmatic hernia
Omphalocele
Situs disorders
Secondary biliary anomalies
Obstruction by adjacent masses
Dilation in multiple gut atresias
Microgallbladder of cystic fibrosis
Summary

**PDE131**
Vascular Anomalies: Prenatal Imaging Features with Postnatal Correlation

**Education Exhibits**
Location: S101B

**Participants**
Erica Riedesel MD (Presenter): Nothing to Disclose
Judy Ann Estroff MD : Nothing to Disclose
Ahmad Ibrahim Alomari MD : Nothing to Disclose
Harriet Joan Paltiel MD : Equipment support, Koninklijke Philips NV

**TEACHING POINTS**
Vascular anomalies are identified on prenatal imaging with increasing frequency. Correct identification of anomalies is essential for appropriate prenatal parental counseling and postnatal medical management. This educational exhibit will review the imaging findings of vascular anomalies on prenatal ultrasound and MRI with correlation to post-natal imaging findings and present case examples seen at a tertiary care pediatrics hospital.

**TABLE OF CONTENTS/OUTLINE**
Vascular Anomalies
International Society for the Study of Vascular Anomalies (ISSVA) Classification Scheme
Vascular Tumors
Congenital Hemangioma
Kaposiform Hemangioendothelioma (KHE)
Vascular Malformations
Capillary Malformation (CM)
Venous Malformation (VM)
Combined Malformations and Vascular Anomaly Syndromes
Klippel-Trenaunay Syndrome (KTS)
CLOVES Syndrome

**PDE132**
A Pictorial Stroll through the Congenital and Acquired Pathologies of the Cholangiopancreatic System in Children and Adolescents
**PDE133**

**Contrast Enhanced Ultrasound (CEUS) in the Characterization of Pediatric Liver Lesions: Spectrum of Imaging Findings**

**Education Exhibits**  
**Location:** S101B

**Participants**
- Annamaria Deganello MD (Presenter): Speaker, Bracco Group
- Eleni Konstantatou MD, Msc: Nothing to Disclose
- Bhavana Bathi MBBS: Nothing to Disclose
- Maria E. Sellars MD, FRCP: Nothing to Disclose
- Paul Singh Sidhu MRCP, FRCR: Speaker, Bracco Group Speaker, Siemens AG Speaker, Hitachi, Ltd

**TEACHING POINTS**

This presentation aims to exhibit the spectrum of CEUS imaging findings of common and uncommon benign pediatric focal liver lesions, with computed tomography (CT) or magnetic resonance (MR) correlation. The role of CEUS in the detection, characterization, and follow-up of these lesions in children who are investigated for acute and chronic liver disease will also be emphasized.

**TABLE OF CONTENTS/OUTLINE**

1. Primary liver tumours are rare in children, however, in our tertiary referral center for pediatric hepatobiliary disease, it is not uncommon to find a focal liver lesion in a child, and 30% of these lesions are benign. We present a pictorial review of CEUS findings in these lesions, some of which unique to the pediatric population, such as hemangioendotheliomas, some others more common in adults including hemangiomas, focal nodular hyperplasia (FNH), nodular regenerative hyperplasia (NRH) and hepatocellular adenoma; focal areas of fatty sparing or infiltration and liver abscess will also be illustrated. We will incorporate CT and MR images for correlation. Although the use of CEUS remains “off-label” in pediatrics, it holds a significant role in providing an accurate diagnosis and a minimally invasive follow-up tool in these patients, without the need for repeated ionizing radiation exposure or sedation.

**PDE135**

**Extra-Intestinal Manifestations and Complications in Pediatric Inflammatory Bowel Disease: The Imaging Link**

**Education Exhibits**  
**Location:** S101B

**Participants**
- Kamaldine Oudjhane MD, MSc (Presenter): Nothing to Disclose
- Shyam Mohan MBBS, MRCP: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is:  1. to recognize the different extra-intestinal manifestations and complications in children with inflammatory bowel disease.  2. To review the utility of imaging modalities in the identification and reassessment of organic findings (signs and complications) at time of diagnosis and on monitoring of the selected therapies.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction-Classification of Extra-intestinal manifestations in children with Inflammatory Bowel Disease: a. Musculoskeletal (peripheral arthropathies, enthesopathies, axial arthropathies) b. Mucocutaneous signs (erythema nodosum, pyoderma gangrenosum) c. Hepatopancreaticobiliary (Primary sclerosing cholangitis, hepatitis, pancreatitis) d. Thromboembolic disease e. Neurologic/ocular manifestations f. Bone health issues (osteoporosis, short stature)  
PDE137
Imaging Patterns of Fatty Liver in Childhood

Education Exhibits
Location: S101B

Participants
H. Nursun Ozcan MD (Presenter): Nothing to Disclose
Berna Oguz MD : Nothing to Disclose
Mithat Haliloglu MD : Nothing to Disclose
Diclehan Orhan : Nothing to Disclose
Musturay Karcaaltincaba MD : Nothing to Disclose

TEACHING POINTS
Our purpose in this educational exhibit is: 1. To describe the different structural patterns of non-alcoholic fatty liver disease (NAFLD) in childhood. 2. To discuss the use of imaging modalities in NAFLD in children and address pitfalls. 3. To highlight the evidence suggesting that chemical shift gradient recalled echo MRI is more trustworthy than US for the assessment of steatosis. 4. To describe the less common imaging patterns of steatosis which include focal deposition, diffuse heterogeneous deposition and multifocal deposition as well as the most common imaging pattern, which is diffuse homogeneous fat deposition. 5. To emphasize how the imaging patterns of steatosis can mimic neoplasms, leading to confusion and unnecessary diagnostic invasive procedures. 6. To describe how location, morphologic features, contrast enhancement and mass effect of the lesion and assessment of its fat content usually permit a correct diagnosis.

TABLE OF CONTENTS/OUTLINE

PDE138
Lumps and Bumps in the Groin of Children

Education Exhibits
Location: S101B

Participants
Hee Mang Yoon MD (Presenter): Nothing to Disclose
Young Ah Cho : Nothing to Disclose
Jin Seong Lee MD : Nothing to Disclose
Ah Young Jung : Nothing to Disclose
Hye-Kyung Yoon MD : Nothing to Disclose
Chong Hyun Yoon : Nothing to Disclose

TEACHING POINTS
Pediatric inguinal swelling occurs mostly from inguinal hernias, especially in boys. However, various lesions can be found in the inguinal or groin in boys as well as girls. Therefore, it is important to consider the different features and characteristics of masses in the inguinal or groin area to exclude other causes, such as congenital anomalies, infections, and neoplasms. Therefore, it is essential for radiologists to be familiar with imaging features of various inguinal lesions. In this exhibit, we will systematically review diverse causes of inguinal swelling in boys and girls. Multimodality imaging features and practical approach to the inguinal swelling will be presented.

TABLE OF CONTENTS/OUTLINE

PDE140
MR Urography in Pediatric Patients: Clinical and Technical Considerations

Education Exhibits
Location: S101B

Participants
Shannon L. Tocchio MD (Presenter): Nothing to Disclose
Kevin Ching MD : Nothing to Disclose
Sameh Tadros MD, MSc : Nothing to Disclose
Abhay Simha Srinivasan MD : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the clinical Indications for MR urography. 2. To discuss patient preparation, how to protocol for MR urography and the purpose of selected pulse sequences. 3. To illustrate both imaging and post-processing capabilities of MR urography vs. traditional imaging techniques used in pediatric genitourinary (GU) radiology. 4. To demonstrate the unique advantages and special considerations of MR urography in pediatric GU imaging.

TABLE OF CONTENTS/OUTLINE
Table of Contents/Outline: 1. Brief history of MR urography and current clinical indications. 2. Review of the technical considerations and important factors when implementing MR urography. 3. Case examples of MR urography and post-processing data with correlative imaging shown on conventional imaging modalities.
MRI, MRCP and ERCP Findings in Pediatric Hepatobiliary and Pancreatic Diseases

Education Exhibits
Location: S101B

Participants
Anil G. Rao MD (Presenter): Speaker, Siemens AG
Paul Gene Thacker MD: Nothing to Disclose
Antonio J. Quiros MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To review the MRI, MRCP and ERCP imaging findings in various congenital and acquired hepatobiliary and pancreatic diseases in children To emphasize the key imaging findings To understand the etiology and pathogenesis of hepatobiliary and pancreatic diseases in children To understand the technique of performing MRI and MRCP in children for evaluation of hepatobiliary and pancreatic diseases

TABLE OF CONTENTS/OUTLINE
Technique of MRI and MRCP for evaluation of hepatobiliary and pancreatic diseases in children Etiology and pathophysiology of various congenital and acquired hepatobiliary and pancreatic diseases such as: Choledochal cysts types I-IV including choledochocele Caroli disease Primary sclerosing cholangitis Ascending cholangitis Progressive familial intrahepatic cholestasis Choledolithiasis and cholecolithiasis Biliary sludge in gall bladder and bile ducts Annular pancreas Pancreas divisum Chronic pancreatitis MRI, MRCP and ERCP findings of the various congenital and acquired hepatobiliary and pancreatic diseases listed above

PDE143
Pancreatitis in Children: They're Not Just Little Adults

Education Exhibits
Location: S101B

Participants
Brian Stewart Pugmire MD (Presenter): Nothing to Disclose
Michael Stanley Gee MD, PhD: Nothing to Disclose
Jess Kaplan MD: Nothing to Disclose
Sudha Ayyala Anupindi MD: Nothing to Disclose

TEACHING POINTS
1. Review the terminology, epidemiology, and pathophysiology of pancreatitis in children as distinguished from that in adults.
2. Review the etiologies of pancreatitis in children and appropriate work-up
3. Discuss the role of various imaging modalities in the evaluation of pediatric pancreatitis including advantages/disadvantages of each and the relevant imaging features.
4. Discuss the role of imaging in clinical management of pancreatitis using specific clinical case scenarios

TABLE OF CONTENTS/OUTLINE
1. Terminology: acute vs. acute recurrent vs. chronic pancreatitis 2. Epidemiology and pathophysiology 3. Etiologies of pancreatitis in children as compared to adults 4. Clinical presentation and initial work-up:
   - Acute vs. chronic presentation Laboratory and imaging work-up 5. Imaging of pancreatitis: pros/cons of different modalities, imaging features, and role in clinical management:
     - Ultrasound CT ERCP MRCP (including secretin MRCP) Image-guided FNA in suspected infected necrotizing pancreatitis 6. Treatment options 7. Case scenarios

PDE144
Pediatric Cystic Mass in the LUQ: The Small and Crowded Space

Education Exhibits
Location: S101B

Participants
Hee Mang Yoon MD (Presenter): Nothing to Disclose
Young Ah Cho: Nothing to Disclose
Jin Seong Lee MD: Nothing to Disclose
Ah Young Jung: Nothing to Disclose
Hye-Kyung Yoon MD: Nothing to Disclose
Chong Hyun Yoon: Nothing to Disclose

TEACHING POINTS
Cystic masses located in the left upper quadrant (LUQ) of the abdomen is not uncommon and diverse group of lesions arise from the major organs in this space; liver, pancreas, stomach, spleen, and mesentery. Diagnosis is often challenging for radiologists because of difficulty to identify precise localization of the lesion, determine the organ of origin, and characterize the specific features of various tumors. In this exhibit, we systematically describe important clues in the diagnosis and imaging features of LUQ cystic masses. Being familiar with the imaging and clinical features of various LUQ cystic masses facilitates accurate diagnosis and treatment.

TABLE OF CONTENTS/OUTLINE
1. Introduction Anatomy of the left upper quadrant of the abdomen Clues for identification of the organ of origin Beak sign, Phantom organ sign, Embedded organ sign 2. Differential diagnosis of the mass according to the organ of origin A. Tumors

PDE145

Percutaneous Nephrostomy Tube Placement in Children: Indications, Technique, and Measures of Success

Education Exhibits
Location: S101B

Participants
Deepti Venkatraman (Presenter): Nothing to Disclose
Michael Stanley Gee MD, PhD: Nothing to Disclose
Debra Ann Gervais MD: Research Grant, Covidien AG

TEACHING POINTS
1. Indications for percutaneous nephrostomy tube placement in infants and young children include congenital (ureteropelvic junction obstruction, primary megaureter, ureteropelvic duplication) and acquired (stones) causes of urinary tract obstruction. 2. Percutaneous nephrostomy is also indicated in children with post-operative stricture or urinary leak following urologic surgery such as pyeloplasty or ureteral reimplantation. 3. Technical considerations for nephrostomy include selection of calyceal access route, selection of image modality for guidance, utilization of one vs two stick approach, and selection of catheter size. 4. Measures of success include technical success (access and drainage of the urinary system) and clinical success (resolution of urinary obstruction or leak without need for surgical intervention).

TABLE OF CONTENTS/OUTLINE
1. Indications for pediatric nephrostomy tube placement. 2. Technical considerations of nephrostomy catheter placement in children. 3. Considerations in choice of access point for tube placement with respect to vascular and calyceal anatomy. 4. Indwelling nephrostomy tube management. 5. Multidisciplinary approach to congenital and acquired obstruction. 6. Review technical and clinical measures of nephrostomy success.

PDE146

Renal Pelvic Dilatation (RPD): Normal or Abnormal?

Education Exhibits
Location: S101B

Certificate of Merit

Participants
Melkamu Dessie Adeb MD (Presenter): Nothing to Disclose
Jeanne S. Chow MD: Nothing to Disclose
Dana Spergel Schwartz MD: Nothing to Disclose
Kassa Darge MD, PhD: Nothing to Disclose

TEACHING POINTS
• Discuss optimal evaluation methods for renal pelvic dilation (RPD) on postnatal imaging. • Discuss the value of renal pelvis antero-posterior diameter (APD) in imaging evaluation of RPD. • Discuss factors influencing evaluation of RPD. • Discuss the role of renal pelvis APD and alternative methods such as the hydronephrosis index (HI) in evaluation of RPD and in guiding management decisions such as performing pyeloplasty.

TABLE OF CONTENTS/OUTLINE

PDE147

Retrograde Urethrography (RUG): Indications, Techniques and Outcome in Children

Education Exhibits
Location: S101B

Participants
Maria Alejandra Bedoya Velez MD (Presenter): Nothing to Disclose
Hansel J. Otero MD: Nothing to Disclose
Dana A. Weiss MD: Nothing to Disclose
Kassa Darge MD, PhD: Nothing to Disclose

TEACHING POINTS
1. Retrograde urethrography (RUG) is the fluoroscopic examination of the urethra via retrograde contrast filling. It enables anatomic detail in the evaluation of the urethra in boys. There is very limited pediatric literature available on this topic, which makes its performance and interpretation challenging. 2. The principal indications of RUG are urethral trauma, stricture, rectourethral fistula, and prostatic utricle. In urethral injuries, the contrast extravasation occurs in the extraperitoneal space if the injury is above the ureteral diaphragm; but if the injury is below the ureteral diaphragm, the contrast extravasation is within borders of darts (Colles) fascia. 3. Different modifications of the RUG technique are performed based on the clinical indication. These modifications include subsequent voiding cystourethrogram (VCUG), simultaneous VCUG, and retrograde pericatheter urethrogram.
TABLE OF CONTENTS/OUTLINE

PDE148
Role of Percutaneous Abscess Drainage in Pediatric Crohn’s Disease

Education Exhibits
Location: S101B

Participants
Brian Stewart Pugmire MD (Presenter): Nothing to Disclose
Michael Stanley Gee MD, PhD : Nothing to Disclose
Debra Ann Gervais MD : Research Grant, Covidien AG

TEACHING POINTS
1. Abscesses are a common feature of Crohn’s disease (CD) and percutaneous drainage (PD) plays an important role in their management. 2. Technical success rates with PD in pediatric patients with CD are high and PD can serve as a surgical sparing procedure allowing initiation of immunomodulatory or anti-TNF medical therapy or as a bridge to elective surgical intervention when needed. 3. There are specific considerations when performing these procedures in pediatric patients regarding sedation and radiation exposure. 4. Appropriate technique and patient selection help to ensure satisfactory outcomes.

TABLE OF CONTENTS/OUTLINE

PDE149
Study of Crohn's Disease in Pediatric Population Using Magnetic Resonance Enterography (MRE) and Ultrasound (US)

Education Exhibits
Location: S101B

Participants
Gonzalo Sanchez Jorda MD (Presenter): Nothing to Disclose
Lourdes Guillen Vargas MD : Nothing to Disclose
Cinta Sanguesa Nebot MD : Nothing to Disclose
Dolores Muro Veilla MD : Nothing to Disclose
Sara Pico Aliaga MD : Nothing to Disclose
Iciar Puchades-Roman MD : Nothing to Disclose

TEACHING POINTS
1. Describing the MRE and US indications for the study of inflammatory bowel disease and the main imaging findings. 2. To show the MRE protocol used for Crohn's Disease (CD) in our hospital. 3. Correlation of MRE versus other conventional techniques, with emphasis in US, in patients with CD.

TABLE OF CONTENTS/OUTLINE
• Crohn's disease: description, pathophysiology. • To show our population group and their characteristics. • Current protocols for CD study by US and MR will be reviewed, along with the sequences used, included DWI, oral contrast agents and use of spasmolytic agents and their utility. • Pictorial review of main MRE findings in CD, and correlation with US, and other imaging techniques (CT).

PDE150
The Utility of MR Urography to Characterize Morphology and Function of Pediatric Urinary Tract Abnormalities

Education Exhibits
Location: S101B

Participants
Mathew Cherny BA, MD (Presenter): Nothing to Disclose
Mark Evan Bittman MD : Nothing to Disclose

TEACHING POINTS
MR urography's (MRU) ability to depict urinary tract morphology and renal function without ionizing radiation is a valuable tool in guiding diagnosis/management of pediatric urinary tract pathology, which traditionally requires multiple imaging modalities to evaluate MRU utilizes heavily T2-weighted and dynamic post contrast sequences which can rapidly define the anatomy and quantify renal enhancement and excretion Augmentation with hydration and diuretics is a useful tool to ensure uniform and timely contrast distribution for optimizing excretory phase imaging. The pediatric population presents specific challenges for MRI, notably being patient cooperation and motion sensitivity often requiring sedation.

TABLE OF CONTENTS/OUTLINE
• Discuss a spectrum of pediatric urinary tract anatomic abnormalities such as urinary tract obstruction, duplication
anomalies, renal ectopia, ectopic ureters, primary megaureter, calyceal diverticulum, and ureteropelvic junction obstruction.

- Appropriateness/indications of MRU in pediatric patients
- Discussion of MRU protocols, including patient preparation, sequence selection, and selection of contrast agents and diuretics
- Review of MRU clinical applications and discussion of benefits/advantages highlighting both the anatomic and functional information which influences clinical decision making

**PDE151**

**Urethral Anatomy and Pathology in Childhood**

*Education Exhibits*

*Location: S101B*

**Participants**

Maria Del Pilar Sanchez-Camacho Gonzalez-Carrato MD (Presenter): Nothing to Disclose
Purificacion Calvo Azabarte: Nothing to Disclose
Sonia DieguezTapias MD: Nothing to Disclose
Maria Isabel Garcia-Hidalgo MD: Nothing to Disclose
Rosa Maria Martin-Crespo Izquierdo: Nothing to Disclose
Lina Marcela Cruz Hernandez ARRT: Nothing to Disclose

**TEACHING POINTS**

1. To describe the embryology and anatomy of the male urethra.
2. To analyze the imaging techniques available for his study.
3. To review the different pathologies depending on the urethral segment.

**TABLE OF CONTENTS/OUTLINE**

The male urethra consists of posterior (prostatic and membranous) and anterior (bulbous and penile) portions. The most important imaging techniques for the study of urethral pathology are:

- Ultrasound: to assess the effects on bladder, ureters and kidneys
- Voiding cystourethrography (VCUG)
- Retrograde urethrogram
- Intravenous urography
- Echo-enhanced cystosonography
- Computed tomography
- Magnetic resonance imaging

We will review the most important urethral pathology and his differential diagnosis:

**Posterior urethra:**
- Posterior urethral valves, categorized into three types according to the Young's classification
- Cecoureterocele
- Plicae colliculus
- Prostatic utricle
- Reflux into the prostatic ducts and seminal vesicles

**Anterior urethra:**
- Cobb's collar
- Anterior urethral valves
- Urethral diverticulum
- Cowper's duct cyst or syringocele
- Urethral polyp
- Urethral duplication
- Megalourethra

**Anorectal malformations:**
- Cloacal malformation
- Urethral fistula

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**PDE152**

**US Approach of Adnexal Torsion in Girls with Acute Pelvic Pain**

*Education Exhibits*

*Location: S101B*

**Participants**

Catherine Baud MD (Presenter): Nothing to Disclose
Nancy Bechard-Sevette MD: Nothing to Disclose
Stephanie David MD: Nothing to Disclose
Julie Bolivar-Perrin: Nothing to Disclose
Magali Saguintaah MD: Nothing to Disclose
Alain Couture MD: Nothing to Disclose
Olivier Prodhomme MD: Nothing to Disclose

**TEACHING POINTS**

To review how to perform color Doppler sonography (CDS) in girls with acute pelvic pain.
To describe the sonographic findings of adnexal torsion.
To learn to recognize the twisted vascular pedicle/tube.
To provide prognostic criteria.
To discuss the other causes of acute pelvic pain.

**TABLE OF CONTENTS/OUTLINE**

1. CDS technique: comparative study of both ovaries, vascular pedicle course analysis
2. Normal ovary torsion: enlargement, abnormal echogenicity with peripheral follicles, heterogeneity, absent or decreased blood flow
3. Ovarian cystic masses torsion: thickened, echogenic adjacent cortex with absent or decreased vascularization
4. Twisted vascular pedicle/tube detection: round mass of 10-30 mm in anteroposterior diameter adjacent to the ovary producing the nipple or the double ovary sign
5. Prognostic signs
6. Isolated tube torsion: hydrosalpinx or/and paraadnexal cyst associated with twisted vascular pedicle/ tube adjacent to the uterus and/or ovary.
8. Others causes of acute pelvic pain

Adnexal torsion is a rare surgical emergency requiring early diagnosis to avoid necrosis. In girls with acute pelvic pain, the twisted vascular pedicle detection can be helpful to diagnose torsion of normal ovary with mild enlargement, torsion of ovarian cystic masses and isolated tube torsion. Sonography is accurate in the differential diagnosis.

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**PDE153**

**US Approach of Testicular Torsion in Children and Teenagers**

*Education Exhibits*

*Location: S101B*

*Cum Laude*

**Participants**
TEACHING POINTS

To review how to perform color Doppler sonography (CDS) of acute scrotum
To describe the sonographic findings of intravaginal torsion
To learn to recognize the twisted spermatic cord
To highlight the diagnostic pitfalls
To provide prognostic criteria
To discuss the other causes of acute scrotum

TABLE OF CONTENTS/OUTLINE

1. CDS technique: comparative study of both testes and extratesticular structures
2. Testicular signs of torsion: absent or decreased blood flow, enlargement, abnormal echogenicity, heterogeneity, abnormal location
3. Extratesticular signs: abnormal epididymal head location, extratesticular mass of 12-33 mm in anteroposterior diameter connected to the inguinal cord
4. Diagnostic Pitfalls
7. Good prognostic signs: vascularized or iso-hyperechoic testis with mild enlargement
8. Signs of necrosis: heterogeneous or avascular testis with thickened hyperemic scrotal wall
9. Negative signs of torsion in spontaneous detorsion, epididymoorchitis and appendix torsion

Intravaginal torsion is much more frequent in teenagers than in children. It is a surgical emergency requiring early diagnosis to avoid necrosis. In uncertain cases, CDS is helpful and can reduce needless surgery. Spiral twist detection is the only reliable sign of testicular torsion whatever its consequences for the testis. CDS may predict testis prognosis.

PDE154

High Resolution MR Imaging of Peripheral Nerve Injury in Children and Young Adults

Education Exhibits
Location: S101B

Participants
Shivani Ahlawat MD (Presenter): Nothing to Disclose
Alan Belzberg: Nothing to Disclose
Laura Marie Fayad MD: Nothing to Disclose

TEACHING POINTS

1. Using high resolution MR imaging, normal peripheral nerve anatomy has a distinct appearance.
2. Commonly used classification schemes for peripheral nerve injury are the Seddon and Sunderland schemes, which are based on either axonal continuity and conduction or histology.
3. There are specific direct and indirect MR imaging features that can be used to identify peripheral nerve injury in children and young adults.

TABLE OF CONTENTS/OUTLINE

1. Review the normal anatomy and histology of a normal peripheral nerve

PDE155

High-resolution Ultrasound of the Temporomandibular Joint in Children with JIA

Education Exhibits
Location: S101B

Participants
Irene Maria Olivia Borzani MD (Presenter): Nothing to Disclose
Umberto Garagiola: Nothing to Disclose
Paolo Cressoni: Nothing to Disclose
Silvana Di Geronimo: Nothing to Disclose
Giampietro Farronato MD, DDS: Nothing to Disclose

TEACHING POINTS

To review the clinical indications, TMJ anatomy, imaging appearance of normal and abnormal findings of temporomandibular joint ultrasound in children with JIA

TABLE OF CONTENTS/OUTLINE

Anatomy Pathophysiology Clinical Findings Imaging techniques Imaging appearance Follow-up

PDE156

Inflammatory Myofibroblastic Tumors in Children: Inflammatory or Neoplastic Condition? Review of Our Experience in 15 Cases

Education Exhibits
Location: S101B
**Participants**

Emilio Inarejos Clemente MD (Presenter): Nothing to Disclose  
Lucia Riaza: Nothing to Disclose  
Monica Rebollo MD: Nothing to Disclose  
Mariona Sunol Capella: Nothing to Disclose  
Maria Teresa Maristany Daunert: Nothing to Disclose

**TEACHING POINTS**

1. Major radiologic features of inflammatory myofibroblastic tumors (IMT) on x-ray, CT and MR with pathologic correlation.  
2. To learn how specific MR key features help to differentiate IMT from malignant tumors.  
3. Highlight the main differential diagnosis, that include, amongst others, rhabdomyosarcoma and Ewing sarcoma.

**TABLE OF CONTENTS/OUTLINE**

1. Review of our series of 15 IMTs, highlighting the main radiographic, pathologic and cytogenetic features to ensure an accurate diagnosis.  
2. MR key features to differentiate IMT from malignant tumors to avoid unnecessary aggressive treatment.  
3. Differential diagnosis with corresponding imaging.  
4. Treatment and prognosis based on our experience.

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**PDE157**

**MR Imaging of Developmental Dysplasia of the Hip: Goals and Obstacles**

*Education Exhibits*

*Location: S101B*

- Certificate of Merit  
- Selected for RadioGraphics

**Participants**

Daniel G. Rosenbaum MD (Presenter): Nothing to Disclose  
Eric Adam Bogner MD: Nothing to Disclose  
Douglas N. Mintz MD: Nothing to Disclose

**TEACHING POINTS**

1. To highlight the utility of MR imaging in the evaluation of developmental dysplasia of the hip following surgical reduction  
2. To illustrate the imaging appearances of the concentrically and non-concentrically reduced hip, including obstacles to and complications of reduction

**TABLE OF CONTENTS/OUTLINE**

- Background and rationale for MR imaging  
- Imaging technique  
- Examination timing and anesthesia  
- Imaging parameters  
- Motion artifact/repetitive acquisition  
- Image interpretation  
- Concentric reduction  
- Ossified vs. non-ossified capital femoral epiphyses  
- Postsurgical changes with closed and open reduction  
- Osteotomy hardware  
- Obstacles to concentric reduction  
- Inverted labrum and limbus formation  
- Hyperterophy of the ligamentum teres/tranverse acetabular ligament  
- Enlarged pulvinar  
- Complications  
- Persistent dislocation  
- Capital femoral epiphyseal contusion  
- Osteonecrosis  
- Contrast administration and epiphyseal perfusion  
- Clinical and imaging follow-up  
- Conclusions

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**PDE158**

**Pediatric Bone Tumors: the Good, the Bad, and the Ugly . . . with Particular Attention to the Bad and Ugly**

*Education Exhibits*

*Location: S101B*

**Participants**

David W. Swenson MD (Presenter): Nothing to Disclose  
Patricia Trinidad Chang MD: Nothing to Disclose  
Kirsten Ecklund MD: Nothing to Disclose

**TEACHING POINTS**

Purpose: 1. Draw on examples of 90 pediatric patients who presented over the last 15 years, and who have both pre and post chemotherapy imaging of osteosarcoma, highlighting typical imaging features at diagnosis and in response to chemotherapy.  
2. Demonstrate challenging cases of osteosarcoma presenting in unusual locations and with atypical imaging appearance.  
3. Discuss the differential diagnosis for atypical osteosarcomas, and present examples of imaging mimickers in the axial and appendicular skeleton.  

**TABLE OF CONTENTS/OUTLINE**

1. Osteosarcoma Basics  
   a. Epidemiology  
   b. Classic imaging  
2. Osteosarcoma Imaging Evolution with Chemotherapy  
   a. Increased osteoid production  
   b. Intralesional hemorrhage  
   c. Significance of increasing tumor size on therapy  
3. Osteosarcoma Challenges  
   a. Unusual locations, including skull, jaw, spine, and pelvis  
   b. Atypical appearances in the appendicular skeleton  
4. Differentiating growth from treatment effects  
5. Osteosarcoma Mimickers and Differentiating Findings  
   a. Ewing’s sarcoma  
   b. Langerhans cell histiocytosis  
   c. Giant cell tumor  
   d. Lymphoma  
   e. Osteoblastoma  
   f. Aneurysmal bone cyst  
   g. Chronic osteomyelitis  
   h. Phosphaturic mesenchymal tumor  
   i. Post-traumatic lesions

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**PDE159**


*Education Exhibits*

*Location: S101B*
**Selected for RadioGraphics**

**Participants**
- Omar Adib (Presenter): Nothing to Disclose
- Emeline Noizet: Nothing to Disclose
- Didier Loisel MD: Nothing to Disclose
- Christophe Aube MD, PhD: Speaker, Bayer AG Support, General Electric Company

**TEACHING POINTS**
- Cervical spine injuries in children are usually seen in the upper cervical region owing to its unique biomechanics and anatomy.
- Knowledge of the normal development and radiographic features of the pediatric cervical spine can aid in the correct interpretation of plain radiograph in the setting of trauma.
- Emergency radiologic analysis of the pediatric cervical spine can be challenging because of wide range of normal anatomic variants and changes that occur with the maturation or ossification process.
- Interpretation of a post-traumatic plain radiograph of cervical spine must be based on age of children, localisation and mechanism of the trauma.

**TABLE OF CONTENTS/OUTLINE**
- Several normal anatomic variants and synchondroses may be encountered on a standard cervical in children.
- Knowledge of the normal embryologic development and anatomy of the cervical spine is important to avoid mistaking synchondroses for fractures in the setting of trauma.
- Variants include, in general, pseudosubluxation C2-C3, absence of cervical lordosis, wedging of C3 vertebra, widening of the prepedral space and the prevertebral soft-tissue.
- This atlas provides the main signs to aid in the correct interpretation of radiographs.

**PDE160**

**Pediatric Distal Tibial Fractures: What the Emergency Radiologist Needs to Know**

*Education Exhibits*
*Location: S101B*

**Participants**
- Christy Blaire Pomeranz MD (Presenter): Nothing to Disclose
- Roger J. Bartolotta MD: Nothing to Disclose

**TEACHING POINTS**
- Pediatric distal tibial fractures require detailed radiologic evaluation with regard to both displacement and physeal involvement in order to guide appropriate management. This exhibit enables the reader to: 1. Apply Salter-Harris fracture classification with regard to the closure pattern of the distal tibial physis 2. Understand which patients need CT in order to minimize radiation exposure 3. Review anatomic and mechanic classifications for distal tibial fractures 4. Maximize the reporting of critical information (alignment, classification) that would alter management.

**TABLE OF CONTENTS/OUTLINE**

**PDE161**

**Pediatric Elbow - The Spectrum of Normal Development, Congenital and Pathologic Findings at Imaging**

*Education Exhibits*
*Location: S101B*

**Participants**
- Adam Gehrt DO (Presenter): Nothing to Disclose
- Arthur Benjamin Meyers MD: Nothing to Disclose
- Kevin Paul Boyd DO: Nothing to Disclose

**TEACHING POINTS**
- Complex normal development at the pediatric elbow should not be confused with pathology. • The pediatric elbow is the site of a variety of common and uncommon acute injury patterns which can be identified on various imaging examinations. • Overuse injuries particularly in the young throwing athlete cause specific patterns of pathology. • A variety of other congenital, infectious and inflammatory conditions, which occur in and around the pediatric elbow, are important to recognize.

**TABLE OF CONTENTS/OUTLINE**
- Normal development • Ossification centers • Accessory Ossification centers • Trochlear pre-ossification center seen on MRI Congenital Disorders • Congenital radial head dislocation • Radioular synostosis • Radial dysplasia Osteochondrosis/Osteonecrosis • Panner’s disease • AVN Traumatic injuries and their complications • Fractures • Soft tissue injuries • Injuries seen in the throwing athlete Miscellaneous • Inflammatory conditions • Infection • Soft tissue masses around the elbow.

**PDE163**
Skeletal Manifestations of Fibroblast Growth Factor Receptor (FGFR) Gene Mutations- Can We Predict Genetic Diagnosis on the Basis of Imaging?

**Education Exhibits**
Location: S101B

Certificate of Merit
Selected for RadioGraphics

**Participants**
Kiran Mahadev Sargar MBBS, MD (Presenter): Nothing to Disclose
Thomas Eugene Herman MD : Nothing to Disclose
Marilyn J. Siegel MD : Research Consultant, Siemens AG Speakers Bureau, Siemens AG

**TEACHING POINTS**
Fibroblast growth factor receptors (FGFR) have role in cell proliferation, growth, differentiation and migration. Genetic mutations in gene encoding FGFR types 1, 2 and 3 are responsible for specific skeletal dysplasias and craniosynostosis syndromes. Genetic diagnosis of mutations in FGFRs can be predicted based on skeletal imaging findings and appropriate genetic tests can be performed to establish the diagnosis.

**TABLE OF CONTENTS/OUTLINE**

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Sonography of Musculoskeletal Infections in Children

**Education Exhibits**
Location: S101B

Certificate of Merit

**Participants**
Jenny Walsh MBChB (Presenter): Nothing to Disclose
Jeannette Kraft MD : Nothing to Disclose

**TEACHING POINTS**
The purpose of this exhibit is:
1. To review the normal bone and joint anatomy in children and highlight differences to imaging in adults.
2. To discuss the sonographic findings associated with septic arthritis, osteomyelitis, pyomyositis and soft tissue infection in children.
3. To correlate ultrasound imaging with MRI findings.
4. To explain when further imaging with MRI is useful.

**TABLE OF CONTENTS/OUTLINE**
- Sonographic technique.
- Normal bone and joint anatomy in children.
- Indications for sonography.
- Review of imaging findings in septic arthritis, osteomyelitis, pyomyositis and soft tissue infection.
- Further investigations.

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The Snaps, Crackles, and Pops: Reviewing the MRI Findings and Recommended Techniques for Evaluating Pediatric Sports Injuries

**Education Exhibits**
Location: S101B

**Participants**
Thomas Michael Cullen MD (Presenter): Nothing to Disclose
Henry Chow Chow DO : Nothing to Disclose
Richard Russell Culver MD : Nothing to Disclose
Loyirk Temiyakarn MD : Nothing to Disclose
Steven M. Bernstein MD : Nothing to Disclose
Pavani Adapa MD : Nothing to Disclose

**TEACHING POINTS**
Discuss the increasing prevalence of pediatric sports injuries. Present a case-based approach to understanding common mechanisms of pediatric sports injuries and their respective findings on MRI. Review recommended MRI technique and protocols for evaluating pediatric sports injuries. Highlight current clinical management strategies and the importance of early recognition of injury to avoid long-term sequela.
TABLE OF CONTENTS/OUTLINE


PDE168

Where's the Bone?: Diseases of Bone Demineralization in Children

Education Exhibits
Location: S101B

Certificate of Merit

Participants
Jennifer L. Favinger MD (Presenter): Nothing to Disclose
Stephen Lawrence Done MD : Nothing to Disclose
Shawn Elizabeth Parnell MD : Nothing to Disclose

TEACHING POINTS
1. Describe the associated radiologic findings in diseases of decreased bone mineralization in children. 2. Distinguish the different diseases of decreased bone mineralization based on the imaging findings. 3. Understand the pathophysiology behind the radiologic appearance of these diseases.

TABLE OF CONTENTS/OUTLINE

Case Outline: 1) Rickets a. Abnormal Vitamin D Metabolism (vit D deficiency, hepatic or renal origin) b. Hypophosphatemic Rickets (phosphate loss due to renal tubular disorders) 2) Osteogenesis Imperfecta- 4 types 3) Gorham Disease 4) Congenital Syphilis 5) Scurvy 6) Copper insufficiency with liver disease and prolonged alimentation 7) Hypophosphatasia 8) Juvenile Idiopathic Osteoporosis 9) Metabolic Bone Disease of Prematurity

PDE169

Whole Body MRI in Peripheral Nerve Sheath Tumor Syndromes: A Systematic Review

Education Exhibits
Location: S101B

Participants
Shivani Ahlawat MD (Presenter): Nothing to Disclose
Jaishri Blakely MD : Nothing to Disclose
Laura Marie Fayad MD : Nothing to Disclose

TEACHING POINTS
1. To review the current literature on the use of whole body magnetic resonance imaging (Wb-MRI) in patients with peripheral nerve sheath tumor syndromes, particularly neurofibromatosis types 1 and 2, and schwannomatosis. 2. To emphasize differences in technical parameters offered at 1.5T and 3T. 3. To describe the utility of WB-MRI for tumor detection (assessment of disease burden), characterization of peripheral lesions, and evaluation of treatment response in patients with peripheral nerve tumor syndromes.

TABLE OF CONTENTS/OUTLINE

• Review of Wb-MRI Techniques in current use
  o 1.5 T v 3.0 T
  o 2-Dimensional versus 3-Dimensional Imaging
  o Anatomic sequences
    T1 weighted
    Fluid sensitive STIR
    Static post contrast images
  o Functional Sequences
    Diffusion Weighted Image with Apparent Diffusion Coefficient Maps
  o Quantification of PNST size
    2-Dimensional (RECIST criteria) versus volumetric Analysis
    • Utility of Whole Body MRI in PNST syndromes
      o Detection
      Whole body benign PNST tumor burden
      • Mosaicism
      • Benign
      o Solitary
      o Plexiform
      • Malignant
      o Treatment response
      • Assessment of tumor burden following treatment

PDE170

“Children’s Twelve”: Cranial Nerves on Pediatric Brain MRI

Education Exhibits
Location: S101B
Participants
Jae-Yeon Hwang MD (Presenter): Nothing to Disclose
Hye-Kyung Yoon MD : Nothing to Disclose
Jeong Hyun Lee MD, PhD : Nothing to Disclose
Hee Mang Yoon MD : Nothing to Disclose
Ah Young Jung : Nothing to Disclose
Young Ah Cho : Nothing to Disclose
Jin Seong Lee MD : Nothing to Disclose
Chong Hyun Yoon : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is:
1. Review the radiological anatomy of the cranial nerves on MRI
2. To exhibit various diseases of cranial nerves in pediatric patients
3. To discuss the optimized MRI protocols for evaluating cranial nerves in pediatric patients

TABLE OF CONTENTS/OUTLINE
1. Summarized review on the cranial nerves 2. Review of the radiological anatom, clinical considerations, and imaging issues of each cranial nerves by using 3D reformatted MR image sets; Diseases may include - Congenital: absence or dysplasia, isolated or in association with other congenital anomalies or syndromes (e.g. mid facial anomaly, Duane retraction syndrome) - Inflammatory: primary or secondary neuropathies (e.g. multiple sclerosis, Miller-Fisher syndrome) - Tumorous: primary tumor or secondary involvement by intracranial or extracranial tumors (e.g. optic glioma, leukemic infiltration) - Miscellaneous 3. Technical issues of the pediatric cranial nerve imaging - Review of the high resolution 3D MR sequences for cranial nerves - Limitations of the cranial nerve imaging in pediatric patients - Optimization of the pediatric cranial nerve imaging

PDE171
Acute Cerebral Vascular Accident and Pre-wallerian Degeneration in Neonates: The Rapid Full 3 Tesla Magnetic Resonance Imaging of the Brain

Education Exhibits
Location: S101B

Participants
Alice P. Wang : Nothing to Disclose
Adrienne Frances Thompson MD : Nothing to Disclose
Yonker Yang Wang MD (Presenter): Nothing to Disclose

TEACHING POINTS
Acute CVA in Neonates, as it has significant prognostic implications. This case-based presentation highlights the benefits of rapid 3T MRI exams in detecting neonates with acute CVA, and how to evaluate Pre-wallerian degeneration.

TABLE OF CONTENTS/OUTLINE
The benefits of 3T MRI rapid full neonatal brain imaging of 100 neonates suspected of acute CVA by intracranial US are presented. Wide range of severity of acute ischemic infarct and intraparenchymal hemorrhage cases were detected with MRI exam while neonates were monitored, without sedation. 36 cases of Pre-wallerian degeneration detected. PWD was further defined, its imaging features and prognostic implications discussed. The timeline of the imaging findings related to presentation laid out, in order to highlight the potential of earlier detection of acute CVA and PWD using 3T MRI. Early discovering of neonatal CVA, particularly PWD on MR imaging is key to determining the disease prognosis. Though effective with 1.5 T MRI, its longer acquisition time predisposes the study to motion artefact, necessitating sedation for the study. Our experience shows that MR imaging at 3T is more effective in detecting the critical result of neonatal PWD in patients presenting with acute CVA, while not using any sedation. We favor the use of 3T MRI when to minimize the risk to the neonates undergoing MR imaging.

PDE173
Arterial Spin Labeling and its Application in Pediatric Neuroimaging

Education Exhibits
Location: S101B

Participants
David Zander MD (Presenter): Nothing to Disclose
Sanjay Padubidri Prabhu MBBS : Nothing to Disclose
Ellen Grant MD : Nothing to Disclose
Edward Yang MD, PhD : Research Consultant, CorticoMetrics LLC
Borjan Gagoski PhD : Nothing to Disclose
Richard Lee Robertson MD : Nothing to Disclose

TEACHING POINTS
The purpose of the exhibit is to: 1. Briefly review the concept of tissue perfusion. 2. Provide an overview of current methods of measuring cerebral perfusion, highlighting pros and cons in the pediatric population. 3. Define arterial spin labeling, illustrate labeling schemes, and describe technical aspects of performing the exam. 4. Detail the variety of arterial spin labeling applications in neuroimaging, with emphasis on unique utility within the pediatric population.

TABLE OF CONTENTS/OUTLINE
+What is perfusion, and how do we measure it? +Comparison of current cerebral perfusion methods -Exogenous diffusible tracers -Exogenous non-diffusible tracers +Endogenous tracers +Define arterial spin labeling (ASL) +Technical methods of ASL
PDE174

Back to the Basics: A Review of Congenital Spine Anomalies on Ultrasound with MRI Correlation

**Education Exhibits**

**Location:** S101B

**Participants**
- Shannon Farmakis MD (Presenter): Nothing to Disclose
- Vilas Shetty MD: Nothing to Disclose
- Marilyn J. Siegel MD: Research Consultant, Siemens AG Speakers Bureau, Siemens AG

**TEACHING POINTS**

1. Review the indications for performing spinal sonography in neonates and young infants
2. Review the normal anatomy of the spine on ultrasound, normal variants, and various spinal anomalies
3. Review correlating MRI findings in spinal anomalies

**TABLE OF CONTENTS/OUTLINE**

- Introduction
- Indications for spine ultrasound including review of various midline skin lesions in lower back and multiple congenital anomalies with high association for spinal anomalies
- Review indications for recommending spine MRI following screening ultrasound
- Embryology of spinal cord development
- Normal spine anatomy on ultrasound
- Normal variants on spine ultrasound with MRI correlation
- Spinal anomalies on ultrasound with MRI correlation

Summary

Spinal ultrasonography remains the imaging gold standard in screening pediatric patients with various skin lesions in the lower back as well as in patients with multiple congenital anomalies or known spinal dysraphism. MRI imaging is the next step in evaluating spine abnormalities. This exhibit aims to review the embryology of spinal cord development, review the normal anatomy of the spine on ultrasound, and then review the appearance of various spinal anomalies on both ultrasound and MRI.

PDE175

Clinical Application of F-18 FLT PET in Pediatric Brain Tumors

**Education Exhibits**

**Location:** S101B

**Participants**
- Yoshihiro Nishiyama MD (Presenter): Nothing to Disclose
- Yuka Yamamoto MD, PhD: Nothing to Disclose

**TEACHING POINTS**

The nucleoside analogue 3′-deoxy-3′-18F-fluorothymidine (FLT) with PET has been introduced for imaging cell proliferation. The purpose of this exhibit is: 1. To assess the clinical value of FLT PET in pediatric patients with brain tumors 2. To compare the uptake of C-11 methionine (MET) PET

**TABLE OF CONTENTS/OUTLINE**

1. FLT PET imaging in pediatric patients with brain tumors - Cerebellar astrocytoma - Medulloblastoma - Craniopharyngioma - Ependymoma - Germinoma - Brainstem glioma
2. Follow-up FLT PET imaging after therapy
3. Tumor recurrence vs. radiation necrosis

PDE177

Intracranial Lesions in Pediatric Patients with Sickle Cell Disease: A Review of Imaging Findings

**Education Exhibits**

**Location:** S101B

**Participants**
- Ronald William Mercer BA (Presenter): Nothing to Disclose
- Teresa Martin-Carreras BS: Nothing to Disclose
- Nicholas Paul McKenna BA: Nothing to Disclose
- Laura W. Bancroft MD: Nothing to Disclose
- Steven Anthony Messina MD: Nothing to Disclose

**TEACHING POINTS**

(1) Intracranial abnormalities in pediatric patients diagnosed with sickle cell disease include vascular stenosis/occlusion, moyamoya, cerebral atrophy, gliosis, non-hemorrhagic infarcts in large vascular and watershed distributions, postoperative changes after pial synangiosis, and osseous cranial abnormalities. (2) Transcranial sonography, computed tomography (CT), magnetic resonance imagining (MRI), MR angiography and conventional angiography provide valuable diagnostic information in the pre- and postoperative pediatric sickle cell patient.

**TABLE OF CONTENTS/OUTLINE**

> Introduction to CNS changes in pediatric patients with sickle cell disease
> Discuss common clinical indications for imaging studies in sickle cell patients ordered to assess the CNS
> Review imaging findings and discuss their prevalence in this population of patients:
- Vascular stenoses, occlusion and moyamoya
- Acute and chronic ischemic changes
- Specifically, the common areas involved (e.g., watershed versus lacunar infarcts)
- Cerebral atrophy and encephalomalacia
- Postoperative changes from
Intracranial Pediatric Arteriovenous Malformations: A Review of AVM Grades, Treatment Modalities and Outcomes

**Education Exhibits**

**Location:** S101B

**Participants**

- Teresa Martin-Carreras BS (Presenter): Nothing to Disclose
- Ronald William Mercer BA: Nothing to Disclose
- Nicholas Paul McKenna BA: Nothing to Disclose
- Laura W. Bancroft MD: Royalties, Wolters Kluwer nv
- Frank Hellinger MD: Nothing to Disclose
- Steven Anthony Messina MD: Nothing to Disclose

**TEACHING POINTS**

1. Discuss the clinico-radiological features in pediatric Spetzler-Martin grades I-V arteriovenous malformations.
2. Elucidate the varying treatment modalities available for pediatric intracranial arteriovenous malformation.
3. Discuss outcomes of single-modality, dual-modality, and triple-modality treatment approaches.

**TABLE OF CONTENTS/OUTLINE**

> Epidemiology and pathophysiology of arteriovenous malformations (AVMs) > Key differences between pediatric and adult AVMs > AVM Spetzler-Martin grading scale > Imaging Findings - Conventional MRI/MRA - Digital Subtraction Angiography (DSA) > Current treatment modalities for pediatric AVMs - Microsurgery, Endovascular Embolization, Radiosurgery > Expected post-treatment findings following embolization and radiosurgery. > Treatment outcomes of pediatric AVMs - Post-procedural obliteration rates > Future directions and summary

**Mimics in Pediatric Neuroradiology: Cases of Mistaken Identity**

**Education Exhibits**

**Location:** S101B

**Participants**

- Asha Sarma MD (Presenter): Nothing to Disclose
- Narayan Viswanadhan MD: Nothing to Disclose
- Sanjay Padubidri Prabhu MBBS: Nothing to Disclose
- Michelle Silvera MD: Nothing to Disclose

**TEACHING POINTS**

Imaging mimics are not uncommon in pediatric neuroradiology. Accurate diagnosis guides optimal management. This exhibit: 1) Familiarizes the radiologist with similar appearing pediatric neuroradiological entities in order to broaden differential diagnosis, improve diagnostic accuracy, and guide optimal management 2) Teaches the radiologist to select additional imaging tests that clarify diagnosis. 3) Discusses clinical features, multimodality imaging signs, and therapeutic considerations in several challenging cases of easily mistaken entities in pediatric neuroradiology.

**TABLE OF CONTENTS/OUTLINE**

Cases will be presented in quiz format. Key differential diagnostic, clinical and imaging semantic, and management considerations will be discussed each case. Case selection with mimicked entity in parentheses: Intracranial aneurysm (tumor) CNS vasculitis (tumor) Vein of Galen malformation (pineal cyst) Spinal cord infarction (tumor) Tumefactive demyelination (tumor, tumoral edema) Giant tumefactive perivascular spaces (vascular lesion) Cavernoma (glioma) Callosal lipoma (ruptured dermoid) Cerebritis (glioma) Limbic encephalitis (glioma) Sphenoid bone fibrous dysplasia (sarcoma) Pyogenic abscess (centrally necrotic tumor) Racemose neurocysticercosis (ependymal cyst) Hirayama disease (epidural mass/abscess)

**MR Imaging Spectrum of Retinoblastoma**

**Education Exhibits**

**Location:** S101B

**Certificate of Merit**

**Participants**

- Samajit Singh Ghuman MBBS, MD (Presenter): Nothing to Disclose
- Seema Sud MBBS: Nothing to Disclose
- Tarvinder Bir Singh Buxi MD: Nothing to Disclose
- Jigar Vasantlal Zota MBBS: Nothing to Disclose
- Aditi Sud: Nothing to Disclose

**TEACHING POINTS**

After viewing this abstract it should be possible to describe - 1) Various MR imaging appearances and growth patterns of Retinoblastoma and associated findings in the globe such as vitreous and retinal haemorrhage/ detachment 2) Findings which indicated scleral/choroidal/optic nerve involvement and extra ocular extension 3) MR imaging in advanced tumours, including optic chiasm, meningeal and bony involvement as well as associated tumours

**TABLE OF CONTENTS/OUTLINE**
PDE181

MRI of Bone Marrow Patterns in the Developing Head and Spine

Education Exhibits
Location: S101B

Participants
Samuel Issac Frost DO (Presenter): Nothing to Disclose
Jamie R. Ledford MD: Nothing to Disclose
Teresa Gross Kelly MD: Nothing to Disclose

TEACHING POINTS
Teaching Points: i. Pattern of MRI bone marrow signal of the pediatric head and spine changes as the child develops from infancy through adolescence. ii. MRI bone marrow signal pattern of the head and spine becomes altered in select disease states that affect the marrow and cortex. iii. A systematic approach to the analysis and characterization of pediatric MRI bone marrow signal in both the normal and abnormal state can facilitate detection and diagnosis of pathology.

TABLE OF CONTENTS/OUTLINE
Table of Contents/Outline: I. Review normal pediatric bone marrow anatomy, physiology, histology and how it corresponds to MR imaging pattern in the developing head and spine. II. Review expected bone marrow changes in the pediatric head and spine from the fetus through 25 years of age. III. Provide examples of abnormal pediatric MRI bone marrow signal in the following categories of disease states: a. Trauma b. Infection c. Neoplasm d. Congenital e. Autoimmune f. Iatrogenic/treatment related

PDE182

Neuroimaging Findings in Pediatric Genetic Skeletal Disorders: A Pattern-recognition Approach

Education Exhibits
Location: S101B

Participants
Matthias W. Wagner MD (Presenter): Nothing to Disclose
Andrea Poretti MD: Nothing to Disclose
Thangamadhan Bosemani MD, FRCR: Nothing to Disclose
Jane Ellen Benson MD: Nothing to Disclose
Thierry Huisman MD: Nothing to Disclose

TEACHING POINTS
Genetic skeletal disorders (GSD) are a group of disorders characterized by abnormality in growth and remodeling of cartilage and bone. Many GSD are systemic disorders with involvement of other organs including the central nervous system (CNS). CNS abnormalities have a significant impact on long-term prognosis of children with GSD and should not be missed. Early diagnosis of CNS involvement is important in the management of GSD. This pattern-recognition approach aims to be helpful in the diagnostic work-up of children with GSD and their management.

TABLE OF CONTENTS/OUTLINE
The 2010 Revision of the Nosology and Classification of Genetic Skeletal Disorders includes 456 conditions. We included all conditions (n=177) with CNS involvement. The diseases are classified based on the skeletal involvement (skull and/or trunk and/or limbs and/or acra). Skeletal involvement was defined in accordance with OMIM (Online Mendelian Inheritance of Man). The CNS involvement has been described based on an extensive literature search. Selected examples will be shown based on prevalence of the diseases and significance of the CNS involvement. Early diagnosis of CNS involvement is important in the management of GSD. Here we provide a pattern-recognition approach for neuroimaging findings in GSD.

PDE183

Neuroimaging Findings in Pediatric Patients with Hereditary Hemorrhagic Telangiectasia

Education Exhibits
Location: S101B

Participants
Faizah Mohd Zaki MD (Presenter): Nothing to Disclose
Prakash Muthusami MBBS, MD: Nothing to Disclose
Suzanne Laughlin MD: Nothing to Disclose
Felix Ratjen: Nothing to Disclose
Helen Maree Branson MBBS, FRCR: Nothing to Disclose

TEACHING POINTS
At the end of this exhibit, learner will be able to: 1. describe the typical brain findings in Hereditary Hemorrhagic Telangiectasia among pediatric population based on the different types of cerebral arterio-venous malformation (CAVM). 2. explain the use of different imaging modalities in diagnosing CAVM and their utilization in the treatment management.

TABLE OF CONTENTS/OUTLINE
1. The diagnostic criteria of HHT in pediatric population and the associated genetic mutation related to HHT. 2. The role of brain MRI screening in the detection of CAVM in HHT patients. 3. The types of CAVM that are found in HHT pediatric population
ranging from developmental venous anomaly, cavernoma, arterial venous fistula and arteriovenous malformation, demonstrated by different imaging modalities including MRI, CT and angiography. 4. The intracranial complication of HHT depicted on neuroimaging.

PDE184

Pediatric Brainstem Pathologies: A Comprehensive Approach on MR Imaging

Education Exhibits
Location: S101B

Participants
Chandan Kakkar MBBS, MD (Presenter): Nothing to Disclose
Kavita Saggi MD : Nothing to Disclose
Jatinder Singh Goraya MD : Nothing to Disclose
Archana Ahluwalia MD : Nothing to Disclose
Tanica Jain MBBS : Nothing to Disclose
 Siddharth Prakash : Nothing to Disclose
Satwant Singh Khela MBBS : Nothing to Disclose
Navdeep Singh MBBS, MD : Nothing to Disclose

TEACHING POINTS
To illustrate MR imaging patterns of various pathologies affecting pediatric brainstem and to develop an imaging approach to diagnosis of brainstem pathologies

TABLE OF CONTENTS/OUTLINE
To illustrate the imaging patterns of diseases with specific predilection of brainstem and typical pattern on imaging, eg. Maple syrup Urine disease, Leigh's disease, Brainstem Glioma, Osmotic myelinolysis, probable HEMS. Diseases affecting brainstem as a part of generalised CNS disease: ADEM -Isolated brainstem , Multiple sclerosis , Tubercular granulomas, Rabies encephalitis, Limbic encephalitis, Severe Hypoxic ischemic encephalopathy, Viral encephalitis Non-specific affection of the brain stem - Central tegmental hyperintensity. To discuss the various differentials and highlight the clinical and imaging points differentiating these conditions. Brainstem is a target for many pathologies having an overlapping clinical and imaging pattern. MRI plays a pivotal role in these conditions helping in arriving at specific diagnosis in a few conditions which is of prime importance in management and predicting the outcome.

PDE185

Pediatric Cochlear Implantation. Neuroimaging Evaluation in the Multidisciplinary Assesment of Children with Special Needs

Education Exhibits
Location: S101B
Certificate of Merit

Participants
Marcela De la Hoz Polo MD (Presenter): Nothing to Disclose
Monica Rebollo MD : Nothing to Disclose
Natalia Coll Alsina : Nothing to Disclose
Victor de Diego Almarza : Nothing to Disclose
Jesus Rodriguez Jorge : Nothing to Disclose
Sophia Ourani : Nothing to Disclose
Maria Antonia Claveria Puig : Nothing to Disclose

TEACHING POINTS
1. Neuroimaging preoperative assesment of the temporal bone. Anatomic factors that may make electrode insertion difficult or result in electrode malposition 2. Inner ear malformations that may occur in pediatric cochlear implantation (CI) candidates 3. Neuroimaging findings in children with sensorineural hearing loss (SNHL) and special needs 4. Review of the overall indications/contraindications for CI. New indications in children with special needs. 5. The role of the multidisciplinary team (ORL, psychologist, speech therapist, neuropediatrician, social worker, radiologist) 6. Postoperative imaging of the CI

TABLE OF CONTENTS/OUTLINE

PDE186

Pediatric Neuro-Ophthalmic Syndromes: Comprehensive Ocular and Brain Imaging

Education Exhibits
Location: S101B

Participants
Vaishnavi Batmanabane MBBS, MS (Presenter): Nothing to Disclose
Manohar Meghraj Shroff MD : Nothing to Disclose
Prakash Muthusami MBBS, MD : Nothing to Disclose
Elise Heon MD : Nothing to Disclose

TEACHING POINTS
The complementary role of neuro imaging (CT and MRI) and ocular imaging (optical coherence tomography - OCT and ocular ultrasonography - USG) for a comprehensive assessment of pediatric neuro-ophthalmic syndromes. The enhanced understanding of symptomatology and pathophysiology of these syndromes provided by OCT and USG. The limitations of these investigations in this setting.

TABLE OF CONTENTS/OUTLINE

- Pediatric neuro-ophthalmic syndromes: Phenotypes and imaging characteristics
  - Syndromic retinal degeneration: Joubert syndrome - Developmental anomalies: CHARGE, Morning Glory syndrome
  - Seizure syndromes: Aicardi - Vascular syndromes: Sturge Weber - Phakomatoses: Tuberous sclerosis
  - Ocular masses: Retinoblastoma

- The role of specialized ophthalmic investigations like OCT and USG
- Additional information provided over CT and MRI for diagnosis and management
- Clinical scenarios in which they would be relevant
- Limitations

PDE187

Susceptibility-Weighted MRI in Acute Lymphocytic Leukemia: Petechial Brain Hemorrhage in the Setting of Hyperleukocytosis

Education Exhibits
Location: S101B

Participants
Michael Eric Stone MD (Presenter): Nothing to Disclose
Karyn Alayne Ledbetter MD : Nothing to Disclose
Sheena Saleem MD, MBBS : Nothing to Disclose
Deniz Altnok MD : Nothing to Disclose

TEACHING POINTS

1. Intracerebral hemorrhage is common in patients with acute leukemia accounting for approximately 20% total mortality. 2. Hyperleukocytosis is defined as a peripheral white blood cell count exceeding 100,000/ml and is not uncommon in patients presenting with acute lymphocytic leukemia (ALL). 3. Hyperleukocytosis is associated with intracranial hemorrhage, proposed to occur secondary to venous congestion due to hyperviscosity. Thrombocytopenia is a confounding factor. 4. Larger hemorrhages can be identified on CT or routine MRI sequences. Susceptibility-weighted MRI (SWI) is much more sensitive for detecting chronic petechial hemorrhage and should be considered in all ALL patients with hyperleukocytosis. 5. Imaging findings include diffuse small blooming foci on susceptibility-weighted sequences. These lesions may be faintly seen on diffusion-weighted sequences and should be scrutinized in the absence of dedicated SWI. These imaging findings will be reviewed using case based examples.

TABLE OF CONTENTS/OUTLINE

I. INTRODUCTION TO ACUTE LYMPHOCYTIC LEUKEMIA II. HYPERLEUKOCYTOSIS A. DEFINITION B. PATHOPHYSIOLOGY OF HYPERVISCOSITY III. IMAGING FINDINGS OF PETECHIAL HEMORRHAGE IN HYPERLEUKOCYTOSIS A. UTILITY OF STANDARD MRI B. UTILITY OF SUSCEPTIBILITY-WEIGHTED IMAGING IV. CASE EXAMPLES V. DIFFERENTIAL CONSIDERATIONS

PDE188

The Role of Advanced Neuroimaging Techniques in Preoperative Planning in Brainstem Expanding Lesions in Childhood

Education Exhibits
Location: S101B

Participants
Cristina Utrilla MD (Presenter): Nothing to Disclose
Arancha Royo MD : Nothing to Disclose
Fernando Carceller : Nothing to Disclose
Amelia Fernandez Zubillaga : Nothing to Disclose
Remedios Frutos MD : Nothing to Disclose
Begona Marin Aguilera : Nothing to Disclose
Alberto Alvarez Muelas MD : Nothing to Disclose
Gonzalo Garzon MD : Nothing to Disclose

TEACHING POINTS

Deciding the appropriate neurosurgical approach to a brainstem mass requires close interaction between radiologists & neurosurgeons. Once an approach is decided, location of arteries & cranial nerves near the planned access point, white matter tract mapping & volumetric assessment of the tumor in relation to posterior fossa landmarks help increase the efficiency of surgery while minimizing adverse effects. Advanced MR techniques allow diagnosis of focal brainstem gliomas, susceptible to surgical treatment, as well as attempt to predict tumor growth pattern and behavior. Preoperative neuroimaging evaluation allows performing brainstem surgery with acceptable morbidity & mortality rates.

TABLE OF CONTENTS/OUTLINE

- Cases: we reviewed 45 cases of brainstem gliomas and 1 cavernoma treated in our institution (24 surgically)
- Preoperative imaging protocol: MRI (T2WI, FLAIR sequences, pre and post-gadolinium T1, DWI, MR-angiography; 20 cases also had MR-Spectroscopy and DTI) and MDCT (MPR and volumetric reconstructions)
- Discussion & Conclusion: The aim of this exhibit is to describe our experience in a neuroimaging based approach selection by showing several examples of pre-surgical planning. Collaboration between surgeons and radiologists allows highly complex and risky approaches such as the Kawase triangle and the telovelar approach, with acceptable outcomes

PDE190

Benign and Malignant Hepatic Liver Focal Lesions in Infant and Children

Education Exhibits
Location: S101B

Participants
Settimo Caruso : Nothing to Disclose
TEACHING POINTS

The aim of this exhibit is to describe the wide spectrum of benign and malignant focal liver lesions affecting infant and children, with radiological/pathological correlation in representative cases.

TABLE OF CONTENTS/OUTLINE

Imaging findings (CT, MRI, US) of benign and malignant focal lesions with radiological/pathological correlation will be described in representative cases: Hydatid Cyst, Rigenerative Nodular hyperplasia, Focal Nodular Hyperplasia, Hepatic Adenomatosis, Hemangiomas, Hepatic epitheloid hemangioendothelioma, Hepatoblastoma, Hepatocellular carcinoma, Infantile hepatic Hemangioma, Fibroendothelioma, Hepatic sarcoma, Cholangiocarcinoma, Post Transplant Lymphoproliferative Disease.

PDE191
BIOLOGICAL CHARACTERIZATION OF NEUROBLASTOMAS USING 18 F FDG PET/CT, 131 I MIBG AND SOMATOSTATIN RECEPTOR IMAGING AND ITS ROLE IN PRESURGICAL STAGING AND MANAGEMENT

Education Exhibits
Location: S101B

Certificate of Merit

Participants

Sneha Ashok Shah (Presenter): Nothing to Disclose
Nilendu Chandrakant Purandare DMRD: Nothing to Disclose
Archi Agrawal MBBS: Nothing to Disclose
Seema A. Medhi DMRD: Nothing to Disclose
Venkatesh Rangarajan MBBS: Nothing to Disclose
Chaitali Bongulwar MBBS: Nothing to Disclose

TEACHING POINTS

Role of FDG PET/CECT in pre surgical staging of Neuroblastomas. Demonstrate utility of Radionuclide Imaging in treatment response assessment and dilemmas Explore the complex biology of Neuroblastoma using different receptor expression and its future use in therapeutics.

TABLE OF CONTENTS/OUTLINE

18 F FDG PET/CECT in neuroblastomas - As image guided risk factor in presurgical staging (INRGSS) - Comparison with 131 I MIBG and incremental value. - Complementary role in response assessment along with 131 I MIBG - Utility in Restaging Understand complex tumor biology of Neuroblastoma - radionuclide imaging to identify expression of somatostatin, GLUT and nor epinephrine. Use of phenotypes information for therapeutics in future.

PDE193
FIBROBLASTIC AND MYOFIBROBLASTIC TUMORS OF CHILDHOOD AND ADOLESCENCE

Education Exhibits
Location: S101B

Cum Laude
Selected for RadioGraphics

Participants

Kiran Mahadev Sargar MBBS, MD (Presenter): Nothing to Disclose
Geetika Khanna MD, MS: Nothing to Disclose
Elizabeth Fowler Sheybani MD: Nothing to Disclose

TEACHING POINTS

Fibroblastic-myofibroblastic tumors account for about 12% of pediatric soft tissue tumors. Though most are benign, they can be locally aggressive and occasionally malignant. Most fibrous tumors have low signal intensity on T1 images, and variable signal on T2 weighted images depending on stage of proliferation. Diagnosis of Gardner fibroma may represent initial presentation of underlying familial adenomatous polyposis syndrome. Desmoid fibromatoses is locally aggressive neoplasm that has tendency to recur locally without evidence of metastatic spread. It has association with Gardner syndrome. Juvenile nasopharyngeal angiofibroma is a benign tumor that appears as an intensely enhancing mass along the pterygomaxillary fissure. Infantile fibrosarcoma tend to have multiple flow voids on MRI and can mimic hemangiomas and kaposiform hemangioendothelioma.

TABLE OF CONTENTS/OUTLINE

1. WHO classification of pediatric fibrous tumors - A. Pseudosarcomas (Nodular fasciitis) B. Fibromas (Gardner fibroma) C. Fibromatoses (Infantile myofibroma, Fibromatosis coli, Nasopharyngeal angiofibroma) D. Intermediate tumors (Desmoid, Inflammatory myofibroblastic tumor, Lipofibromatosis, Infantile fibrosarcoma) E. Sarcomas (Low grade fibromyxoid sarcoma) 2. We will discuss clinical, pathologic and imaging features of these common pediatric fibrous tumors.

PDE194
FROM ACS TO AVN: A COMPREHENSIVE GUIDE TO THE SYSTEMIC IMAGING CHARACTERISTICS AND RADIOLOGIC MANAGEMENT OF SICKLE CELL DISEASE

Education Exhibits
Location: S101B

Certificate of Merit
TEACHING POINTS

The purpose of this exhibit is to: Discuss the etiology and pathophysiology of sickle cell disease. Review the characteristic and uncommon findings sickle cell disease on MRI, CT, ultrasound, radiograph, and scintigraphy. Discuss the complications of the disease and the radiologist's role in minimizing morbidity and mortality. Highlight the current recommendations for imaging sickle cell patients in the acute and clinical setting, with a discussion of research regarding the use of intravenous contrast in these patients.

TABLE OF CONTENTS/OUTLINE

The genetics and pathophysiology of sickle cell disease (SCD). Case-based review of the systemic findings of SCD: Musculoskeletal: bone infarcts, marrow repopulation, osteomyelitis, osteonecrosis, septic arthritis. Abdominal: splenic infarct, cortical nephrocalcinosis. Chest: cardiomegaly, mosaics attenuation of lung parenchyma, ground glass opacities related to reperfusion of infarcted lung, fibro-inflammatory changes. Discussion of the complications and natural progression of the disease. Review current recommendations for imaging sickle cell patients in the acute and clinical setting, including the use of intravenous contrast.

PDE195

Imaging in Paediatric Renal Tumors: How Can a Radiologist Contribute in Effective Management?

Education Exhibits

Location: S101B

Participants

Seema Ashish Kembhavi MD, DMRD (Presenter): Nothing to Disclose
Sajid Qureshi MS : Nothing to Disclose
Girish Chinnaswamy : Nothing to Disclose
Siddhartha Laskar MD : Nothing to Disclose
Mukta Ramadwar : Nothing to Disclose
Sneha Ashok Shah : Nothing to Disclose

TEACHING POINTS

Atypical imaging features that can point to a non-Wilms' tumor diagnosis Pros and cons of National Wilms' Tumor Study (NWTS) and International Society of Paediatric Oncology (SIOP) approach Using imaging for selecting patients: can we get the best of both worlds?

TABLE OF CONTENTS/OUTLINE


PDE196

Imaging of Early and Late Effects of Cancer Therapy in Children

Education Exhibits

Location: S101B

Certificate of Merit

Participants

Govind Babusing Chavhan MD (Presenter): Nothing to Disclose
Paul S. Babyn MD : Nothing to Disclose
Paul Nathan MD, FRCP: Nothing to Disclose
Sue Creviston Kaste DO : Nothing to Disclose

TEACHING POINTS

1. Effects of cancer therapy in children can be seen in early survival period or later in life in almost all organ systems of the body. 2. Many of these conditions are evaluated by imaging and some are diagnosed based on characteristic imaging features.

TABLE OF CONTENTS/OUTLINE

Introduction
Common therapy options in childhood cancers
Early (during therapy) and late (after end of therapy) effects of cancer therapy
Therapy related conditions with illustration of imaging features in various systems :
- Endocrine system- Hypothyroidism, Growth Hormone deficiency, short stature BMD deficits, delayed bone age
- Pulmonary- Interstitial lung disease, parenchymal alterations, fibrosis, scarring, volume loss
- Hepatobiliary- Focal nodular hyperplasia, cholelithiasis, fibrosis, iron deposition
- Genitourinary- Renal atrophy, hemorrhagic cystitis, acquired vaginal occlusion
- MSK- Osteonecrosis, cortical changes, marrow conversion, osteoporosis bone mineral density deficits , scoliosis, myositis., osteochondromas, radiation osteitis, premature physeal closure, asymmetric physeal closure, marrow fibrosis, post XRT growth disturbances, asymmetric growth
- Muffisystem- GVHD, PTLD, Secondary malignancies
Summary and Teaching points
References
Pediatric Lymphomas: Update on Imaging Findings

**Participants**
- Maria Virginia Trujillo Ariza MD (Presenter): Nothing to Disclose
- Annelies Coessens MD: Nothing to Disclose
- Maria Cruz Ageitos Casais MD: Nothing to Disclose
- Andres Lopez Carballeira MD: Nothing to Disclose
- Mercedes Linares Paz MD: Nothing to Disclose
- Julia Cortez Hernandez MD: Nothing to Disclose

**TEACHING POINTS**
- To review the epidemiology and presentation of Hodgkin’s lymphoma (HL) and non-Hodgkin’s lymphoma in the pediatric age population.
- To describe the anatomopathological classification of HL and NHL.
- To describe the utility of the different imaging techniques (x-ray, US, TC, MRI, and PET) in the diagnosis and follow-up of these patients.
- To review the principal imaging findings on pediatric’s HL and NHL and summarize some of the main treatment complications.
- To analyze the main criteria for the evaluation of therapeutic response.

**TABLE OF CONTENTS/OUTLINE**
- Epidemiology and presentation of HL and NHL
- Anatomopathological classification of HL and NHL
- Utility of imaging techniques: x-ray, US, TC, MRI, and PET
- Imaging findings for: initial diagnose and treatment complications
- Therapeutic response.

The Role of MIBG SPECT/CT in Neuroblastoma: A Pictorial Review

**Participants**
- Olivia Carney FFR(RCSI) (Presenter): Nothing to Disclose
- Lorenzo Blassoni MBBS: Nothing to Disclose
- Marina Easty FRCR: Nothing to Disclose

**TEACHING POINTS**
- Neuroblastoma is the third commonest childhood tumour after leukaemia and brain malignancies. I-123-labelled MIBG scintigraphy is considered the best diagnostic technique for evaluation of disease activity at presentation and at follow-up with a reported sensitivity of 93% and specificity of almost 100%. Interpretation of CT and MRI after surgery or radiotherapy can be challenging but integration with MIBG SPECT enables a direct correlation of anatomic information and functional information resulting in better localization and definition of scintigraphic findings. Objectives of this pictorial review: To review the contribution of MIBG SPECT/CT in diagnosis of Neuroblastoma. To illustrate the diagnostic usefulness of MIBG SPECT/CT in the assessment of Neuroblastoma post treatment including improved disease localization and identification of metastatic disease.

**TABLE OF CONTENTS/OUTLINE**
- MIBG SPECT/CT plays a useful role in the diagnosis and follow-up of Neuroblastoma. It improves image interpretation and therefore assists in future treatment planning. This pictorial review includes cases demonstrating the benefits of MIBG SPECT/CT including: Accurate anatomic localization of the pathologic site. Detection of metastatic disease. Differentiating postsurgical changes from recurrent disease. Early detection of disease relapse.

Whole-body Magnetic Resonance Imaging of Neuroblastoma to Reduce Radiation Exposure: Effectiveness for Follow-up, Re-staging and Evaluation of Disease Response to Therapy

**Participants**
- Mototaka Miyake MD (Presenter): Nothing to Disclose
- Yoshiaki Watanabe MD: Nothing to Disclose
- Masakatsu Tsurusaki MD, PhD: Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAIICHI SANKYO Group Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAIICHI SANKYO Group
- Yasuaki Arai: Nothing to Disclose

**TEACHING POINTS**
- Neuroblastoma (NB) requires multimodal diagnostic imaging methods including radiography, CT, metaiodobenzylguanidine (MIBG) scintigraphy, and bone scintigraphy, FDG-PET, and MRI. Whole-body MRI (WB-MRI) which enables both local staging and detection of metastatic spread in one approach is useful to minimize radiation exposure during the sequential evaluation of younger patients. This exhibit will show the usefulness and the limitation of WB-MRI for follow-up, re-staging and evaluation of disease response to therapy of NB.

**TABLE OF CONTENTS/OUTLINE**
- Quick Review of the clinical and the multimodal imaging manifestations of neuroblastoma with emphasis on WB-MRI.
- Introduction of management strategies for follow-up, re-staging and evaluation of disease response to NB.
- 3. MR imaging techniques to improve quality and consistency in evaluation. The transversal 2D sequential scan including STIR, T2WI, DWI, pre-contrast DIXON and post-contrast DIXON and the high-resolution 3D scan, both of which can be obtained exactly at
isocenter, provide seamless images without the boundary artifacts and the distortion. The total scan time of all the sequences is ranging from 45 min to 60 min. 4. Case-based review of recurrence, metastatic disease, treatment response and post-therapeutic surveillance. 5. Pitfalls and limitations of WB-MRI.

PDE201

Child Abuse Injuries: Spectrum of Imaging Findings

**Education Exhibits**

**Location:** S101B

**Participants**

- Alba Lucia Reyes Ortiz MD (Presenter): Nothing to Disclose
- Maria Isabel Garcia-Hidalgo MD: Nothing to Disclose
- Purificacion Calvo: Nothing to Disclose
- Sonia DieguezTapias MD: Nothing to Disclose
- Lina Marcela Cruz Hernandez ARR: Nothing to Disclose
- Maria TERESA Herrera Lopez MD: Nothing to Disclose

**TEACHING POINTS**

Child abuse or nonaccidental trauma (NAT) is a fairly common condition. Its diagnosis is a challenge, however it is imperative that this diagnosis be made to prevent further physical, mental, and emotional harm to the affected children. The radiologist plays a fundamental role in order to document the abuse. The purpose of this paper is to review the clinical and radiologic spectrum of child abuse signs, through the description, analysis of the mechanism and classification of radiological findings of inflicted lesions, by implementing schemes applied to real cases of our hospital, because the key to diagnosing child abuse early is to know and recognize its radiological signs and to keep a high clinical suspicion.

**TABLE OF CONTENTS/OUTLINE**

- Background. - Review of the image appearance in the findings of child abuse with a systematic approach to interpretation. - Description of the skeletal injuries in extremities, spine, scapula, and rib cage, as well as head injuries. - Medical illustrations - Tables - CT, X-Rays and MRI images from cases of our hospital.

PDE202

Do We Need All the Radiographs in a Skeletal Survey for Suspected Non Accidental Injury? Experience from a Paediatric Tertiary Referral Centre and Up to Date Literature Review

**Education Exhibits**

**Location:** S101B

**Participants**

- Walid Al-Deeb MBBS, MRCP (Presenter): Nothing to Disclose
- Joanne Warner MBChB, MRCS: Nothing to Disclose
- Farhat Bano: Nothing to Disclose
- Caren Landes: Nothing to Disclose

**TEACHING POINTS**

1- To gain awareness of the current Non-Accidental Injury skeletal survey guidelines and potential anticipated changes. 2- To beware of pitfalls in Non-Accidental Injury skeletal survey assessment, particularly pertaining to the spinal region. 3- An invaluable imaging review of the classical injuries seen in child abuse.

**TABLE OF CONTENTS/OUTLINE**

- Current UK and US skeletal survey guidelines in suspected non accidental injury. Elaborate on contemporary discussions relating to the exclusion of certain radiographs from the skeletal survey with reference to the current literature. - Analysis of 189 skeletal surveys reviewed by a Paediatric Radiologist with extensive experience as an expert witness in child protection proceedings. Common fractures encountered (Table 1) Pitfalls of spinal imaging (Figure 1) Charts comparing which view the fracture was commonly seen in (for ribs and skull) ; (Figure 2) How our data compares with current literature. - Images of some of the fractures from our cases as an essential refresher of the more typical injuries seen in child abuse. (Figure 4) - Discuss the need for an updated template in light of our findings and the published literature, with reference to the ALARA principle to obviate exposure to unnecessary ionising radiation.

PDE203

Get a Handle on Handlebar Injuries: Multimodality Assessment of Common and Uncommon Handlebar Injuries in Pediatric Patients

**Education Exhibits**

**Location:** S101B

**Participants**

- Nourolhoda Birouti MD (Presenter): Nothing to Disclose
- Benjamin Teichman Addicott MD, MS: Nothing to Disclose
- John Joseph Krol MD: Nothing to Disclose
- Katharine Lee Hopkins MD: Nothing to Disclose
- Petra Vajtai MD: Nothing to Disclose
- Kelli Ruth Schmitz MD: Research Consultant, Agfa-Gevaert Group

**TEACHING POINTS**

1. To review the mechanism responsible for abdominal handlebar injuries. 2. To illustrate handlebar injuries resulting in visceral, intestinal, soft tissue, and vascular trauma. 3. To illustrate how imaging contributes to diagnosis and management of handlebar injuries.

**TABLE OF CONTENTS/OUTLINE**
**PDE204**

**Novel and Unique Applications of Contrast Enhanced Ultrasound (CEUS) as a Bedside Problem-solving Tool in the Management of the Acute Pediatric Patient**

*Education Exhibits*

*Location: S101B*

**Certificate of Merit**

**Participants**

- Annamaria Deganello MD (Presenter): Speaker, Bracco Group
- Eleni Konstantatou MD, MSc: Nothing to Disclose
- Anu Obare MBBS: Nothing to Disclose
- Maria E. Sellars MD, FRCR: Nothing to Disclose
- Paul Singh Sidhu MRCP, FRCR: Speaker, Bracco Group Speaker, Siemens AG Speaker, Hitachi, Ltd

**TEACHING POINTS**

We illustrate the benefits of bedside use of CEUS in a variety of acute pediatric medical problems, in which it contributes to achieve immediate effective patient management, without recourse to CT and MR imaging, eliminating radiation exposure and the need for sedation.

**TABLE OF CONTENTS/OUTLINE**

CEUS is a rapid, safe, radiation-free and accurate technique that, despite remaining "off-label" in the context of pediatric imaging, proves to be extremely beneficial for this group of patients, and has an expanding role in children with the desire to reduce radiation exposure. This pictorial review illustrates a variety of unusual cases where CEUS was tremendously effective in the immediate diagnosis of abnormalities and in the acute management of pediatric patients. CEUS imaging findings of complicated pneumonias, biliary complications of liver transplant and inflammatory bowel disease are described. We also display examples of intra-cavitary use of CEUS, a novel application of this method, with diluted microbubbles being injected through thoracic and biliary catheters, which allows exact localization of the drains and accurate measurement and detection of complications of drained fluid collections or bile ducts.

**PDE205**

**Surviving to Pediatric Diseases: New Faces of Disease in Adults (Long Term Complications and New Ones)**

*Education Exhibits*

*Location: S101B*

**Participants**

- Maria Pardo-Antunez (Presenter): Nothing to Disclose
- Xavier Merino-Casabiel MD: Nothing to Disclose
- Ana Coma RT: Nothing to Disclose
- Victor Sanchez Pineda MD: Nothing to Disclose
- Sergi Quiroga MD: Nothing to Disclose
- Rosa Dominguez-Onoro MD: Nothing to Disclose

**TEACHING POINTS**

Review the complications that may arise in adults from therapy and long-term survival of pediatric diseases. Describe the spectrum of radiological findings, with an emphasis in MRI and CT.

**TABLE OF CONTENTS/OUTLINE**

Therapeutic advances in the treatment of a wide range of pediatric diseases have improved the prognosis of life. The rate of long-term survival of these patients, which may be almost normal, has also increased the risk of developing other complications of their underling disease or long-term complications related to treatment. It can be a challenge for radiologist identify them for not being aware. We illustrate these "new faces of disease" with examples of emerging complications of diseases secondary to survival rate improvement (Cystic fibrosis and Distal intestinal obstruction syndrome) or long-term complications related to the treatment that the no pediatric radiologist is not aware (Repaired congenital heart disease and liver cirrhosis and/or tumors, Radiotherapy or grow-hormone replacement and vascular diseases, Radiotherapy or immunosupressor treatments and secondary neoplasm). In conclusion, radiologists should be familiar with the long-term consequences of therapy or unusual presentation of some diseases because the long-term prospects of survival associated with these diseases.

**PDE206**

**The “DWIBSlight” Saga: Breaking Dawn - Shedding Light on DWIBS Imaging in Pediatric Patients**

*Education Exhibits*

*Location: S101B*

**Certificate of Merit**
Participants
Monica Epelman MD (Presenter): Nothing to Disclose
Carolina V. Guimaraes MD: Nothing to Disclose
David Dinan MD: Nothing to Disclose
Craig M. Johnson DO: Nothing to Disclose
Lané F. Donnelly MD: Author with royalties, Reed Elsevier Author with royalties, Amirsys, Inc

TEACHING POINTS
-To identify indications for DWIBS imaging in children -To review normal DWIBS appearances in different body regions and understand imaging pitfalls -To illustrate examples of pathological conditions

TABLE OF CONTENTS/OUTLINE
DWIBS, diffusion-weighted whole body imaging with background body signal suppression, is a free-breathing, fast MRI sequence that does not require contrast. It is based on the detection of random Brownian motion of water over very small distances. DWIBS is an alternative to PET imaging in pediatric patients due to the lack of radiation. Technical aspects of DWIBS and the current role of the method in pediatric imaging will be presented.

1. Background
2. Normal appearances
3. Pitfalls
4. Abnormal examples in oncology imaging
5. Summary

PDE207
Utility of 18F-FDG PET/CT in the Pediatric Patient: Imaging Review of Common and Rare Non-malignant Causes of Fever of Unknown Origin in the Pediatric Patient
Education Exhibits
Location: S101B

Participants
Kelly C. Borden (Presenter): Nothing to Disclose
Phillip Jahyung Koo MD: Advisory Board, Bayer AG Research Consultant, Dendreon Corporation Consultant, Eli Lilly and Company, General Electric Company
Jennifer Jinyang Kwak MD: Nothing to Disclose
Brian M. Bagrosky MD, MS: Research Consultant, Eli Lilly and Company

TEACHING POINTS
-Understand the utility of 18F-FDG PET/CT in the workup of fever of unknown origin (FUO) in the pediatric population. -Discuss important differences in the 18F-FDG PET/CT protocol for the pediatric patient from the adult patient. -Recognize the normal biodistribution of 18F-FDG in the pediatric patient. -Identify both common and rare non-malignant etiologies of FUO in the pediatric population. -Describe imaging pearls and potential imaging pitfalls in the work up of pediatric FUO with 18F-FDG PET/CT

TABLE OF CONTENTS/OUTLINE
Review of the pediatric 18F-FDG PET/CT protocol -Patient preparation -Radiopharmaceutical dosing -PET/CT scanning protocols -Radiation dose comparisons -Normal physiologic and pathophysiologic FDG biodistribution in the healthy and septic pediatric patient, respectively -Imaging examples of non-malignant etiologies of FUO by organ system with discussion of imaging pearls and potential imaging pitfalls -Central nervous system -Parietal lobe abscess, meningitis -Pulmonary -Pneumonia with loculated pleural effusion -Gastrointestinal -C. Difficile colitis -Genitourinary -Pyelonephritis, Pyonephrosis with obstructing staghorn calculus, tubo-ovarian abscess -Lymphatic/Hematological -Kikuchi's disease, deep venous thrombosis -Musculoskeletal -CRMO, osteomyelitis

PDE209
Optimal Use of the Automatic Tube Current Modulation (ATCM) at Pediatric CT
Education Exhibits
Location: S101B

Participants
Takanori Masuda (Presenter): Nothing to Disclose
Yoshinori Funama PhD: Nothing to Disclose
Naoyuki Imada: Nothing to Disclose
Takayuki Oku: Nothing to Disclose
Masao Kiguchi RT: Nothing to Disclose
Kazuo Awai MD: Research Grant, Toshiba Corporation Research Grant, Hitachi Ltd Research Grant, Bayer AG Research Consultant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd

TEACHING POINTS
The purpose of this educational exhibit is to: 1. Help you understand the ATCM technique 2. Describe methods for effective use of the ATCM for the child patient 3. Propose the optimal scan protocol to reduce radiation dose for the child

TABLE OF CONTENTS/OUTLINE
Easy explanation of the ATCM for pediatric CT examinations Patient factors -subject size -breathing effect Technical factors -setting noise index -helical pitch -tube voltage -X-ray filter-such as bow-tie filter -image filter-such as adaptive noise reduction filters Our proposed scan protocol for achieving optimal image quality and radiation dose reduction
**PDE211**

**The Pros and Cons of Using Low kVp in CT Imaging**

*Education Exhibits*

*Location: S101B*

**Participants**

- Jianying Li (Presenter): Employee, General Electric Company
- Xiaolei Tong: Employee, General Electric Company
- Yun Shen PhD: Employee, General Electric Company
  Researcher, General Electric Company

**TEACHING POINTS**

1. To illustrate the limitations of using fixed tube voltage at 120kVp or 140kVp in CT imaging, especially for pediatric patients
2. To illustrate the advantages and disadvantages of using low kVp in CT imaging
3. To demonstrate strategies of selecting the kVp based on patient size and clinical tasks

**TABLE OF CONTENTS/OVERVIEW**

1. Standard CT imaging and its limitations -fixed tube voltage at 120kVp or 140kVp with mA modulation -potentially higher contrast medium (CM) dose for adequate enhancement, especially in venography -potentially higher radiation dose for adequate contrast-noise-ratio (CNR)
2. Pros and cons of using low kVp -contrast improvement with low kVp in contrast enhanced CT scans -lower dose efficiency and higher image noise with increased patient size at low kVp -The use of iterative reconstruction (IR) for noise reduction
3. Optimal strategies using these technologies -patient size and clinical task-dependent low kVp selection -balancing noise and CNR based on clinical tasks -proper IR strength for further reducing noise

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**PHE014-b**

**Texture Analysis of Abdominal Tumors: The Next Frontier in CT Diagnosis and Characterization**

*Education Exhibits*

*Location: PH Community, Learning Center*

**Participants**

- James L. Schroeder MD, PhD: Nothing to Disclose
- Siva P. Raman MD: Nothing to Disclose
- Yifei Chen BS: Nothing to Disclose
- Pamela Tecce Johnson MD (Presenter): Research funded, Becton, Dickinson and Company

**TEACHING POINTS**

Texture analysis, a new post-processing algorithm, relies on the idea that there are patterns of contrast on CT images that are not easily discriminated by the human eye, but which may contain information relevant to prognosis or classification of various lesions. The purpose of this exhibit is to answer the question, “What does texture analysis ‘see’ in CT images?”, and to review how this information can be used. Specifically the major teaching points are:

1. To review the image-processing basis of texture analysis of CT images.
2. To discuss recent findings of studies involving CT texture analysis to predict disease type or severity.

**TABLE OF CONTENTS/OVERVIEW**

- Derivation of the parameters used in texture analysis
- Relationship of texture parameters to pathophysiology
- Review of CT texture analysis studies
- Studies of disease classification
- Studies of disease prognosis
- Illustration of potential clinical usage of texture analysis
- Summary and future research

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**PHE015-b**

**Value of Dual-Energy Computed Tomography in Metal Artifact Reduction Using Energetic Extrapolation**

*Education Exhibits*

*Location: PH Community, Learning Center*

**Participants**

- Shima Aran MD (Presenter): Nothing to Disclose
- Khalid Walid Shagdan MD: Nothing to Disclose
- Elmira Hassanzadeh MD: Nothing to Disclose
- Efren Jesus Flores MD: Nothing to Disclose
- Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

**TEACHING POINTS**

Dual-energy CT (DECT) stands as the frontier imaging modality for metal artifact reduction as it provides significantly enhanced image acquisition with no additional radiation dose. Metal artifacts during polychromatic CT imaging are secondary to multiple physical phenomena such as beam hardening, photon starvation, scattered radiation and edge effects and excessive quantum noise. Monochromatic images are generated from projection-space data and are less susceptible to beam hardening artifacts. Availability of high photon energies in DECT reduced the issue of photon starvation and streak artifacts. The opportunity of scrolling through various extrapolated energy levels allows to find a suitable energy level which is high enough to overcome metal artifact, but not so high to make the surrounding soft tissue definition obscured. Optimal energy levels have generally been reported to be 110 to 140 keV. These unique advantages of DECT make it the imaging modality of choice for metal artifact reduction.

**TABLE OF CONTENTS/OVERVIEW**

- Dual-energy CT (DECT) stands as the frontier imaging modality for metal artifact reduction as it provides significantly enhanced image acquisition with no additional radiation dose. Metal artifacts during polychromatic CT imaging are secondary to multiple physical phenomena such as beam hardening, photon starvation, scattered radiation and edge effects and excessive quantum noise. Monochromatic images are generated from projection-space data and are less susceptible to beam hardening artifacts. Availability of high photon energies in DECT reduced the issue of photon starvation and streak artifacts. The opportunity of scrolling through various extrapolated energy levels allows to find a suitable energy level which is high enough to overcome metal artifact, but not so high to make the surrounding soft tissue definition obscured. Optimal energy levels have generally been reported to be 110 to 140 keV. These unique advantages of DECT make it the imaging modality of choice for metal artifact reduction.

**PHE016-b**

**Flow and String Phantoms for Clinical Medical Physics Evaluation of Doppler Ultrasound System Performance**

*Education Exhibits*
*Location: PH Community, Learning Center*

**Participants**
- Yi Zhang (Presenter): Nothing to Disclose
- Ted Lynch PhD: Nothing to Disclose
- Scott Stekel: Nothing to Disclose
- Donald Joseph Tradup: Nothing to Disclose
- Nicholas James Hangiandreou PhD: Nothing to Disclose

**TEACHING POINTS**
To provide an overview of available tools and methods for evaluating Doppler US system performance. To explain the distinct characteristics of flow phantom and string phantom, and demonstrate how phantom properties can influence their abilities of performing certain physics tests. To illustrate how flow and string phantoms can be used to evaluate Doppler US system performance, particularly in the analysis of errors and variations in Doppler peak velocity measurements and volume flow rate measurements. A custom algorithm was developed to objectively estimate peak velocity values from both phantoms.

**TABLE OF CONTENTS/OUTLINE**
- Brief Introduction of Clinical Doppler US Modes
- Doppler US System Physics Tests
- Overview Survey of Commercially Available Testing Phantoms
- Flow phantom and its basic characteristics
- String phantom and its basic characteristics
- Comparison of String and Flow phantoms for Doppler US System Evaluation
- Advantages and disadvantages of using both phantoms for each physics tests
- Both phantoms give comparable results in analyzing variations in clinical Doppler US peak velocity measurement
- Other Important Considerations for Phantom Selection
- Potential Phantom Design Improvement

**PHE017-b**

**Patient Dose Measurement Methods in Interventional Cardiology Procedures**

*Education Exhibits*
*Location: PH Community, Learning Center*

**Participants**
- Mamoru Kato PhD (Presenter): Nothing to Disclose
- Koichi Chida PhD: Nothing to Disclose
- Takashi Moritake MD, PhD: Nothing to Disclose
- Tadayo Sato: Nothing to Disclose
- Tetsuo Tosa MS: Nothing to Disclose
- Hajime Osaka RT: Nothing to Disclose
- Ken Kadokawa MD: Nothing to Disclose
- Masafumi Sasaki RT: Nothing to Disclose
- Fumiaki Sasaki BSC: Nothing to Disclose
- Kazunori Matsumoto BSC: Nothing to Disclose

**TEACHING POINTS**
To determine the conditions for utilization of direct measurement methods for measuring the patient entrance skin dose (ESD) in interventional cardiology procedures. To estimate the maximum ESD in real-time based on direct measurement method.

**TABLE OF CONTENTS/OUTLINE**
- Direct measurement methods of the ESD: Skin dose monitor (SDM), thermoluminescence dosimeter (TLD), radiophotoluminescence dosimeter (RPLD), dosimetry film, and color indicator methods were used; each method had its own advantages and disadvantages. Evaluation of ESD in 80 percutaneous coronary interventions (PCIs) By using RPLDs to measure the ESD in PCI, we analyzed the correlation between maximum ESDs and angiographic parameters. PCI procedures tend to require extended fluoroscopic exposure times with various angles of X-ray projection. Thus, it is of vital importance to evaluate the maximum ESD and site through a series of PCIs. It is difficult to determine the maximum ESD with SDM. TLD showed fading characteristics. The dosimetry film method tended to overestimate the ESD owing to the distance between the table and skin. Identification with the color indicator method is difficult, and slight differences cannot be clearly displayed. The ESDs of 80 PCIs using the RPLDs were a good correlation between maximum ESDs and air kerma at the interventional reference point.

**PHE018-b**

**What is the Most Useful Device for Real-time Measurement of the Maximum Radiation Dose to the Patient during Interventional Radiology?**

*Education Exhibits*
*Location: PH Community, Learning Center*

**Participants**
- Masaaki Nakamura MSc (Presenter): Nothing to Disclose
- Koichi Chida PhD: Nothing to Disclose
- Yohei Inaba BSC, RT: Nothing to Disclose
- Ryota Kobayashi BSC: Nothing to Disclose
- Masayuki Zuguchi MD: Nothing to Disclose

**TEACHING POINTS**
To present the importance of evaluating the patient’s maximum skin dose in real-time, to reduce the risk of radiation injury in interventional radiology (IR). To discuss the devices used to measure the patient dose in IR and the advantages/disadvantages
TABLE OF CONTENTS/OUTLINE

Advantages/limitations of real-time patient dose-measuring devices
Skin dose monitor, patient skin dosimeter, MOSFET dosimeter, etc., were evaluated. Performance comparison among real-time patient dose-measuring devices Energy dependence, linearity, dose-rate dependence, angular dependence, invisibility of sensor and cable in X-ray images, etc., were studied.

Development of a new device for real-time measurement of patient radiation dose
The real-time skin dosimeter (RSD) device consists of a photoluminescence sensor, optical fiber, photodiode, and display. OUTLINE: During IR, patients can be injured due to long-term X-ray radiation exposure. To date, no feasible method exists for measuring the radiation dose to the patient in real-time during IR. We developed a novel real-time patient dosimeter for IR procedures. The RSD offers good fundamental characteristics, including high sensitivity, and only a slight energy and dose-rate dependence.

PHE019-b

Evaluation of Radiation Dose in Endovascular Treatment of Thoracic and Abdominal Aortic Aneurysms Using a Hybrid Operating Room System

Education Exhibits
Location: PH Community, Learning Center

Certificate of Merit

Participants
 Yoshihiro Haga (Presenter): Nothing to Disclose
 Koichi Chida PhD: Nothing to Disclose
 Yuji Kaga RT: Nothing to Disclose
 Eriko Kumazaka BSC: Nothing to Disclose
 Nozomi Kataoka BSC: Nothing to Disclose
 Yoshimi Iwata: Nothing to Disclose
 Naoto Satou: Nothing to Disclose
 Taichirou Meguro: Nothing to Disclose

TEACHING POINTS
- To determine the radiation dose to the patient and physician using hybrid operating room system (HORS) in the treatment of thoracic and abdominal aortic aneurysms
- To understand the importance of reducing/optimizing the radiation dose to physician and patient in HORS

PHE020-b

Clinical Application of Ultra-short Echo Time MR Angiography on Silent Scan

Education Exhibits
Location: PH Community, Learning Center

Participants
 Michimasa Suzuki (Presenter): Nothing to Disclose
 Masaaki Hori MD: Nothing to Disclose
 Koji Kamagata: Nothing to Disclose
 Munetaka Yamamoto: Nothing to Disclose
 Hidenori Ooishi: Nothing to Disclose
 Shigeki Aoki MD, PhD: Nothing to Disclose
 Mariko Yoshida: Nothing to Disclose
 Ryusuke Irie: Nothing to Disclose
 Miyoko Takayama: Nothing to Disclose
 Yuko Adachi MD: Nothing to Disclose
 Kanako Sato MD: Nothing to Disclose
 Shuji Sato: Nothing to Disclose
 Nozomi Hamasaki: Nothing to Disclose
 Nao Takano: Nothing to Disclose

TEACHING POINTS
- To know basic principles of ultra-short echo time MR Angiography (UTE-MRA)
- To know its current usefulness in clinical neuroimaging
- To know the pitfall of UTE-MRA based on its principle

PHE021-b

Strategies for Measuring and Standardizing Image Quality and Patient Dose Across a Range of CT Scanner Models and Patient Sizes
of CT Scanner Models and Patient Sizes

Education Exhibits
Location: PH Community, Learning Center

Certificate of Merit

Participants
Michael Robert Bruesewitz (Presenter): Nothing to Disclose
Xinhui Duan PhD: Nothing to Disclose
Yi Zhang: Nothing to Disclose
Lifeng Yu PhD: Nothing to Disclose
Shuai Leng PhD: Nothing to Disclose
Cynthia H. McCollough PhD: Research Grant, Siemens AG

TEACHING POINTS
1. Show the substantial differences in image quality and dose that can occur across scanners and for different patient sizes. 2. Explain methods to optimize protocols in order to improve performance consistency across a large practice.

TABLE OF CONTENTS/OUTLINE

Purpose
1. Perform a scanner survey to investigate the variation in image quality and radiation dose across 3 patient sizes and 16 CT scanners from 3 different manufacturers.
2. Quantify the variation of CT performance in terms of spatial resolution, image noise, noise texture, and CTDIvol.
3. Explain the observed dependence of image quality on patient size, scanner model, and automatic exposure control (AEC) system.
4. Describe a method that uses the described performance measures to improve consistency in image quality and dose across scanner models and patient sizes.

Content Organization
1. Summarize scanner models surveyed in our multiple sites.
2. Describe phantoms used for measuring spatial resolution, image noise, and noise texture for different patient sizes
3. Describe image quality evaluation
5. Report image quality and dose differences amongst scanners and patient sizes
6. Describe strategies to adjust AEC settings and other parameters to achieve greater consistency in image quality and dose

PHE022-b
Spectral, Slice Thickness and Focal Spot Shaping in CT Imaging: How Do They Work and What Can They Do?

Education Exhibits
Location: PH Community, Learning Center

Participants
Michael Robert Bruesewitz (Presenter): Nothing to Disclose
Lifeng Yu PhD: Nothing to Disclose
Shuai Leng PhD: Nothing to Disclose
Thomas J. Vrieze RT: Nothing to Disclose
Joel Garland Fletcher MD: Grant, Siemens AG
Cynthia H. McCollough PhD: Research Grant, Siemens AG

TEACHING POINTS
1) To illustrate the benefits of spectral shaping in single- and dual-energy CT
2) To show how deconvolution and iterative reconstruction (IR) can be used to produce images that are thinner than a detector width along the z axis
3) To describe the use of dynamically controlled focal spot shaping to limit the effects of focal spot blooming as tube current and potential are increased
4) To demonstrate the clinical impact of improved x,y, and z spatial resolution

TABLE OF CONTENTS/OUTLINE

CONTENT ORGANIZATION
1. Spectral Shaping in single- and dual-energy CT
   a. Principles
   b. Clinical applications
2. Slice Thickness Shaping
   a. Principles
   b. Clinical applications
3. Focal Spot Shaping
   a. Focal spot blooming
   b. Dynamic focal spot shaping to combat focal spot blooming
   c. Benefits in low-\text{KV} and dual-energy clinical protocols

CONCLUSION/SUMMARY
1) Increased tube current capabilities enable aggressive filtration of x-ray spectra, resulting in clinically important noise and contrast-to-noise ratio improvements
   a) 50\% reduction in dose for lung screening
   b) Increased sensitivity of material decomposition techniques.
2) With z axis deconvolution and IR, slice widths narrower than the detector width are possible
3) Dynamic focal spot shaping provides constant levels of spatial resolution across all tube currents and potentials

PHE023-b
CT Parameters and Image Quality: A Pictorial Essay
Participants
Karen Shaw, MD (Presenter): Nothing to Disclose
Eugenia Gold: Nothing to Disclose
Mark Norell, PhD: Nothing to Disclose
Nolan J. Kagetsu, MD: Spouse, Employee, Pfizer Inc

TEACHING POINTS
How does changes in CT parameters improve image quality - changes in field of view, mA, kVp, slice thickness. In collaboration with a natural history museum, the effect of varying parameters on image quality will be illustrated through the large differences in parameters between medical grade and archeological grade CT scanners. This is a pictorial essay on the physics behind CT image acquisition.

TABLE OF CONTENTS/OUTLINE
CT parameters will be illustrated in quiz format. Two images will be shown of the same item and the differences in image quality will be attributed to a CT parameter and described in terms of noise, low contrast, and spatial resolution. 1. mA: two different images will depict changes in osseous detail 2. kVp: two different soft tissue images with drastically different kVp 3. field of view: different images with two different fields of view 4. pitch: reconstructed images of the same thickness using different pitch 5. slice thickness: how resolution changes with different slice thicknesses Image quality will be then related to patient dose with changes in CT parameters.

PHE024-b
Evaluating Image Quality of Compressed Sensing MRI Aiming at Clinical Applications

Participants
Toshiki Saito, BS, RT (Presenter): Nothing to Disclose
Yuki Ichinoseki, MS, RT: Nothing to Disclose
Kota Miyamoto, BS, RT: Nothing to Disclose
Tatsu Nagasaka, RT: Nothing to Disclose
Yoshio Machida, PhD: Nothing to Disclose

TEACHING POINTS
Purposes of this exhibit are the following.
1. To review image quality (IQ) evaluation in recently introduced compressed sensing (CS) MRI
2. To recognize the necessity for evaluation aimed at clinical application
3. To learn useful examples related to evaluation of the depictability in MR angiography (MRA) using numerical simulation

TABLE OF CONTENTS/OUTLINE
CS-MRI and conventional IQ evaluation - CS: Sophisticated theory in informatics using data sparsity - CS-MRI: Complicated nonlinear procedure enabling fast scan Various results depending on an assumed model - IQ indexes: MTF, NPS or 'P-SNR, SSIM' in informatics Appropriate evaluation for clinical images? IQ evaluation aimed at clinical applications in CS-MRI - Our concern for evaluation in clinical images such as low contrast in T2WI and thin blood vessels in MRA - Direct evaluation is useful under complicated circumstances Analysis of the depictability of thin blood vessels: Numerical simulation - Simple numerical model mimicking cerebral arteries was used - MRA images were obtained using various MRA and CS sparsity conditions Bright / Black Blood, and subtracted MRA CS sparsity in wavelet space or image domain - Elucidation of CS-MRI characteristics Blood vessel depictability in MIP (or minIP) image Semi-quantitative evaluation with signal intensity of vessels

PHE025-b
Molecular Biophysics: The Interaction of Light and Matter-Spectroscopic Methods in Breast Imaging

Participants
Shwayta Kukreti, MD, PhD (Presenter): Nothing to Disclose
Albert Cerussi, PhD: Nothing to Disclose
Bruce Tromberg, MD: Nothing to Disclose
Enrico Gratton, PhD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to 1. Review the principles of how light photons interact with matter. 2. Review the Tissue Optical Index: the physics basis for this index, and its application for breast cancer imaging. 3. Review the Self Referencing Differential Spectroscopic Method: the mathematics, and application for breast cancer imaging.

TABLE OF CONTENTS/OUTLINE
1. Review the fundamentals of the spectroscopy: the attenuation of light through matter, including the fundamental physics and chemistry principles 2. Review the Tissue Optical Index -Review the mathematical methods to derive this index towards a way to demonstrate changes in tissue state non-invasively -Explain the clinical interpretation of the index value -Review the clinical utility for breast imaging 3. Review the Self Referencing Differential Spectroscopic Analysis Method -Review the mathematics of this method towards the identification of a "cancer signature" spectrum -Explain the biochemical basis of the spectrum -Review the clinical utility for breast imaging 4. Summary 5. Future directions of tissue spectroscopy
PHE027-b

X-ray Phase-contrast Imaging Techniques—Potentials and Challenges for Medical Applications

Education Exhibits
Location: PH Community, Learning Center

Participants

- Julia Herzen (Presenter): Nothing to Disclose
- Marian Willner : Nothing to Disclose
- Sigrid Auweter : Nothing to Disclose
- Michael Chabior : Nothing to Disclose
- Mathias Marschner : Nothing to Disclose
- Lorenz Birnbacher : Nothing to Disclose
- Astrid Velroyen : Nothing to Disclose
- Kai Scherer : Nothing to Disclose
- Peter B. Noel PhD : Nothing to Disclose
- Alexander Andre Fingerle MD : Nothing to Disclose
- Holger Hetterich MD : Nothing to Disclose
- Tobias Saam MD : Research Grant, Diamed Medizintechnik GmbH Research Grant, Bayer AG
- Franz Pfeiffer : Nothing to Disclose

TEACHING POINTS

X-ray phase-contrast imaging is an imaging modality utilizing the phase-shift of the X-ray wave instead of the attenuation as contrast mechanism, and enhancing soft-tissue contrast compared to conventional attenuation-based radiography or tomography. The poster intends 1.) to provide an introduction into different phase-contrast imaging methods and 2.) to give an idea of their potentials and their challenges for pre-clinical and clinical applications.

TABLE OF CONTENTS/OUTLINE

Different X-ray phase-retrieval methods will be presented and their demands on the X-ray sources, spectrum, detectors etc. will be discussed. Based on selected recently published studies, the potential and the limitations of each technique shall be demonstrated with the focus on pre-clinical and clinical imaging.

The educational poster will provide a basic knowledge of X-ray phase-contrast imaging as a powerful research tool and a promising candidate for clinical implementation.

PHE100

A Practical Approach MRI Physics—Musculoskeletal MRI Protocols

Education Exhibits
Location: PH Community, Learning Center

Participants

- Glenn Erski MD (Presenter): Nothing to Disclose
- Ryan Braun MD : Nothing to Disclose
- Atabak Allaei MD : Nothing to Disclose
- Srinivas Kolla MD : Nothing to Disclose
- Scott Alan Lehto MD : Nothing to Disclose

TEACHING POINTS

We will review aspects of MRI physics crucial to obtaining optimized images. We will focus on aspects of MRI physics pertinent to image acquisition having modifiable parameters. We will provide a review of available MRI hardware and suitable applications. We will finish with a discussion of commonly used musculoskeletal (MSK) sequences and provide suggested protocols. In doing so we hope to solidify and reinforce viewer understanding of: 1. Current MRI hardware and suitable applications 2. Modifiable MRI parameters and their bearing on image quality with an emphasis on tradeoffs 3. Causes for common artifacts and solutions to minimize these artifacts. 4. How to minimize common artifacts or use them to your advantage 5. MSK MRI protocols for the common indications.

TABLE OF CONTENTS/OUTLINE


PHE101

Achieving Ultra-Low-Dose CT in the ED with Exposures Equivalent to Plain Radiographs

Education Exhibits
Location: PH Community, Learning Center

- Selected for RadioGraphics

Participants

- Elizabeth H. Y. Du BA, BSc (Presenter): Nothing to Disclose
- Savvas Nicolaou MD : Nothing to Disclose
- Patrick McLaughlin FFR(RCSI) : Nothing to Disclose

TEACHING POINTS
- Ultra-low-dose CT protocols have resulted in literature effective doses of 0.1 mSv, 0.2 mSv and 0.4 mSv in the chest, abdomen/thoracic spine and pelvis/lumbar spine, respectively. Three key developments have allowed for marked CT dose reductions: automated exposure control, iterative reconstruction technologies and improvements in detector design.

**TABLE OF CONTENTS/OUTLINE**

- Adverse radiation effects from medical radiation exposure
- Audit data of mean effective doses (MEDs) for plain chest, abdominal, thoracic spine, lumbar spine and pelvic radiographs from a level one ED; MEDs of ultra-low-dose CT trials in the literature
- Imaging examples of ultra-low-dose CT to illustrate image quality
- Theory behind automated exposure control in modulating tube current according to patient width and attenuation profile; algorithm for modulating CT voltage according to patient size and CT application
- Theory behind and merits/disadvantages of iterative reconstruction technologies incl. filtered back projection and sinogram affirmed iterative reconstruction (SAFIRE Plus); application of SAFIRE Plus in imaging bariatric patients
- Pitfalls of conventional solid-state detectors; 3rd generation CT detectors and reduced electronic noise; CT imaging examples from integrated circuit detectors vs. discrete circuit detectors
- Significance of ultra-low-dose CT on ED imaging decision-making

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**PHE102**

**Acoustic Radiation Force Impulse Imaging—from Physical and Anatomical Bases to Clinical Applications through Experimental Models**

*Education Exhibits*  
*Location: PH Community, Learning Center*

Selected for RadioGraphics

**Participants**  
Costanza Bruno (Presenter): Nothing to Disclose  
Salvatore Minniti MD: Nothing to Disclose  
Alessandra Bucci: Nothing to Disclose  
Roberto Pozzi Mucelli: Nothing to Disclose

**TEACHING POINTS**  
1) To understand how ARFI works and which are the physical and anatomical factors affecting the acquisition of data  
2) To discuss thoroughly the current clinical applications, considering for each pathological condition and for each organ which are the problems to be solved and which information can be obtained

**TABLE OF CONTENTS/OUTLINE**

A) What it is  
B) What influences it  
1. Physical factors  
   a. Extrinsic (degree of compression; distance between the target and the source)  
   b. Intrinsic (wavelength of the transducer)  
2. Anatomical factors  
   a. Anisotropy  
   b. Dimension of the ROI  
C) Clinical applications  
   1. Liver  
   2. Pancreas  
   3. Kidney  
   4. Miscellaneous

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**PHE104**

**Clinical Utility of Digital Tomosynthesis from Head to Toe: What the Radiologist Needs to Know**

*Education Exhibits*  
*Location: PH Community, Learning Center*

Selected for RadioGraphics

**Participants**  
Haruhiko Machida MD (Presenter): Nothing to Disclose  
Toshiyuki Yuhara: Nothing to Disclose  
John M. Sabol PhD: Employee, General Electric Company  
Takuya Ishikawa: Nothing to Disclose  
Etsuko Tate: Nothing to Disclose  
Eiko Ueno MD: Nothing to Disclose

**TEACHING POINTS**  
To describe the acquisition techniques of digital tomosynthesis (DT)  
To demonstrate various DT applications by presenting clinical images  
To illustrate both the clinical advantages and limitations of DT

**TABLE OF CONTENTS/OUTLINE**

Acquisition techniques DT radiography/fluoroscopy/digital breast tomosynthesis (DBT)  
FBP/iterative reconstruction (IR)  
Clinical applications head and neck: sinonasal/dental disease chest: pulmonary nodule orthopedic: fracture detection/postoperative follow-up, particularly with metallic implant (metallic artifact reduction by segmentation or IR)/spine disease/joint space  
assessment fluoroscopy: IVU/upper GI/Ba enema DBT: breast cancer (artifact and radiation dose reduction by IR)  
Clinical advantages and pitfalls improved anatomical visualization/diagnostic accuracy (vs. non-DT radiography/fluoroscopy) artifacts: blurring/ripple/ghosting less dose/metallic artifact/dependency on patients' posture (vs. CT) improved workflow/cost-effectiveness (vs. CT)

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**PHE105**

**Contrast Enhanced Ultrasound: An Emphasis on Technical Pearls and Tips**

*Education Exhibits*  
*Location: PH Community, Learning Center*

Certificate of Merit

**Participants**  
Diana Pereira MD (Presenter): Nothing to Disclose
TEACHING POINTS

- Recognition of the main indications and limitations of CEUS (contrast enhanced ultrasound) in adults
- Presentation of technical principles pearls and pitfalls of CEUS

TABLE OF CONTENTS/OUTLINE

CEUS is based on the presence of encapsulated microscopic bubbles of gas in the blood stream that oscillate when exposed to a low-intensity ultrasound field. This technique allows a dynamic assessment and quantification of the vascularity and tissue perfusion in real time with excellent spatial resolution. CEUS is a real-time functional low-cost evaluation, with robust and versatile performance. This non-nephrotoxic technique may be performed at the patients' bedside without ionizing radiation. We aim to perform a step by step technical review and pictorial assessment of the procedure, including informed consent form, ultrasound probes, suitable contrast dosage according to organ in study and essential timings for video capture. We will put emphasis on technical pearls and tips (e.g. optimizing the timing of video capture) that will increase the overall quality of the procedure, make the images easier to read and allow a final diagnosis to be reached with confidence. Along with the technical appraisal, we will analyze and illustrate some organs approachable with this technique and review pitfalls.

PHE106

CT Dose Reduction Techniques: An Interactive Team-Based Approach

Education Exhibits
Location: PH Community, Learning Center

Participants
- Arun C. Nachiappan MD : Nothing to Disclose
- Manisha Surendra Raythatha MD (Presenter): Nothing to Disclose
- Xiao Shi MD : Nothing to Disclose
- Harold Ira Litt MD, PhD : Research Grant, Siemens AG Research Grant, Heartflow, Inc
- Erik Soloff MD : Nothing to Disclose
- John M. Boone PhD : Research Grant, Siemens AG Research Grant, Hologic, Inc Consultant, Varian Medical Systems, Inc
- Tessa S. Cook MD, PhD : Nothing to Disclose
- Rafael Andres Vicens-Rodriguez MD : Nothing to Disclose

TEACHING POINTS

- Discuss the various CT parameters to achieve dose reduction.
- Compare and contrast vendor specific parameters for dose reduction.
- Demonstrate how one can conduct a CT dose reduction workshop, analyze departmental CT protocols in a team-based setting, and implement changes.

TABLE OF CONTENTS/OUTLINE

1) Overview of CT protocol parameters important for dose reduction.
2) Comparison of dose reduction techniques and CT parameters across vendors- Siemens, GE, Philips, Toshiba
3) Guidelines for CT Protocols that are tailored to specific clinical indications.
4) CT dose reduction workshop functioning to educate radiology residents in practical medical physics applications in an interactive team-based setting.

PHE107

CT Imaging of Obese Patients: Obesity-related Artifacts and Methods to Avoid Them

Education Exhibits
Location: PH Community, Learning Center

Participants
- Dzmitry Fursevich MD (Presenter): Nothing to Disclose
- Matthew Cody Odell MD, MPH : Nothing to Disclose
- Gary Michael LMarzi MD : Nothing to Disclose
- Manuel A. Hernandez MD : Nothing to Disclose
- William F. Sensakovic PhD : Officer, YellowDot Innovations, LLC

TEACHING POINTS

1. Recognize the most common artifacts encountered in CT imaging of obese and morbidly obese patients.
2. Understand various methods of optimization of CT protocols for obese patients that can improve diagnostic imaging quality.
3. Become familiar with situations where obesity-related artifacts may not render images non-diagnostic and may be acceptable

TABLE OF CONTENTS/OUTLINE

1. Overview of limitations in CT imaging of obese patients
2. Pictorial review and discussion of most common artifacts in CT imaging of obese patients
   a. Ring artifact
   b. Truncation artifact
   c. Photon Starvation artifact
   d. Noise
   3. Variables that can be modified/utilized to reduce artifacts and to improve diagnostic quality
   a. Contrast media and parameters of administration
   b. Iterative reconstruction c. Noise filters d. kVp e. mAs f. Gantry rotation speed g. Pitch h. Reconstructed slice thickness
4. Overview of situations in which CT artifacts may be acceptable
5. Summary

PHE109


Education Exhibits
Location: PH Community, Learning Center
TEACHING POINTS

1. Summarize available electronic resources providing didactic training in the physics of medical imaging for radiology residents.
2. Emphasize benefits of E-learning in conjunction with or as a replacement for traditional classroom based physics curricula.
3. Provide evidence of the benefit of online physics curricula modules as a technique to improve resident education and competence by summarizing existing published evidence of the efficacy of the resources in (1).

TABLE OF CONTENTS/OUTLINE

Importance of good background in physics
- Pass Core Exam
- Understanding of imaging parameters to optimize image quality
- Understanding of artifacts
- Manage patient and staff safety

Benefits of E-learning
- Convenience
- Improved understanding
- Improved retention of material
- Pace set by user

Discussion of online resources
- RNSA/AAPM modules
  1. Curriculum
  2. Examples
  3. Strengths / Weaknesses
  4. Published proof of efficacy
- e-MRI from IMAIOS
  1. Curriculum
  2. Examples
  3. Strengths
  4. Weaknesses
- FluoroSafety modules in the safe use of fluoroscopy
  1. Curriculum
  2. Examples
  3. Strengths / Weaknesses
  4. Published proof of efficacy

Conclusion
- Available resources
- Summary of overall benefits of e-learning

PHE110

MRI in Resource Limited Settings: Challenges and Solutions to Low-field Permanent Magnet Imaging

Education Exhibits
Location: PH Community, Learning Center

Participants
Christina Louise Sammet PhD : Nothing to Disclose
Godwin Inalegwu Ogbole MBBS (Presenter): Nothing to Disclose
Pattanasak Mongkolwat PhD : Nothing to Disclose
Adesola Ogunniyi : Nothing to Disclose
Ann B. Ragin PhD : Nothing to Disclose
Steffen Sammet MD, PhD : Research Grant, Koninklijke Philips NV

TEACHING POINTS

The purpose of this exhibit is: 1.) To review the technical capabilities and limitations of existing low-field MRI systems 2.) To learn about the available MR pulse sequences for clinical imaging at low field 3.) To explore the feasibility of low field MR imaging research in resource-limited settings 4.) The understand the state of quality control procedures for low-field MR systems

TABLE OF CONTENTS/OUTLINE

A review of the technical abilities and limitations of low-field MR systems - Limitation of the main field (B0) strength for permanent magnets - Unique installation challenges for a magnet that is always "on" - RF receiver chain design and coil availability - Gradient system performance Available MR pulse sequences for clinical imaging - Structural imaging capabilities and example images - Quantitative imaging - what we can and cannot do - Contrast agent performance considerations at low-field Feasibility of imaging research in resource-limited settings - Research utilization - experiences from our institution - Image management and post-processing in settings with limited digital infrastructure. The state of quality control procedure for low-field MR systems - The state of accreditation for low-field systems - Existence of phantoms for low-field Quality Control procedures Future directions and summary

PHE112

Potential Exposure Dose Reductions in Digital Breast Tomosynthesis: An Image Processing and Image Reconstruction Technique-based Approach
**Education Exhibits**
Location: PH Community, Learning Center

**Participants**

- Tsutomu Gomi PhD (Presenter): Nothing to Disclose
- Katsuya Fujita BSc: Nothing to Disclose
- Tokou Umeda PhD: Nothing to Disclose
- Akiko Okawa MD, RN: Nothing to Disclose
- Tohoru Takeda MD, PhD: Nothing to Disclose

**TEACHING POINTS**

1) To use reconstruction techniques [filtered back projection (FBP) and iterative reconstruction (IR)] and image processing [wavelet denoising (WD)] to identify indications of digital breast tomosynthesis (DBT) at various exposure doses, 2) to compare DBT and radiography, and 3) to select an appropriate reconstruction technique or WD and exposure dose for breast lesion detection.

**TABLE OF CONTENTS/OUTLINE**

1. Overview of FBP, IR [simultaneous iterative reconstruction techniques (SIRT)], and WD for DBT and radiography 2. Diagnostic imaging properties -Efficacy with regard to normal structure and lesion detection 3. Parameter review -Signal difference to noise ratio and artifact spread function [Wu et al. Med. Phys. 31, (2004)] Root mean square error -Average glandular dose 4. Clinical relevance Summary: DBT provides improved visibility for superimposed structures and can suppress streak artifacts after appropriate IR selection, suggesting that DBT with IR rather than FBP should be further evaluated. Furthermore, the exposure dose could possibly be decreased by half with a combination of IR and WD. An understanding of the potential of DBT with IR and WD for exposure dose selection may improve the diagnostic accuracy of this technique in clinical applications.

**PHE113**

**Recent Technological Advances in CT, and the Clinical Impact Therein - The Physics of Clinical CT Taught through Images**

**Education Exhibits**
Location: PH Community, Learning Center

Certificate of Merit

**Participants**

- Val Murray Runge MD (Presenter): Speaker, Bayer AG Speaker, Bracco Group
- Gustav Andreisek MD: Grant, Holcim Ltd Grant, Siemens AG Speaker, Guerbet SA Travel support, Guerbet SA Consultant, Otsuka Holdings Co, Ltd Travel support, Otsuka Holdings Co, Ltd Institutional Research Grant, Bayer AG Institutional Research Grant, Guerbet AG Institutional research collaboration, Siemens AG Institutional research collaboration, Koninklijke Philips NV Speaker, General Electric Company Speaker, Koninklijke Philips NV Speaker, Siemens AG
- Gang Wu MD: Nothing to Disclose
- Hatem Alkadhi MD: Nothing to Disclose

**TEACHING POINTS**

1. To present and discuss current technological advances in CT, with major impact on clinical imaging, including specifically scan speed, dual energy and dual source, iterative reconstruction, low kV techniques, and perfusion imaging. 2. To detail for the radiologist the clinical impact of each advance, providing guidance in terms of utility and day to day clinical implementation, with attention to radiation dose reduction.

**TABLE OF CONTENTS/OUTLINE**

The exhibit will focus on six major areas, using primarily diagrams and images to convey the topics therein in an easily understood format. (1) Scan speed (and pitch) will be examined in the context of developments permitting imaging of the heart in one beat (wide area detectors, dual source), pediatric imaging without sedation, non-breath-hold imaging, and trauma. (2) Dual energy and dual source will be discussed, including two important applications, material decomposition and metal artifact reduction. (3) Iterative reconstruction will be reviewed, specifically the different existent approaches, reconstruction time, image quality, and image noise. The last three topics include (4) low kV, (5) perfusion imaging, and (6) dose reduction (including tube current modulation). A short summary will address future developments, including specifically technology translation to low- and mid-range cost systems.

**PHE114**

**Technical Aspects of Optimization for Gadoxetic Acid-enhanced Liver MR Imaging**

**Education Exhibits**
Location: PH Community, Learning Center

Certificate of Merit

**Participants**

- Satoshi Kobayashi MD (Presenter): Nothing to Disclose
- Naoki Ohno PhD: Nothing to Disclose
- Yasunari Fujinaga MD: Nothing to Disclose
- Toshiaki Miyati PhD: Nothing to Disclose
- Toshifumi Gabata MD: Nothing to Disclose
- Osamu Matsui MD: Research Consultant, Kowa Company, Ltd Research Consultant, Otsuka Holdings Co, Ltd Research Consultant, Eisai Co, Ltd Speakers Bureau, Bayer AG Speakers Bureau, Eisai Co, Ltd
- Hiroshi Ikeno: Nothing to Disclose
- Wataru Koda: Nothing to Disclose
- Kazuto Kozaka MD: Nothing to Disclose
- Dai Inoue: Nothing to Disclose
- Kotaro Yoshida MD: Nothing to Disclose
- Norhide Yoneda: Nothing to Disclose
- Tetsuya Minami MD: Nothing to Disclose
**TEACHING POINTS**

To describe the advantage and disadvantage of gadoxetic acid (Gd-EOB-DTPA, EOB) enhanced liver MRI compared to MR images with conventional Gadolinium based MR-contrast media (Gd). To demonstrate the various techniques for optimization for EOB enhanced MRI.

**TABLE OF CONTENTS/OUTLINE**

1. Basic knowledge of EOB especially focused on the aspect of hepatocellular transporter function 2. Advantage and disadvantage of EOB enhanced MRI special reference to the differences with conventional Gd-enhanced MRI for hepatobiliary examination. 3. Technical aspect of optimization for EOB-enhanced MRI (1) EOB administration technique (2) Take measures for acute transient dyspnea after intravenous administration of EOB (3) Optimal flip angle for better hepatobiliary phase image acquisition (4) Consideration of super-delayed phase image acquisition to improve conspicuity of hepatic lesions Summary Although EOB might be strong tool for detection and characterization of hepatic lesion, optimization of imaging protocol for EOB enhanced MRI is essential to acquire better images and improve patients’ quality of life.

**PHE115**

**The Value of Single-source Dual-energy Spectral CT Imaging in Beam-hardening Reduction and Metallic Artifacts Correction**

**Education Exhibits**

*Location: PH Community, Learning Center*

**Participants**

- Lin Li MD (Presenter): Nothing to Disclose
- Yanfeng Zhao MD: Nothing to Disclose
- Liang Yang: Nothing to Disclose
- Dehong Luo MD: Nothing to Disclose
- Chunwu Zhou: Nothing to Disclose
- Huizhi Cao: Nothing to Disclose

**TEACHING POINTS**

1) To understand typical beam-hardening artifact in clinical images and why virtual monochromatic images are naturally free of beam-hardening artifact. 2) To demonstrate the advantage of virtual monochromatic images with extra metallic artifact reduction technique (MARs) in a significant reduction metal artifact. 3) To summarize the experience of phantom and clinical study on selecting optimal keV to reduce artifact while remaining the best CNR.

**TABLE OF CONTENTS/OUTLINE**

1) Various beam-hardening and metal artifacts artifacts in traditional CT examination. 2) Principle of virtual monochromatic imaging using rapidly switching the dual kVp and what is MARs. 3) Monochromatic image demonstrating a significant reduction in artifact from phantom experiment and clinical study. 1. Optimal keV and Scan parameters to remove artifacts near contrast agents or bones. 2. Optimal keV with MARs to remove artifacts near metal. 3. Experimental data and various clinical images.

**PHE116**

**Understanding General Principles and New Technologies at Dual Energy CT**

**Education Exhibits**

*Location: PH Community, Learning Center*

**Participants**

- Fuminari Tatsugami (Presenter): Nothing to Disclose
- Toru Higaki PhD: Nothing to Disclose
- Masao Kiguchi RT: Nothing to Disclose
- So Tushima: Employee, Toshiba Corporation
- Akira Taniguchi RT: Employee, Toshiba Corporation
- Kazuo Awai MD: Research Grant, Toshiba Corporation Research Grant, Hitachi Ltd Research Grant, Bayer AG Research Consultant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd
- Yoko Kaichi: Nothing to Disclose

**TEACHING POINTS**

1. Dual energy CT, in which the subject is scanned at two different energies (tube voltages), can be used to perform material decomposition based on the differences in CT number at different energies. 2. Novel analysis software which utilizes raw data-based dual energy data has been developed on a 320-detector CT scanner. 3. In raw data-based dual energy CT imaging, beam-hardening artifacts are reduced as compared with image-based dual energy CT imaging. 4. Electron densities and effective atomic numbers can be determined with high accuracy by raw data-based dual energy analysis with a 320-detector CT scanner.

**TABLE OF CONTENTS/OUTLINE**


**PHE117**

**Understanding the Differences in Radiation Dose Distribution between Multi Detector CT and C-arm CT for High Contrast Imaging**

**Education Exhibits**

*Location: PH Community, Learning Center*
Participants
Timothy Peter Szczykutowicz PhD (Presenter): Equipment support, General Electric Company Research Grant, Siemens AG
Sebastian Schafe: Consultant, Siemens AG
Kevin Royalty MS, MBA: Employee, Siemens AG
Sara Rademacher Nace MD: Nothing to Disclose
Tabassum A. Kennedy MD: Nothing to Disclose

TEACHING POINTS
(1) While producing similar tomographic images, there exist geometric and technological differences between MDCT and c-arm CT (CACT). (2) Target collimated imaging modes available on some CACT systems allow for smaller irradiated volumes compared to MDCT. (3) The reduced scan angular range and smaller irradiated volume modes achievable with CACT can be exploited to reduce the eye lens dose in temporal bone imaging by several hundred percent relative to MDCT.

TABLE OF CONTENTS/OUTLINE
This education exhibit will provide an overview of the components of MDCT and CACT systems that define the volume to be irradiated in order to obtain volumetric images. Temporal bone imaging will be used to demonstrate how scan acquisition differences between MDCT and CACT result in differences in the incident fluence radiation dose distribution. The difference in the eye lens dose between MDCT and CACT will be presented using results measured with thermo-luminescent dosimeters. Volumetric dose maps will also be shown to allow the clinician to visualize the dose distribution differences between MDCT, full field CACT and volume of interest CACT. The clinician should be able to walk away from this exhibit and easily communicate to their colleagues why eye lens and integral dose reductions are possible when target collimation modes of CACT are used in place of MDCT.

PHE119
How to Obtain a Digital Perfusion Phantom to Evaluate the Effect of Iterative Reconstruction Methods on Noise Reduction in Brain CT Perfusion

Education Exhibits
Location: PH Community, Learning Center

Participants
Tomomi Omura (Presenter): Nothing to Disclose
Noriyuki Takahashi: Nothing to Disclose
Hideto Toyoshima BSc: Nothing to Disclose
Yongbum Lee PhD: Nothing to Disclose
Toshibumi Kinoshita MD, PhD: Nothing to Disclose

TEACHING POINTS
CT perfusion (CTP) is useful in the evaluation of ischemia, but radiation exposure of CTP is greater than other CT examinations. Low dose scan reduces radiation exposure, but leads to an increase of image noise. The teaching points are 1. To review ways to reduce image noise in CTP. 2. To learn the difficulty of evaluation of the effect of iterative reconstruction (IR) methods. 3. To understand a way to create a digital phantom for evaluating noise reduction. 4. To assess the evaluation of the effect of IR method on noise reduction using the digital phantom.

TABLE OF CONTENTS/OUTLINE
Ways to improve the image noise - Reconstruction kernel - De-noising filter - IR method Acquisition of digital phantom source images - CTP images obtained without contrast medium injection Design of digital phantom - A digital phantom obtained by adding computer-simulated middle cerebral arteries to non enhancement images of a phantom Evaluation of noise reduction by use of the digital phantom - IR method vs. FBP method Conclusion We found that a 43% reduction of image noise was obtained using an IR method by use of the digital phantom, and demonstrated usefulness of the digital phantom to evaluate the effect of noise reduction without contrast medium injection for CTP.

PHE120
Medical Radiation in Pregnancy: What We Need to Tell Our Patients and Referring Colleagues

Education Exhibits
Location: PH Community, Learning Center

Participants
Elina Zaretsky MD, MA: Nothing to Disclose
James Eric Silberzweig MD: Nothing to Disclose
Jason Teitelbaum MD (Presenter): Nothing to Disclose

TEACHING POINTS
Pregnant patients and their referring physicians frequently have questions about the risks of birth defects and miscarriages following routine radiological exams. Proper education regarding ionizing radiation exposure may help alleviate much undue stress for medically justified procedures. 1) Communication and informed consent should be related to the level of risk - e.g., extremity x-ray versus pelvic arteriogram. 2) The informed consent process should address the generalized risks and benefits to the pregnant female and the fetus.

TABLE OF CONTENTS/OUTLINE
1. Discuss and illustrate fetal development and the effects of radiation exposure at various gestational ages. 2. Review stochastic and deterministic effects of radiation exposure. 3. Discuss the relevant principles of informed consent (such as limited consent, detailed consent) as they pertain to diagnostic x-ray, CT, MRI, and angiographic procedures for the pregnant patient.
The Role of Medical Imaging and Electromagnetic Radiation in Evaluating Paintings for Forgery or Restoration

Education Exhibits
Location: PH Community, Learning Center

Selected for RadioGraphics

Participants
Thea Colleen Moran MD (Presenter): Nothing to Disclose
Alan D. Kaye MD, PhD: Nothing to Disclose
Franklin Rivera Bueno MS: Nothing to Disclose

TEACHING POINTS
1. Electromagnetic radiation has long been used in the scientific analysis of cultural properties. 2. Scientific analysis is useful in detecting forgeries and guiding restoration. There are radiologists who have businesses which provide this service. 3. Radiologists and art conservationists both rely on xrays (and, to a lesser extent, gamma radiation) as important tools in scientific analysis. 4. Radiologists are most familiar with plain film radiography in painting analysis; however, there are other ways in which xrays can be created and analyzed in the scientific study of paintings. 5. Imaging is important in holistic analysis of paintings; spectroscopy is important in elemental analysis. 6. Optical coherence tomography is the modality used for cross sectional analysis of paintings; there is currently no role for either CT, US or MRI.

TABLE OF CONTENTS/OUTLINE
1. The art world and the burgeoning need for scientific analysis 2. Stylistic analysis vs scientific analysis 3. Xrays Imaging - film screen, xeroradiography, digital Fluorescence -spectroscopic analysis - Proton induced xray emission . 4. Xrays and gamma rays Neutron activation 5. Optical coherence tomography

PHE122

Under Pressure: The Physics of Segmental Pressures and Volume Plethysmography as Applied to the Peripheral Arterial System

Education Exhibits
Location: PH Community, Learning Center

Participants
Jill Alison Jones MD (Presenter): Nothing to Disclose
Eva Diehls BA, BS: Nothing to Disclose
Stanton Jay Rosenthal MD: Nothing to Disclose
Allison Gilbert: Nothing to Disclose

TEACHING POINTS
Segmental pressure measurement and volume plethysmography have been used for decades as non-invasive screening tools to evaluate suspected peripheral artery disease. When used in combination, these studies can quickly and reliably determine the presence of disease, estimate disease location and grade severity, often at a reduced cost compared to traditional duplex ultrasound. However, technical limitations of the exam can result in both false positive and negative interpretations. Interpreting providers should have a general understanding of the underlying physics and technical parameters involved with segmental pressures and plethysmographic studies in an effort to reduce error and improve diagnostic confidence.

TABLE OF CONTENTS/OUTLINE

PHE124

Wall Suction-assisted Thoracentesis and Paracentesis Procedures: Relevant Principles and Practical Experiments Related to Fluid Dynamics

Education Exhibits
Location: PH Community, Learning Center

Participants
Tatiana Kelli MD (Presenter): Nothing to Disclose
Hansol Kim MD: Nothing to Disclose
Vincent Michael Levesque MA: Nothing to Disclose
Daniel Kacher MS: Nothing to Disclose
Karen Munkley: Nothing to Disclose
Paul B. Shyn MD: Nothing to Disclose

TEACHING POINTS
1. Basic physics of fluid pressure and flow 2. Factors affecting suction pressure in a body cavity relative to the wall suction source 3. Summary of fluid dynamic considerations pertinent to wall suction-assisted thoracentesis and paracentesis procedures

TABLE OF CONTENTS/OUTLINE
Pre-Radiation Therapy MRI for Abdominal and Pelvic Tumors: Advantages and Challenges

TEACHING POINTS
Current standards of pre-radiation imaging of abdominal and pelvic tumors involve CT for treatment planning. MRI has better tissue contrast for many applications and can better define target tumor volume and surrounding at-risk tissues. This is particularly important given the emergence of proton-beam therapy. Abdominal MRI has several challenges that need to be met for quality radiation planning, including motion (from both breathing and organ motion), MRI artifacts, and how to accurately measure treatment response. Our institution has developed a protocol containing sequences of sufficient speed to accurately delineate tumor size and treatment response.

TABLE OF CONTENTS/OUTLINE
Introduction and current standards.
Advantages of MRI over CT for characterization of tumor and monitoring response.
Need for improved tumor delineation for planning proton beam therapies.
Challenges involved with the use of MRI for tumors in the abdomen and pelvis: organ motion, breath holding, table positioning.
Building a protocol that accurately demonstrates tumor size/extent and response to therapy while limiting time spent scanning and reproducing position used during therapy.

Anatomically Accurate 3D Printed Phantoms for Optimization of MR Spine Image Quality in the Presence of Implanted Surgical Hardware for Radiation Therapy Planning

TEACHING POINTS
1. 3D printing technologies can provide accurate representation of complex anatomical structures. 2. 3D models allow patient specific visualization of susceptibility induced artifacts on MR imaging resulting from implanted surgical spine hardware. 3. 3D models with implanted hardware allow optimization of MR imaging sequences with specific reference to anatomic targets used in radiation therapy planning. 4. Models provide improved visualization of organs at risk and radiation treatment planning volumes.

TABLE OF CONTENTS/OUTLINE

Angiosarcoma: Review of Imaging features on CT, MRI, and FDG-PET/CT

TEACHING POINTS
Soma Kumasaka (Presenter): Nothing to Disclose
Kenzo Okauchi MD: Nothing to Disclose
Takahito Nakajima MD: Nothing to Disclose
Tetsuya Higuchi MD, PhD: Nothing to Disclose
Yoshito Tsushima MD: Nothing to Disclose

TABLE OF CONTENTS/OUTLINE
Angiosarcoma is an uncommon malignant vascular tumor accounting for less than 1% of all malignancies. Though angiosarcoma can occur in any region of the body, head and neck skin lesions are often seen in elderly persons. And cutaneous angiosarcoma is high grade aggressive tumors that tends to recur locally and metastasize. In this presentation, we will present the imaging features of angiosarcomas that occurred in skin, heart, breast, liver, and so on. We are going to describe 1) the clinical features of angiosarcoma, 2) the imaging findings of angiosarcoma on CT, MRI and FDG-PET, and 3) the differential diagnosis. This knowledge will be helpful to understand this disease and imaging features for prompt and accurate diagnosis.

**TABLE OF CONTENTS/OPTLINE**

We are going to present the following: 1. Clinical features of angiosarcoma in each organ: soft tissue (skin, muscle), liver, heart, breast, lung, etc. 2. CT and MRI findings (signal intensity, contrast enhancement) 3. FDG-PET/CT 4. Pathological findings 5. Differential diagnosis
Participants
Jose Antonio Fernandez Villameytide MD (Presenter): Nothing to Disclose
Rafael Gomez Ilan: Nothing to Disclose
JULIA RODRIGUEZ SANCHEZ: Nothing to Disclose
LUCIA MENDEZ: Nothing to Disclose
Daniel Jesus Gonzalez Suarez: Nothing to Disclose
MARIA FUEYO: Nothing to Disclose
Jesus Maria Longo MD: Nothing to Disclose
RUBEN CABANILLAS FARONDON: Nothing to Disclose

TEACHING POINTS
To exhibit a multimodality -FDG PET-CT and MRI- imaging protocol for IMRT/VMAT volume target delineation of skull base and paranasal tumors. To describe practical issues of MRI and PET-CT interpretation in order to include the pathways of local spread and preserve the organs at risk in the target volume.

TABLE OF CONTENTS/OUTLINE

ROE103
Pelvic Magnetic Resonance Imaging for Radiation Planning in Cervical Cancer

Education Exhibits
Location: RO Community, Learning Center

Participants
Daniella Ferraro Fernandes Costa Pinho MD (Presenter): Nothing to Disclose
Qing Yuan PhD: Nothing to Disclose
April Alexander Bailey MD: Nothing to Disclose
Jamie Bolton-Ronacher: Nothing to Disclose
Brian Andrew Hrycushko PhD, MS: Nothing to Disclose
Kevin V. Albuquerque MD: Nothing to Disclose
Ivan Pedrosa MD: Shareholder, Humana Inc

TEACHING POINTS
1. To understand the indications for radiation therapy in cervical cancer and the clinical needs for imaging to provide better treatment planning. 2. To review the safety concerns and technical considerations of pelvic magnetic resonance imaging (MRI) for planning brachytherapy in cervical cancer.

TABLE OF CONTENTS/OUTLINE
1. Review of current indications and approach to radiation in cervical cancer patients 2. Limitations of computed tomography to define anatomical boundaries in the pelvis. 3. Advantages of using pelvic MRI to provide better anatomical information for brachytherapy planning. 3. Safety considerations in MRI. a) Conditional applicators vs plastic applicator. b) Specific absorption rate (SAR) limitations. 4. Technical considerations: a) Patient preparation (bladder filling, enema) b) Field strength: 1.5T vs 3T c) MRI protocol: 2D vs 3D T2, diffusion-weighted imaging (DWI) d) Anatomic coverage: key anatomic landmarks. e) CT/MRI fusion 5. Examples of cases with different tumors 6. Conclusion

ROE104
Radiation Therapy in Management of Soft Tissue Sarcomas: A Primer for Radiologists

Education Exhibits
Location: RO Community, Learning Center
Certificate of Merit
Selected for RadioGraphics

Participants
Jeremy Robert Wortman MD (Presenter): Nothing to Disclose
Sreeharsha Tirumani MBBS, MD: Nothing to Disclose
Akshay Baheti MBBS, MD: Nothing to Disclose
Michael Hayden Rosenthal MD, PhD: Nothing to Disclose
Jyothi Priya Jagannathan MD: Nothing to Disclose
Nikhil H. Ramaiya MD: Nothing to Disclose

TEACHING POINTS
1) Despite being radio-resistant, radiotherapy is often used in the management of non-gastrointestinal stromal tumor (GIST) soft tissue sarcomas.
2) Types of radiotherapy include external beam, intensity modulated and stereotactic body radiotherapy.
3) Radiotherapy can be used in non-GIST soft tissue sarcomas in adjuvant and neoadjuvant settings, as sole therapy, and for treatment of metastases. In GIST, radiotherapy is uncommonly used after R1 or R2 resections, inoperable tumors and with adjuvant imatinib.
4) Imaging plays a crucial role in treatment planning for radiotherapy by determining the gross tumor volume and clinical target volume and in assessing response to therapy.
5) Imaging helps in monitoring for complications such as radiation enteritis, pneumonitis and radiation-associated malignancies.

TABLE OF CONTENTS/OUTLINE
1) Overview of the multiple roles of radiation therapy in treatment of GIST and non-GIST soft tissue sarcomas. 2) Elucidate the
concepts of gross tumor volume, clinical target volume and planned target volume. 3) Discuss methods in which imaging is used during the planning of radiation therapy using case based examples, including patterns of response to treatment. 4) Review the common complications of radiation therapy in soft tissue sarcomas.

From Seeds to Sequences: A Step by Step Approach to Magnetic Resonance (MR) Treatment Planning for Radiotherapy (RT) in Prostatic Carcinoma

TEACHING POINTS
After viewing this exhibit, the viewer will understand: a) different RT methods to treat prostatic carcinoma, b) the importance of MR for RT treatment planning and, c) how to optimize treatment planning studies.

TABLE OF CONTENTS/OUTLINE
1. Review RT methods in prostate cancer including: brachytherapy and image guided (intensity modulated, stereotactic radiosurgery, proton) RT (IGRT) techniques. 2. Review advantages of MR for depiction of regional anatomy discussing anatomic pulse sequences including 2D and 3D Fast Spin Echo. 3. Discuss the role of primary tumor localization with multi-parametric MR to boost areas of dominant tumor potentially improve outcomes. 4. Review types of implanted devices, discussing the advantage of using platinum (rather than gold) fiducials for planning of IGRT. 5. Review available pulse sequences and introduce the novel application of multi-echo gradient recalled echo for improved localization of seeds and fiducial markers facilitating RT planning.

All that Glitters Is Not Gold: Multi-parametric (mp) MRI – Pathologic Correlation in False Positive Cases of Prostate Cancer Diagnosed in the Setting of Active Surveillance and Rising PSA with Negative Biopsy

TEACHING POINTS
After viewing this exhibit, the viewer will: a) appreciate common causes of false positive diagnoses at mp-MRI of the prostate and their histologic correlates, and b) understand helpful imaging features to avoid these pitfalls of interpretation in active surveillance patients and those with negative biopsies and rising PSA.

TABLE OF CONTENTS/OUTLINE
1. Review normal anatomic structures that can mimic prostate cancer at mp-MRI including the "central zone" and the anterior fibromuscular stroma. 2. Briefly review the concept of mp-MRI and recently proposed MR scoring systems, discussing the importance of diffusion weighted imaging (DWI) and dynamic contrast enhancement (DCE). 3. Demonstrate how DCE is a source of false positive diagnoses in glandular benign prostatic hyperplasia (BPH), illustrate the importance of T2W and DWI for evaluation of glandular BPH. 4. Discuss the concept of "T2 blackhole effect" on DWI and how low T2 signal intensity structures can mimic tumor on apparent diffusion coefficient (ADC) map and the importance of the trace echo-planar images. 5. Demonstrate examples of stromal BPH mimicking cancer and helpful differentiating features at mp-MRI. 6. Demonstrate examples of both acute (bacterial and granulomatous) and chronic prostatitis mimicking cancer at mp-MRI.

Focally Targeted Magnetic Resonance Imaging Guided Transrectal Ultrasound Biopsy of the Prostate with an Ultrasound Machine That Has Electromagnetic Tracking Fusion

TEACHING POINTS
Focally targeted magnetic resonance imaging (MRI) guided trans rectal ultrasound (TRUS) biopsy of the prostate with a commercially available ultrasound machine that has electromagnetic tracking (EM) fusion:
1. is less accurate than MR guided biopsy, but non-inferior for targets larger than 9 mm, 2. can optimize accuracy using focal landmarks near the target location, 3. can be performed within 10 minutes.

TABLE OF CONTENTS/OUTLINE
Prostate anatomy deformation differs between MRI and TRUS. EM tracking, rigid fusion cannot compensate for this, resulting in a low overall fusion accuracy. Focal structures are visible in both MR and TRUS, when used landmarks, they can enhance accuracy near the target.

Prostate cancer lesions are often heterogenous. The most aggressive part of the lesion should be targeted. MRI can localize these aggressive areas. T2w MRI is sent to the US machine that can synchronously visualize it with the live ultrasound. Using fusion landmarks near the target the biopsy accuracy can be optimized.

We are currently evaluating this MR-TRUS biopsy method in comparison to MR guided biopsy. We include targets larger than 9 mm. The procedure has been successfully performed in 5 patients. This cost-effective biopsy method seems non-inferior to MR guided biopsy for targets of sufficient size.

**URE005-b**

**Probing the Adrenals: Ultrasound Evaluation of Adrenal Masses**

*Education Exhibits*

*Location: NA*

**Participants**

Akshya Gupta MD (Presenter): Nothing to Disclose
Joel P. Thompson MD: Nothing to Disclose
Shweta Bhatt MD, MBBS: Nothing to Disclose

**TEACHING POINTS**

1. Review sonographic findings of adrenal masses with CT and MRI correlation when possible.
2. Review the key imaging and clinical findings required in forming a differential diagnosis.
3. Illustrate the role of ultrasound in evaluating adrenal masses.

**TABLE OF CONTENTS/OUTLINE**

Introduction
Review the normal adrenal appearance on ultrasound
Present a wide range of adrenal pathology focusing on ultrasound imaging characteristics of each lesion. Cases include adenoma, hemorrhage, myelolipoma, metastatic disease including metastatic leiomyosarcoma, phaeochromocytoma, ganglioneuroma, ganglioneuroblastoma, and neuroblastoma. Review the scope of ultrasound as an imaging modality for adrenal masses. Traditionally CT and MRI better characterize adrenal pathology. However with certain imaging characteristics and the appropriate clinical context, ultrasound can be an effective tool even outside the pediatric population.

**URE006-b**

**Don't Take Out That Testes — It's Not a Tumor!**

*Education Exhibits*

*Location: NA*

**Participants**

Akshya Gupta MD (Presenter): Nothing to Disclose
Mary Barrett: Nothing to Disclose
Sachica Cheris: Nothing to Disclose
Bing Ren MD: Nothing to Disclose
Shweta Bhatt MD, MBBS: Nothing to Disclose
Deborah J. Rubens MD: Nothing to Disclose
Vikram Singh Dogra MD: Editor, Reed Elsevier

**TEACHING POINTS**

Ultrasound remains the modality of choice for initial evaluation of the testes. The purpose of this exhibit is to:
1. Review common and uncommon benign testicular and extra-testicular masses, with emphasis on ultrasound diagnosis, pathologic correlation and clinical presentation.
2. Highlight distinguishing imaging features that guide management decisions including follow-up imaging versus surgical intervention.

**TABLE OF CONTENTS/OUTLINE**

Introduction
Review of normal sonographic testicular anatomy
Case presentations include, but are not limited to, adrenal rests, Sertoli and Leydig cell tumors, Leydig cell hyperplasia, leiomyoma, epidermoid cyst, fibrous pseudotumor, sarcoidosis, incomplete polyorchidism, spontaneous testicular hemorrhage, and intratesticular arteriovenous malformation. Radiologic appearance based on pathology will be emphasized. Management recommendations based on ultrasound findings including when patients can be followed conservatively to ensure resolution or stability, as opposed to requiring surgical management due to neoplastic potential will be presented.

**URE007-b**

**Contrast Enhanced Ultrasound in the Scrotum and Penis: How to Do It — What to Expect of It**

*Education Exhibits*

*Location: NA*

**Participants**

Demosthenes D. Cokkinos MD (Presenter): Nothing to Disclose
Eleni Antypa: Nothing to Disclose
Maria G. Skilakaki MD: Nothing to Disclose
Popy Ioannidi MD: Nothing to Disclose
Stavroula Athanasopoulou: Nothing to Disclose
Ploutarhos A Piperopoulos MD, PhD: Nothing to Disclose

**TEACHING POINTS**
Principles, indications, technique, safety and limitations for performing Contrast Enhanced Ultrasound (CEUS) in the scrotum and penis. Images of CEUS examinations with abnormal findings in the scrotum and penis in comparison to baseline non-enhanced US.

TABLE OF CONTENTS/OUTLINE

Review of basic principles and physics of US contrast agents. Tips on drug preparation and machine settings in order to perform a CEUS examination. Review of the commonest CEUS indications in the scrotum and penis including infection and abscess, tumours, torsion, trauma and infarct. Comparison between CEUS and baseline non enhanced US and study of the diagnostic information added post contrast injection. Assessment of the role of CEUS in this field according to current international imaging guidelines.

URE008-b

Sonographic Evaluation of Transplanted Kidney: Things to Check, to Confirm That all is Well — What to Look Out for When It Is Not

Education Exhibits
Location: NA

Participants
Demosthenes D. Cokkinos MD (Presenter): Nothing to Disclose
Eleni Antypa: Nothing to Disclose
Panagiotis Tserotas MD: Nothing to Disclose
Evangelos Baltas MD: Nothing to Disclose
Dimitrios Exarchos MD: Nothing to Disclose
Ploutarhos A Piperopoulos MD, PhD: Nothing to Disclose

TEACHING POINTS

To set an ultrasound (US) examination standard protocol for examining transplant kidneys in various periods after the operation. To recognise normal transplant kidney findings on B-mode, Colour and Spectral Doppler US. To assess the use of US contrast agents. To identify common post-transplantation complications.

TABLE OF CONTENTS/OUTLINE

Different chapters of the presentation include:
Operation technique review
Examination protocol with B-mode, colour-spectral Doppler and US contrast agents
Normal transplant US images (kidney length, cortical thickness, morphology, vascular anastomoses, main/intrarenal arteries waveforms, resistive index, peak systolic velocity).
Common complications images (acute tubular necrosis, acute/chronic rejection, infection, renal artery/vein stenosis or thrombosis, infarction, obstruction, arteriovenous malformations and pseudoaneurysms, fluid collections).
Description of a detailed examination protocol that guarantees inclusion of all parameters that should be evaluated during sonographic examination of transplant kidneys.

URE009-b

Role of Imaging in Active Surveillance of Small Renal Masses: A Systematic Review of the Literature

Education Exhibits
Location: NA

Participants
Megha Nayyar BA (Presenter): Nothing to Disclose
Bhushan Desai MBBS, MS: Nothing to Disclose
Vinay Anant Duddalwar MD, FRCR: Research Grant, General Electric Company

TEACHING POINTS

The objective is to systematically summarize the current literature in the field of active surveillance for small renal masses (SRMs), with focus on the role of imaging (contrast enhanced CT, MRI and Ultrasound) in the primary decision making, subsequent follow-up during active surveillance and future research needs.

1. Summary data generated from this systematic literature review will answer questions related to patient selection and imaging approach and guide us in the design of a larger prospective clinical imaging trial for active surveillance of SRMs.
2. Highlight the limitations of current approach as well as recommendations for creating a cost-effective model for active surveillance of SRMs thus guiding clinical-decision making process.

TABLE OF CONTENTS/OUTLINE

I. Commentary on pre-existing literature reviews and meta-analyses II. American Urological Association (AUA) guidelines regarding active surveillance of SRMs III. Evidence Acquisition: Article selection workflow, data extraction procedure and decision tree IV. Evidence Synthesis: Summarize all the included studies in a narrative form, as well as in summary tables that condense the important features of the study populations, design, imaging modality, and outcomes. V. Meta-analyses results: using random effects model.
Clinical Challenges and Images of Incidental Renal Masses: How Much Do You Know Regarding Renal Tumors Other than Renal Cell Carcinoma?

**Education Exhibits**

**Location:** NA

- Certificate of Merit
- Selected for RadioGraphics

**Participants**

- Suk Hee Heo MD (Presenter): Nothing to Disclose
- Jin Woong Kim MD: Nothing to Disclose
- Sang Soo Shin MD: Nothing to Disclose
- Hyo Soon Lim MD: Nothing to Disclose
- Yong-Yeon Jeong MD: Nothing to Disclose
- Heoung-Keun Kang MD: Nothing to Disclose

**TEACHING POINTS**

1. To overview imaging findings of various incidental renal tumors other than renal cell carcinoma (RCC)
2. To illustrate radiologic-pathologic correlation in various incidental renal tumors
3. To discuss differential points to help discriminate between RCC and other renal tumors

**TABLE OF CONTENTS/OUTLINE**

1. Clinical challenges and images (cases 1~11)  
   1) Case 1: angiomyolipoma  
   2) Case 2: Papillary adenoma  
   3) Case 3: Oncocytoma  
   4) Case 4: Metanephric adenoma  
   5) Case 5: Cystic nephroma  
   6) Case 6: Mixed epithelial and stromal tumor  
   7) Case 7: Hemangioma  
   8) Case 8: Leiomyoma  
   9) Case 9: Neuroendocrine tumor (Carcinoid)  
   10) Case 10: Myofibroblastic tumor  
   11) Case 11: Solitary fibrous tumor  
2. WHO Classification of renal tumors  
3. Review of cases 1~11 with radiologic-pathologic correlation  
4. Summary of useful radiologic findings to help discriminate between RCC and other incidental renal tumors  
5. Suggested algorithms for narrowing differential diagnosis of incidental renal tumors

URE011-b

Unsuspected Urinary Bladder Neoplasms: CT Imaging, Cystoscopic and Pathologic Correlation

**Education Exhibits**

**Location:** NA

**Participants**

- Yong-Soo Kim MD, PhD (Presenter): Nothing to Disclose
- Tae-Yoon Kim MD: Nothing to Disclose
- Seunghun Lee MD: Nothing to Disclose

**TEACHING POINTS**

1. To review of incidence and pathophysiology of urinary bladder neoplasms
2. To know the unusual urinary bladder neoplasms correlated with pathologic findings

**TABLE OF CONTENTS/OUTLINE**

1. Incidence and pathophysiology of urinary bladder neoplasm  
2. Common radiologic features of urothelial carcinoma correlated pathology  
4. Mesenchymal origin i. Leiomyoma  
5. Secondary involvement i. Metastasis ii. Lymphoma  
6. D. Tumor mimic lesions

URE012-b

What Lurks Beneath? An Update on Submucosal Bladder Lesions with Radiologic-Pathologic Correlation

**Education Exhibits**

**Location:** NA

**Participants**

- Andrew Chung MD: Nothing to Disclose
- Nicola Schieda MD (Presenter): Nothing to Disclose
- Ania Zofia Kielar MD: Nothing to Disclose
- Matthew Donald Fernand McInnes MD, FRCP: Nothing to Disclose
- Evan Spencer Siegelman MD: Consultant, BioClinica, Inc; Consultant, ICON plc; Consultant, ACR Image Metrix
- Trevor A. Flood MD, FRCP: Nothing to Disclose

**TEACHING POINTS**

After viewing this exhibit, the viewer will understand the normal anatomy and histology of the urinary bladder wall (emphasizing the submucosa) and develop an imaging approach to disease processes which can mimic urothelial lesions arising within the bladder submucosa or from extrinsic sites that secondarily involve the bladder wall.

**TABLE OF CONTENTS/OUTLINE**

1. Review the relevant anatomy and histology of the bladder wall, emphasizing the submucosa  
2. Discuss methods to evaluate submucosal and extrinsic bladder lesions focusing mainly on CT and MRI techniques  
Dual-energy CT Characterization of Urinary Calculi: Basic Principles, Applications and Limitations

Participants
Shima Aran MD (Presenter): Nothing to Disclose
Khalid Wald Shaqdan MD : Nothing to Disclose
Avinash Ranesh Kambadakone MD, FRCP : Nothing to Disclose
Elmira Hassanzadeh MD : Nothing to Disclose
Efren Jesus Flores MD : Nothing to Disclose
Hani H. Abujudeh MD, MBA : Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

TEACHING POINTS

Dual-energy CT (DECT) adds many exciting new applications to single-energy MDCT as the imaging modality of choice for detecting renal calculi. DECT allows characterization of renal stone composition which is clinically important as it allows selection of targeted preventive approaches and stone-specific treatment options. Also using DECT, calculi are detectable on nephrographic phase imaging or in contrast-filled collecting systems using the iodine subtraction techniques. Calculation of water content using spectral imaging is useful to diagnose urinary obstruction. We plan to expose radiologists to a series of challenging cases to understand how this unique and clinically relevant modality can facilitate diagnosis and management of renal calculi.

TABLE OF CONTENTS/OUTLINE

1. Basic principles of DECT on the basis of photoelectric and Compton interactions as well as material decomposition. 2. Available techniques of DE data acquisition, for example, dual source CT scanners, fast kilovoltage switching and sandwich detector techniques. 3. Image processing and reconstruction of DECT data. 4. Clinical application of DECT for diagnosis and management of renal calculi. 5. Sample cases. 6. Limitations of DECT such as the effects on image quality, and radiation dose.

URE014-b

MRI Findings and Staging of Penile Squamous Cell Carcinoma: A Case-based Review

Participants
Jeeban-Paul Das MBBS, MRCPI (Presenter): Nothing to Disclose
Barry Hutchinson MBChB, MRCS : Nothing to Disclose
Clare Jane Roche MBChB : Nothing to Disclose
Joseph Anthony Sheehan MD, MBA : Nothing to Disclose
Peter A. McCarthy MD : Nothing to Disclose

TEACHING POINTS

Penile neoplasia is a rarely encountered cancer in the developed world. Squamous Cell Carcinoma (SCC) is the most common primary malignancy of the penis accounting for 95% of all such cases. Staging with MRI is the most sensitive method of predicting tumour size and local nodal metastasis. MR imaging can also aid in the planning for surgical resection and assessing for local recurrence. The aims of this exhibit are to: 1. Use a case-based approach to illustrate the MRI findings of penile SCC 2. Outline how MR imaging can assist in the staging of penile SCC

TABLE OF CONTENTS/OUTLINE


URE015-b

Pitfalls in Imaging of Recurrent Retroperitoneal Liposarcoma: Subtle Findings Not to be Missed

Participants
Sailaja Reddy MBBS, FRCR (Presenter): Nothing to Disclose
Bella Huasen MBChB, MRCS : Nothing to Disclose
Ayesha Nasrullah : Nothing to Disclose
Alaa Jaly MBBS : Nothing to Disclose
Ben Taylor MBChB, FRCR : Nothing to Disclose

TEACHING POINTS

1. Retroperitoneal liposarcoma recurrence can be extremely subtle; by viewing this exhibit the reader will increase their awareness of early signs of recurrence. 2. Localised increase in fat is the most commonly missed sign of liposarcoma recurrence. It may present as separation of bowel loops, displacement of solid visceras or widening tissue interfaces. 3. Serial computed tomography may show only very slow enlargement of soft tissue nodules or increase in soft tissue stranding which can be missed unless all historic examinations are reviewed. 4. We discuss the common post operative findings, which if stable over the follow up period, are considered to be benign post surgical changes.

TABLE OF CONTENTS/OUTLINE

1. Background of retroperitoneal liposarcoma. 2. Our experience: We are a large supra regional oncology centre, with extensive
experience in the surgical management of retroperitoneal liposarcoma. We present our experience of imaging follow up of 112 cases of retroperitoneal liposarcoma over a 7 year period. 3. Imaging Serial CT is the mainstay of follow up after initial radical surgery, with an aim of early identification of recurrences to allow further curative surgery. We provide examples of subtle recurrences and highlight the teaching points in each case. 4. Summary

URE100
Adrenal Gland: Catching the Usual Imaging Features of Unusual and Rare Lesions

Education Exhibits
Location: NA

Participants
Amine Ayed MD (Presenter): Nothing to Disclose
Cecile Ghander MD: Nothing to Disclose
Christophe Tresallet MD: Nothing to Disclose
Isabelle Huynh-Charlier MD: Nothing to Disclose
Sophie Egels: Nothing to Disclose
Frederique Tissier MD: Nothing to Disclose
Olivier Lucidarme MD: Consultant, Bracco Group Consultant, F. Hoffmann-La Roche Ltd Consultant, Boehringer Ingelheim GmbH

TEACHING POINTS
Imaging plays a key role in the diagnosis of adrenal lesions especially in differentiating between benign and malignant conditions. Unusual and rare adrenal lesions are significantly challenging. This exhibit is an overview of a wide spectrum of rare adrenal lesions that can be challenging and will emphasize on the key radiologic features of a wide variety of rare and uncommon adrenal lesions. Upon review of this exhibit, the reader will be able to recognize the typical key radiologic features that characterize these conditions.

TABLE OF CONTENTS/OUTLINE
1. Brief review of normal adrenal anatomy
2. Unusual tumorous benign and malignant lesions (including macronodular adrenal hyperplasia, ganglioneuroma, hemangioma, fibrous solitary tumor, rare metastases)
3. Unusual non tumorous lesions (including TB, granulomatosis, cysts, hematomas, congenital adrenal hyperplasia, chronic adrenal insufficiency, adrenal infarction)

URE101
Chemical Shift Imaging of the Adrenal Gland: The Key Sequence When Interpreted Correctly

Education Exhibits
Location: NA

Selected for RadioGraphics

Participants
Sharon Zahava Adam MD (Presenter): Nothing to Disclose
Paul Nikolaidis MD: Nothing to Disclose
Jeanne Miriam Horowitz MD: Nothing to Disclose
Helena Gabriel MD: Nothing to Disclose
Nancy A. Hammond MD: Nothing to Disclose
Tanvi Patel MD: Nothing to Disclose
Vahid Yaghmai MD: Nothing to Disclose
Frank H. Miller MD: Nothing to Disclose

TEACHING POINTS
1. Utility of chemical shift imaging to diagnose typical and atypical adenomas
2. Other unusual lesions will be illustrated and should be considered.

TABLE OF CONTENTS/OUTLINE
1. MR techniques at 1.5 and 3 T of the adrenal gland
2. Typical and atypical features of adrenal adenomas
3. India ink artifact and features of myelolipomas
4. Mimickers of adenomas-clear cell renal and HCC mets
5. Collision tumors
6. Hepatic adrenal rest tumors (HART)
7. Iron in the adrenal

URE102
Imaging Characterization of Adrenal and Retroperitoneal Ganglioneuromas with Pathologic Correlation

Education Exhibits
Location: NA

Participants
Sanaz Javadi MD: Nothing to Disclose
Hassan Shawa: Nothing to Disclose
Ajaykumar Chandralal Morani MD: Nothing to Disclose
Mohammed Amir Habra: Nothing to Disclose
Abdelhameed M Nienaa: Nothing to Disclose
Khaled M. Elsayes MD (Presenter): Nothing to Disclose

TEACHING POINTS
- Review imaging characteristics of adrenal and retroperitoneal Ganglioneuromas.
- Discuss pertinent imaging findings of these...
- Review imaging characteristics of adrenal and retroperitoneal Ganglioneuromas. Discuss pertinent imaging findings of these tumors, focusing on distinguishing features. Correlate cross-sectional imaging of these masses with clinical and pathologic findings.

**TABLE OF CONTENTS/OUTLINE**

- Introduction
- Imaging techniques
- Imaging characteristics of Ganglioneuromas
- Review of pattern based approach
- Correlate cross-sectional imaging of these masses with clinical and pathologic findings

**SUMMARY**

Ganglioneuroma is a benign and rare entity and represents a diagnostic challenge. Familiarity with imaging characteristics of these tumors helps to increase the index of suspicion for diagnosis. Certain imaging features, associated findings, clinical presentation and laboratory findings may help differentiate these benign lesions from malignant adrenal and retroperitoneal masses. Based on a comprehensive review of 22 pathologically proven cases presented to our institution, we demonstrate the clinical, pathological and imaging features of this uncommon lesion.

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**URE103**

**Urachal Anomalies from Cradle to Grave**

- **Education Exhibits**
- **Location**: NA

**Participants**

Terrence Constant Demos MD (Presenter): Nothing to Disclose
Anita Nagamine MD: Nothing to Disclose
Harold Victor Posniak MD: Nothing to Disclose
David Hatch MD: Nothing to Disclose
Richard H. Burke MD: Nothing to Disclose

**TEACHING POINTS**

- Present incidence, embryology and anatomy of urachus and anomalies
- Illustrate and discuss imaging of patent urachus, umbilico-urachal sinus, urachal cyst and vesico-urachal diverticulum including sonography, CT and MR imaging in the fetus, children and adults
- Discuss current recommendations for treatment and follow up of symptomatic and asymptomatic adults and children with these anomalies
- Illustrate imaging, and discuss presentation and treatment of complicating infections and neoplasms.

**TABLE OF CONTENTS/OUTLINE**

- Introduction
- Umbilico-urachal sinus
- Patent urachus
- Urachal cyst
- Vesico-urachal diverticulum
- Infection
- Neoplasms
- Unusual complications
- Conclusion (Presentation and Treatment of each anomaly and complications are discussed in addition to Imaging)

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**URE104**

**Beyond Standard CT Urography — Current and Novel Imaging Technologies and Strategies for Reducing Radiation Exposure and Contrast Medium Load**

- **Education Exhibits**
- **Location**: NA

**Participants**

Xiaochao Guo MD (Presenter): Nothing to Disclose
Juan Hu: Nothing to Disclose
Xiaoying Wang MD: Nothing to Disclose
He Wang MD: Research Grant, General Electric Company
Rui Wang PhD: Nothing to Disclose
Kai Zhao MD: Nothing to Disclose
Huihui Wang: Nothing to Disclose

**TEACHING POINTS**

1) To review current imaging technology and its limitations in CT urography
2) To illustrate novel imaging technologies for reducing radiation exposure and contrast medium load in CT urography
3) To learn optimal strategies using these current and novel technologies by presenting experimental data and clinical images

**TABLE OF CONTENTS/OUTLINE**

1) Standard imaging technology and its limitations • single-bolus triple phases (unenhanced, nephrographic and excretory phase) • image quality • radiation exposure • contrast medium (CM) 2) Current and novel imaging technologies • split-bolus double phases (unenhanced, nephrographic- excretory phase) • low kVp technique • low CM dose and concentration • iterative reconstruction (IR) • dual-energy CT (DECT): virtual unenhanced scan/monochromatic imaging/material density imaging 3) Optimal strategies using these technologies

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**URE105**

**CT Urography (CTU) Using New CT Technologies: Clinical Advantages of a Proposed Scan and Contrast Injection Protocol**

- **Education Exhibits**
- **Location**: NA

**Participants**

Yukiko Honda MD (Presenter): Nothing to Disclose
Toru Higaki PhD: Nothing to Disclose
Yoko Kaichi: Nothing to Disclose
Chihiro Tani MD: Nothing to Disclose
Akira Taniuchi RT: Employee, Toshiba Corporation
Kazuo Awai MD: Research Grant, Toshiba Corporation Research Grant, Hitachi Ltd Research Grant, Bayer AG Research Consultant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd
Daisuke Komoto MD: Nothing to Disclose
TEACHING POINTS

We focus on a new CTU method that uses split bolus injection and dual-energy CT (DECT) technology. It facilitates the simultaneous acquisition of nephrographic- and excretory-phase images and helps to reduce radiation exposure. Applying DECT techniques to split bolus injection allows a further radiation dose reduction at CTU by generating virtual non-enhanced images and save actual non-enhanced scan. Virtual monochromatic CT images generated from DECT can reduce beam hardening artifacts induced by iodinated urine and may help to identify subtle enhancements or small tumors in the ureter wall.

TABLE OF CONTENTS/OUTLINE

1. Current scan- and contrast injection protocol for CTU
2. New technologies for CTU
   a) Dual energy CT (DECT) - Principles of DECT - Utility and limitations of DECT for diagnosing ureter calculi and tumors
   b) Iterative reconstruction (IR) - Principles of IR - Improvement of CTU image quality by IR - Radiation dose reduction at CTU by IR
3. Proposed CTU protocol using new technologies - CTU using split bolus injection and DE technology
4. Future perspective of CTU

URE106

Thickening of the Ureter and/or Renal Pelvis: Spectrum of CT Findings

Education Exhibits
Location: NA

Participants

David Coll MD (Presenter): Nothing to Disclose
C Yanguas: Nothing to Disclose
Anna Soldevila MD: Nothing to Disclose
M. J. Diaz: Nothing to Disclose
O Valencoso: Nothing to Disclose
Josep M Badal: Nothing to Disclose
J Trullas: Nothing to Disclose

TEACHING POINTS

- how to perform CT of the urinary tract
- to identify false causes of ureter and renal pelvis wall thickening
- to illustrate the differences in appearances of ureteral and/or renal pelvis thickening: mucosal or submucosal thickening
- to discuss the different etiologies of ureter and/or renal pelvis thickening correlated with clinical evolution, analytical results or pathology

TABLE OF CONTENTS/OUTLINE

The clinical presentation of the thickening of the ureter and/or the renal pelvis is highly variable. It may be asymptomatic; alternatively it may cause colicky pain or haematuria or it may present clinical and analytical signs of sepsis. Treatment options vary depending on the aetiology which may be A) inflammatory (pyelitis or pyeloureteritis related or not to kidney stones), B) catheter-related or idiopathic; C) infectious (related to tuberculosis or bacterial infection); or D) neoplastic (related to urothelial carcinoma or lymphoma). Knowledge of the different radiological manifestations of the aetiologies of thickening of the ureter and/or renal pelvis is the key to correct diagnosis and to the selection of optimal treatment.

URE107

Urinary Diversion: A MDCT Technical Challenge — How to Establish the Most Accurate Procedure in Order to Assess the Main Post-surgical Complications

Education Exhibits
Location: NA

Participants

Violeta Gonzalez Mendez MD (Presenter): Nothing to Disclose
Alicia Merina MD: Nothing to Disclose
Virginia Navarro Cutillas: Nothing to Disclose
Alberto Arnaiz Martinez MD: Research Consultant, Novartis AG
Elena Martinez Chamorro: Nothing to Disclose

TEACHING POINTS

The main purpose of this study is to describe the best MDCT technique in order to evaluate the various complications found in early and late follow-up of patients who previously underwent urinary diversion. Other minor goals are to describe the main diversion procedures and to analyze the major complications.

TABLE OF CONTENTS/OUTLINE

Introduction Approach to the three most common types of urinary diversion. Overview of the MDCT technical procedure: Do we need a phase without contrast injection? When do we need it? When is oral contrast material needed? Could and under what circumstances we do benefit from the split-bolus injection? How can we achieve an optimal excretory phase? Classification of complications according to the time of onset, highlighting the possible peculiarities in MDCT technique depending on the type of complication suspected. Early (< 30 days after surgery): Bowel: adynamic ileus, mechanical obstruction, anastomotic leak. Infectious: pyelonephritis. Postsurgical fluid collections. Urinary tract complications (anastomatic leak, obstruction, fistulas) Stomal o conduit ischemia. Wound Late Infection Calunci Ureteral stenosis Tumor recurrence Stomal / conduit: retraction, prolapse, stenosis. Herniation

URE108

All about Renal Involvement of IgG4-Related Sclerosing Disease

Education Exhibits
Participants
Nieun Seo MD (Presenter): Nothing to Disclose
Jin Hee Kim MD : Nothing to Disclose
Jae Ho Byun MD : Nothing to Disclose
Seung Soo Lee MD : Nothing to Disclose
Hyoung Jung Kim MD : Nothing to Disclose
Myung-Hwan Kim : Nothing to Disclose
Moon-Gyu Lee MD : Nothing to Disclose

TEACHING POINTS
1. To outline the current concept in IgG4-related sclerosing disease (IgG4-SD) 2. To present imaging atlas of renal involvement of IgG4-related sclerosing disease with clinical features and pathogenesis 3. To emphasize the importance of renal involvement in diagnosing IgG4-SD in various clinical settings

TABLE OF CONTENTS/OUTLINE

URE109
Beyond Uncomplicated Cystitis: Cross-sectional Imaging Spectrum of Lower Genitourinary Tract Infections — Usual and the Unusual Suspects

Education Exhibits
Location: NA

Participants
Vijayanadh Ojili MD (Presenter): Nothing to Disclose
Sandhya Vinu-Nair : Nothing to Disclose
Arpit M. Nagar MBBS : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the cross-sectional imaging findings of usual and unusual lower genitourinary tract infections. 2. To discuss the role of imaging and image-guided interventions in the management of these patients.

TABLE OF CONTENTS/OUTLINE
1. Introduction, etiopathogenesis and clinical presentation. 2. Role of cross-sectional imaging modalities (particularly CT). 3. Imaging spectrum of usual and unusual lower genitourinary tract infections (mycetoma of the urinary bladder, emphysematous cystitis/prostatitis, prostatic abscess/tuberculosis, postpartum endometritis, gas gangrene of the uterus etc).

URE110
Does Renal Tuberculosis Confuse You A Lot?

Education Exhibits
Location: NA

Participants
Kai Zhao MD (Presenter): Nothing to Disclose
Xiaoying Wang MD : Nothing to Disclose

TEACHING POINTS
There are some clinical features and statistical figures about renal tuberculosis that do not accord with what we take for granted. This exhibit will explain the confused questions about renal tuberculosis. The purpose of this exhibit is to help radiologists to understand the pathogenesis and development of renal tuberculosis, as well as to improve the radiologist’s diagnostic accuracy of renal tuberculosis.

TABLE OF CONTENTS/OUTLINE
The exhibit will be presented in a quiz format. Key points will be highlighted in the answer of each question. The list of questions includes: 1. Renal tuberculosis (TB) is the most common in urogenital system tuberculosis. But where do TB bacilli come from? 2. Since most renal TB spread through blood line, why 85%-90% patients just discover tuberculosis in unilateral kidney? 3. Since most renal tuberculosis spread from pulmonary tuberculosis, why there is still 7% extrapulmonary patients have only urogenital system tuberculosis without pulmonary tuberculosis? 4. Why hydronephrosis always happens in the contralateral kidney? 5. What’s the mechanism behind autonephrectomy?

URE111
Genital Complications of Crohn Disease: Imaging Features and Implications of Management

Education Exhibits
Location: NA
Certificate of Merit

Participants
TEACHING POINTS

Review the imaging features of genital complications in Crohn patients on fluoroscopy, and cross-sectional imaging. Discuss the epidemiology, clinical presentation, and management of genital complications of Crohn Disease (CD). Review other disease entities that can mimic Genital CD.

TABLE OF CONTENTS/OUTLINE

1. Imaging features of genital CD at fluoroscopy, US, CT and MRI will be discussed: A. Rectovaginal fistula B. Anovaginal/vaginal-vulvar fistula C. Enterovaginal Fistula D. Recto-urethral Fistula E. PID/TOA F. Labial/Scrotal edema G. Perineal involvement of CD 2. Other disease entities that can simulate genital CD 3. Management and therapeutic options

SUMMARY
Crohn disease (CD) is a chronic relapsing, granulomatous, and inflammatory bowel disorder characterized by transmural bowel inflammation and a tendency to form fistulas with adjacent structures. Genital complications of CD are not uncommon; however, are often clinically masked by dominant intestinal or systemic symptoms. The usual mechanism is direct extension of fistulizing transmural intestinal disease to the pelvic organs, and rarely due to "metastatic" CD involving the perineum and external genitalia separated from the bowel. Recognition of their manifestations and imaging appearances is crucial so that appropriate medical or surgical intervention is accomplished.

URE112
Multimodality Imaging of Non-neoplastic Renal Disease: Clinical Features and Differential Diagnosis

Education Exhibits
Location: NA

Participants
Masayo Ogawa (Presenter): Nothing to Disclose
Nagaaki Marugami : Nothing to Disclose
Junko Takahama MD : Nothing to Disclose
Kimihiko Kichikawa MD : Nothing to Disclose
Aki Takahashi MD : Nothing to Disclose
Takahiro Itoho : Nothing to Disclose

TEACHING POINTS

1) To understand the multimodality imaging approach to non-neoplastic renal disease.
2) To differentiate non-neoplastic renal disease from neoplastic disease showed similar image along with the clinical history.

TABLE OF CONTENTS/OUTLINE

1) Presentation of non-neoplastic renal disease compared with neoplastic mimickers

2) Clinico-radiological key findings in differential diagnosis.

Summary
Although some non-neoplastic renal disease show similar image to neoplastic disease, clinico-radiological key findings may help us to lead correct diagnosis.

URE113
Evaluation and Follow-up of the Complications of Partial Nephrectomy: CT Patterns

Education Exhibits
Location: NA

Participants
Gianpiero Cardone MD (Presenter): Nothing to Disclose
Maurizio Papa MD : Nothing to Disclose
Paola Mangili PhD : Nothing to Disclose
Giorgio Guazzoni MD : Nothing to Disclose
Giuseppe Balconi : Nothing to Disclose

TEACHING POINTS

1) To illustrate the most frequent CT imaging appearance of the treated kidney, after conventional or robotic assisted partial nephrectomy. 2) To review the most common CT patterns of the complications of renal partial nephrectomy. 3) To evaluate the most effective CT imaging examination techniques in the treated kidney evaluation.

TABLE OF CONTENTS/OUTLINE

1) Most frequent postoperative complications after renal partial nephrectomy: a) Bleeding / hematomas b) A/V fistulas c) abscesses d) Collecting system lesions e) Peritoneal and retroperitoneal fluid collections f) Post surgical ureteropelvic junction stenosis 2) Best CT techniques in the evaluation of complications of renal partial nephrectomy 3) Conventional and urographic...
CT patterns of complications of renal partial nephrectomy. 4) CT imaging follow-up of complications of renal partial nephrectomy

URE114

Contrast-enhanced Ultrasound of Papillary Renal Masses: A Radiologic Review

Education Exhibits
Location: NA

Participants
Michael Roth MD (Presenter): Nothing to Disclose
Jeffery Robert Bird MD: Nothing to Disclose
Neal E Rowe MD: Nothing to Disclose
Patrick Luke MD: Nothing to Disclose
Cesare Romagnoli MD: Consultant, Profound Medical Inc

TEACHING POINTS
The aim of this educational exhibit is: 1. Outline the characteristics of papillary renal carcinomas (RCC) on Contrast Enhanced Ultrasound (CEUS) using data from pathologically confirmed solid renal masses. 2. To compare utility of CEUS for diagnosing papillary RCC versus other imaging modalities, such CT and MR. 3. Highlight clinical applicability of CEUS for diagnosis of solid renal masses in patients with renal failure.

TABLE OF CONTENTS/OUTLINE
Description of the CEUS technique used in assessing renal masses, including the indications and contraindications of CEUS for assessing renal masses. Imaging characteristics of papillary renal cell carcinomas (RCC) with CEUS, including own imaging data from seven pathologically confirmed cases. Illustrative sample cases of CEUS in papillary RCCs. Comparison of utility of CEUS for diagnosis of papillary renal carcinomas versus other imaging modalities. Discussion of CEUS in setting of patient with renal failure: highlighting safety vs other imaging modalities; increased incidence of papillary RCC in end stage renal failure. Summary with take-home points.

URE115

Cross Sectional Imaging of the Kidney: Classic Signs and Pitfalls

Education Exhibits
Location: NA
Certificate of Merit

Participants
Khaled M. Elsayes MD (Presenter): Nothing to Disclose
Christine O. Menias MD: Nothing to Disclose
Kumaresan Sandrasegaran MD : Nothing to Disclose
Ahmed MK Zaki MBbCh: Nothing to Disclose
Sadhna Verma MD: Nothing to Disclose
Akram Mohamed Shaaban MBbCh : Contributor, Amirsys, Inc

TEACHING POINTS
- Describe most commonly encountered classic signs pathognomonic for specific renal pathologies. - Illustrate various imaging pitfalls of the kidney that can lead to erroneous diagnoses. - Describe relevant technical background, pathophysiology and hemodynamics of these pitfalls.

TABLE OF CONTENTS/OUTLINE

URE116

CT and MR Imaging after Radiofrequency and Cryoablation of Renal Tumors

Education Exhibits
Location: NA

Participants
Xavier Buy MD (Presenter): Proctor, Galil Medical Ltd
Julien Garnon MD : Nothing to Disclose
Catherine Roy MD : Nothing to Disclose
Jean Palussiere MD : Travel support, Bracco Group
Afshin Gangi MD, PhD : Proctor, Galil Medical Ltd

TEACHING POINTS
To know the physical and biological principles of radiofrequency and cryoablation To standardize imaging follow-up protocols after radiofrequency and renal tumor ablation To know the typical and atypical imaging features and the sequential changes after renal thermal ablation To know the major differences between post-radiofrequency and post-cryoablation imaging

TABLE OF CONTENTS/OUTLINE
A. Principles of RFA and CRA B. Biological effects of RFA and CRA C. Imaging follow-up protocols after renal ablation D. Typical imaging features after complete and incomplete ablation E. Atypical imaging features and pitfalls F. Imaging of complications after renal ablation G. Strategy in doubtful cases

URE117
Metastatoc Renal Cell Carcinoma and Targeted Antiangiogenic Therapy: Old Illness, New Concerns

Education Exhibits
Location: NA
Certificate of Merit

Participants
Mariano Facundo Werner Reyes (Presenter): Nothing to Disclose
Carmen Sebastian Cerqueda MD: Nothing to Disclose
Blanca Pano Brufau MD: Nothing to Disclose
Begona Mellado: Nothing to Disclose
Oscar Reig: Nothing to Disclose
Carlos Nicolau MD: Nothing to Disclose

TEACHING POINTS
- To review the new treatment algorithms based on targeted antiangiogenic therapy for metastatic renal cell carcinoma (mRCC).
- To describe specific radiological findings of side effects resulting from these new treatments.
- To depict typical and atypical responses and relapse patterns in follow-up by means of CT and MR, including functional techniques.

TABLE OF CONTENTS/OUTLINE
1. Targeted angiogenic therapies in mRCC; specific pathways.
2. Targeted mRCC antiangiogenic therapies, guidelines and clinical trial reviews.
3. Secondary effects of targeted antiangiogenic therapies; review of each specific therapy with radiological examples.
4. Pitfalls of RECIST in the monitoring of mRCC targeted antiangiogenic therapy.
5. New criteria assessment of therapeutic response of these therapies based on density and perfusion. Review of qualitative signs and quantitative parameters.
6. Does diffusion play a role in the monitoring of these new therapies?
7. Positive and negative prognosis of radiological findings in baseline and follow-up studies.
8. Patterns of response, typical and atypical (based on size, density and perfusion parameters).
9. Patterns of relapse.

URE118
Quantitative and Qualitative Discrimination of Renal Cell Carcinoma Subtypes and Benign Mimics with MR Imaging: A Pictorial and Evidence Based Review

Education Exhibits
Location: NA

Participants
Nisha Alle MD (Presenter): Nothing to Disclose
Nelly Tan MD: Nothing to Disclose
Jonathan R. Young MD: Nothing to Disclose
Steven Satish Raman MD: Consultant, Bayer AG Consultant, Covidien AG

TEACHING POINTS
The purpose of this exhibit is: 1. To review the background on renal cell carcinoma (RCC) and mimics. 2. To discuss the appropriate quantitative and qualitative MR protocols for characterization of T1a renal tumors including analysis of characteristic time-signal intensity curves. 3. To review MR imaging characteristics of RCC subtypes and benign mimics (oncocytoma, minimal fat angiomyolipoma) on T1, T2, DWI, DCE, and Arterial Spin Labelling. 4. To describe the role of percutaneous renal biopsy and immunostains in guiding diagnosis among renal masses.

TABLE OF CONTENTS/OUTLINE
- Background of RCC -Epidemiology -Role of MRI in imaging of small renal masses -Contemporary qualitative and quantitative MRI techniques for staging T1a RCC subtypes and benign mimics -T1, T2, DWI, DCE, and Arterial Spin Labelling -Time signal intensity curves -MRI characteristics of RCC subtypes -Common immunostains -Rate of diagnostic accuracy in malignancy.

URE119
Radiological and Histo-pathological Correlation of Renal Cell Carcinoma using MDCT: A Teaching Atlas

Education Exhibits
Location: NA

Participants
Ankur Shah MD (Presenter): Nothing to Disclose
Hemant Tribhovandas Patel MD: Nothing to Disclose
Megha Sanghvi MD: Nothing to Disclose
Drushi Vatsal Patel MBBS, MD: Nothing to Disclose
Mrugesh Doctor: Nothing to Disclose
Shikha Rahul Khandelwal MBBS, DMRD: Nothing to Disclose

TEACHING POINTS
1. To review the role of MDCT in diagnosing renal cell carcinoma.
2. To evaluate most effective CT examination technique for delineation of tumor enhancement.
3. To predict the histopathological subtype of the lesion using various CT features and enhancement patterns.

TABLE OF CONTENTS/OUTLINE
- MDCT technique for evaluation of renal cell carcinoma - CT findings in renal cell carcinoma - Different enhancement patterns.
Renal Angiomyolipomas (AML) with Minimal Fat: CT and MR Imaging Patterns

Education Exhibits

Location: NA

Participants

Gianpiero Cardone MD (Presenter): Nothing to Disclose
Maurizio Papa MD : Nothing to Disclose
Paola Mangili PhD : Nothing to Disclose
Giorgio Guazzoni MD : Nothing to Disclose
Giuseppe Balconi : Nothing to Disclose

TEACHING POINTS

1) To describe the most frequent CT and MR patterns of renal AML with minimal fat. 2) To calculate the fat content in renal AML with minimal fat, using Chemical-Shift MR Imaging. 3) To describe the usefulness of MR Imaging in the characterization of renal AML with minimal fat.

TABLE OF CONTENTS/OUTLINE

1) Morphologic and pathologic characteristics of AML with minimal fat 2) CT and MR patterns of AML with minimal fat 3) Quantitative measurement of intratumoral fat content using Chemical-Shift MR imaging technique (Quantitative measurement of fat content using Chemical-Shift GRE MR acquisition (Signal intensity (SI) index > 25% was considered typical for AML).

Renal Masses Treated with Percutaneous and Laparoscopic Cryoablation: Computed Tomography (CT) and Magnetic Resonance (MR) Recurrence Patterns

Education Exhibits

Location: NA

Participants

Gianpiero Cardone MD (Presenter): Nothing to Disclose
Maurizio Papa MD : Nothing to Disclose
Andrea Losa MD : Nothing to Disclose
Massimo Lazzeri MD : Nothing to Disclose
Paola Mangili PhD : Nothing to Disclose
Giorgio Guazzoni MD : Nothing to Disclose
Giuseppe Balconi : Nothing to Disclose

TEACHING POINTS

1) To illustrate the most frequent CT and MR imaging appearance of the kidney, after percutaneous and laparoscopic cryoablation of renal masses. 2) To review the most common CT and MR recurrence patterns after percutaneous and laparoscopic cryoablation of renal masses. 3) To evaluate the most effective CT and MR imaging examination techniques in the evaluation of the kidney after percutaneous and laparoscopic cryoablation.

TABLE OF CONTENTS/OUTLINE

1) Percutaneous and laparoscopic renal cryoablation techniques 2) CT and MR imaging techniques in the follow-up of renal cryotherapy: the most effective techniques were multiphasic acquisition (CT) and TSE T2w and dynamic ce-FS-GRE T1w sequences, evaluated before and after digital subtraction procedure (MR). 3) Renal parenchimal changes after Cryo ablation 4) The most effective CT and MR recurrence patterns: a) morphology b) densitometry (CT) and signal intensity (MR) c) contrast enhancement patterns CT and MR patterns of recurrence in patients treated with renal cryoablation were the increase in size and vascularization of the treated areas, with the presence of an enhancing nodule within the ablation-induced lesion.

Separating the Subtypes: A Radiologic and Histopathologic Review of the Most Common Subtypes of Renal Cell Carcinoma (RCC) and Oncocytoma, a Benign Mimic of RCC

Education Exhibits

Location: NA

Participants

Jonathan R. Young MD (Presenter): Nothing to Disclose
Jocelyn A. Young : Nothing to Disclose
Daniel Jason Aaron Margolis MD : Research Grant, Siemens AG
Jiaoti Huang : Nothing to Disclose
Steven Satish Raman MD : Consultant, Bayer AG Consultant, Covidien AG

TEACHING POINTS

1. Quantitative imaging features, namely the magnitude of enhancement on multiphasic MDCT, can assist in discriminating the most common subtypes of renal cell carcinoma (clear cell, papillary, and chromophobe) and oncocytoma, a benign mimic of RCC. 2. Qualitative imaging features, such as pattern of enhancement, neovascularity, calcification, and contour, can also assist in discriminating clear cell RCC, papillary RCC, chromophobe RCC, and oncocytoma. 3. Because clear cell RCC, papillary RCC, chromophobe RCC, and oncocytoma have differing prognoses, a non-invasive means of discriminating between these entities can be of great clinical value and can thus guide further management.

TABLE OF CONTENTS/OUTLINE

1. Epidemiology of clear cell RCC, papillary RCC, chromophobe RCC, and oncocytoma 2. Prognoses of clear cell RCC, papillary RCC, chromophobe RCC, and oncocytoma 3. Multiphasic enhancement of clear cell RCC, papillary RCC, chromophobe RCC, and
oncocytoma. 4. Qualitative imaging features, including pattern of enhancement, neovascularity, calcification, and contour, of clear cell RCC, papillary RCC, chromophobe RCC, and oncocytoma. 5. Histopathologic features of clear cell RCC, papillary RCC, chromophobe RCC, and oncocytoma.

### URE123

**The Nefarious Nephron: Pitfalls in Renal Imaging**

**Education Exhibits**

Location: NA

**Participants**
- Mittul Gulati MD: Nothing to Disclose
- Vinay Anant Duddalwar MD, FRCR: Research Grant, General Electric Company
- Phillip Ming-Da Cheng MD, MS: Nothing to Disclose
- Miriam Romero MD (Presenter): Nothing to Disclose

**TEACHING POINTS**
1. Demonstrate common sources of error in renal imaging on US, CT and MRI.
2. Familiarize the reader with a variety of mimics of inflammatory and neoplastic renal disease.
3. Emphasize the importance of technique in accurately characterizing lesions.

**TABLE OF CONTENTS/OUTLINE**
1. Post treatment appearance of the kidney: partial nephrectomy, inflammatory pseudotumor, local recurrence
2. Blood and pus: where neoplasm may hide
3. Unusual renal cell carcinomas
4. Friend or foe: distinguishing angiomyolipoma and sarcoma
5. Technique matters: measuring enhancement and sources of artifact
6. Technique matters: MRI subtraction
7. Problem solving with contrast ultrasound
8. Summary

### URE124

**The Treated Kidney: Computed Tomography (CT) and Magnetic Resonance (MR) Recurrence Patterns**

**Education Exhibits**

Location: NA

**Participants**
- Gianpiero Cardone MD (Presenter): Nothing to Disclose
- Maurizio Papa MD: Nothing to Disclose
- Paola Mangili PhD: Nothing to Disclose
- Giorgio Guazzoni MD: Nothing to Disclose
- Giuseppe Balconi: Nothing to Disclose

**TEACHING POINTS**
1. To illustrate the most frequent CT and MR imaging appearance of the treated kidney, after surgical and ablative treatments.
2. To review the most common CT and MR recurrence patterns after renal surgical and ablative treatments.
3. To evaluate the most effective CT and MR imaging examination techniques in the treated kidney evaluation.

**TABLE OF CONTENTS/OUTLINE**
1. Renal masses: surgical and ablative treatments: a) total nephrectomy b) partial nephrectomy c) radiofrequency ablation d) cryoaablotion
2. CT and MR imaging techniques: The most effective technique was multiphasic acquisition (CT) and TSE T2w and dynamic ce-FS-GRE T1w sequences, evaluated before and after digital subtraction procedure (MR).
3. The most frequent CT and MR recurrence patterns: a) morphology b) densitometry (CT) and signal intensity (MR) c) contrast enhancement patterns. The most important CT and MR parameters in the evaluation of recurrence after renal surgical and ablative treatments were the presence of enhancing mass in the surgical site or the increase in size and vascularization of the treated areas.

### URE125

**Tubulocystic Renal Cell Carcinoma: A New Recognized Epithelial Tumor**

**Education Exhibits**

Location: NA

**Participants**
- Rafael Andres Vicens-Rodriguez MD (Presenter): Nothing to Disclose
- Raghunandan Vikram MBBS, FRCR: Nothing to Disclose
- Pheroze Tamboli MD: Nothing to Disclose
- Srinivasa R. Prasad MD: Nothing to Disclose
- Christopher G. Wood MD: Consultant, Pfizer Inc Investigator, Pfizer Inc Speaker, Pfizer Inc Consultant, Argos Therapeutics, Inc Investigator, Argos Therapeutics, Inc Consultant, GlaxoSmithKline plc

**TEACHING POINTS**
1. After viewing this exhibit, the learner will know the background, pathology and multimodality imaging features of this new type of renal cell carcinoma.
2. Additionally, the learner will distinguish the imaging differences between tubulocystic renal cell carcinoma and other types of RCC.

**TABLE OF CONTENTS/OUTLINE**
- Background - Genetics and Pathology - Multimodality imaging features (US, CT, MRI).
- Retrospective cohort (N=10).
- Imaging differences from other types of RCC.
- Conclusion.

### URE126

**Atypical Extra-hepatic Fat-Containing Masses in the Abdomen and Pelvis**
A wide variety of routine and unusual fat-containing masses can arise in the abdomen and pelvis. Identifying fat within a lesion is critical to narrowing the differential diagnosis. CT and MRI are essential to characterizing these masses, and can often allow for a specific diagnosis or narrow differential diagnosis.

Learning Objectives:
- Mesentery: Lipoma causing midgut volvulus
- Lipoma causing intussusception
- Adrenal Gland: Teratoma; Giant Myelolipoma; Adrenal Adenoma; Adrenal Cortical Cell Carcinoma
- Renal: Angiomyolipoma; Renal Cell Carcinoma
- Ovarian: Dermoid; Monodermal Teratoma; Malignant Teratoma; Broad Ligament Liposarcoma
- Pelvis: Liposarcoma; Extra-medullary Hematopoiesis; Extra-adrenal Myelolipoma

Summary:
- Introduction
- Review of embryological development
- Pathogenesis and epidemiologic information
- Classification of congenital urachal anomalies
- Acquired urachal remnant diseases
- Review of clinical presentation and imaging features
- Infection
- Malignancy

TABLE OF CONTENTS/OUTLINE:
- Overview and review of embryological development
- Classification of congenital urachal anomalies
- Acquired urachal remnant diseases
- Review of clinical presentation and imaging features on CT and US
- Overview of congenital urachal anomalies
- Vesicourachal Diverticulum
- Patent Urachus
- Umbilical-Urachal Sinus
- Urachal Cyst
- Review of clinical presentation and imaging features on CT and US of congenital urachal anomalies
- a. Vesicourachal Diverticulum
- b. Patent Urachus
- c. Umbilical-Urachal Sinus
- d. Urachal Cyst
- Review of clinical presentation and imaging features on CT and US of acquired urachal remnant diseases
- a. Infection
- b. Malignancy

URE128
The Anatomical and Imaging Features of Urachal Anomalies

Participants:
- Priya Krishnarao MD (Presenter)
- Benjamin Boun-Ming Chou MD
- Shawn Renee Van Bockel MD

TEACHING POINTS:
- To review the embryological development that gives rise to congenital urachal anomalies.
- To understand the classification of urachal anomalies based on anatomical location.
- To review CT and US imaging features of congenital anomalies and acquired urachal remnant diseases.
- To identify associated complications of urachal anomalies and its implications for management.

TABLE OF CONTENTS/OUTLINE:
1. Overview and review of embryological development
2. Classification of congenital urachal anomalies
3. Acquired urachal remnant diseases
4. Review of clinical presentation and imaging features on CT and US
5. Review of congenital urachal anomalies
6. Vesicourachal Diverticulum
7. Patent Urachus
8. Umbilical-Urachal Sinus
9. Urachal Cyst
10. Review of clinical presentation and imaging features on CT and US of congenital urachal anomalies
11. Infection
12. Malignancy
**Education Exhibits**

**Location:** NA

**Participants**

- **Christopher Ravi Bailey, BA:** Nothing to Disclose
- **Elliot K. Fishman, MD:** Research support, Siemens AG Advisory Board, Siemens AG Research support, General Electric Company Advisory Board, General Electric Company Co-founder, HipGraphics, Inc
- **Pamela Tecce Johnson, MD (Presenter):** Research funded, Becton, Dickinson and Company

**TEACHING POINTS**

Noncontrast CT for is a commonly performed exam for patients with flank pain and hematuria. The diagnosis of alternative renal pathology is markedly limited without IV contrast. In some cases, however, a transitional cell carcinoma may be apparent on a noncontrast CT. The purpose of this exhibit is to

1. Illustrate the noncontrast CT findings in upper tract, ureteral and bladder transitional cell carcinomas
2. Demonstrate the importance of a high contrast window and coronal MPRs to facilitate the diagnosis

**TABLE OF CONTENTS/OUTLINE**

- Background: Rising utilization of noncontrast CT in patients with flank pain and hematuria
- Literature review with respect to utility for identifying alternative renal pathology
- Technique: High contrast window to increase conspicuity of soft tissue lesions against background of fluid
- Case series of TCC findings on noncontrast CT

**URE131**

**Common Imaging Pitfalls in Multiparametric 3T MRI of the Prostate Gland**

**Education Exhibits**

**Location:** NA

**Participants**

- **Robert Villani, MD (Presenter):** Nothing to Disclose
- **Pnina Herskovits, MD:** Nothing to Disclose
- **Erin Lindsay McLaughlin, MD:** Nothing to Disclose
- **Eran Ben-Levi, MD:** Nothing to Disclose
- **Ardeshir R. Rastinehad, DO:** Nothing to Disclose

**TEACHING POINTS**

The teaching points to be made are as follows: 1. Familiarize the reader with the typical appearance of non malignant prostate tissue on MRI 2. Discuss the typical appearance of prostate malignancy 3. Describe the variety of benign findings in the prostate that mimic neoplastic processes on MRI 4. Discuss techniques to avoid imaging pitfalls

**TABLE OF CONTENTS/OUTLINE**


**URE132**

**Current and Emerging Role of Multiparametric Prostate MRI in the Setting of MR-guided Interventions and Focal Therapies**

**Education Exhibits**

**Location:** NA

**Participants**

- **Varaha Tammisetty, MD (Presenter):** Nothing to Disclose
- **Eric Michael Walser, MD:** Nothing to Disclose
- **David Arthur Woodrum, MD, PhD:** Nothing to Disclose
- **Robert J. Amato:** Nothing to Disclose

**TEACHING POINTS**

1. To discuss the utility of multiparametric approach to prostate MRI in the setting of MR guided interventions and focal therapies including localization, detection. 2. Understand the importance of structured and standardized interpretation criteria such as PIRADS and Likert scale. 3. To discuss the emerging role of prostate MRI in identifying 'index tumor' and predicting 'aggressiveness' 4. Also discuss the role of prostate MRI in each of the clinical scenarios related to MR guided interventions.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction including the limitations of Transrectal biopsies and PSA 2. Multiparametric approach to prostate MRI in the setting of MR guided interventions and focal therapies including localization, detection. 3. Example case 4. Structured and standardized interpretation criteria such as PIRADS and Likert scale. 5. Role of prostate MRI in identifying 'index tumor' and predicting 'aggressiveness' 6. Example cases 7. Role of prostate MRI in each of the clinical scenarios related to MR guided interventions and focal therapies including patient selection 8. International Multidisciplinary Consensus on Trial Design of focal therapy in prostate cancer 9. Future directions and summary

**URE133**

**How Contemporary MRI Influences the Management of Prostate Cancer Patients**

**Education Exhibits**

**Location:** NA
Participants
Anwar Roshanali Padhani MD (Presenter): Advisory Board, Acuitas Medical Ltd Advisory Board, Siemens AG Speakers Bureau, Siemens AG Researcher, Siemens AG Speakers Bureau, Johnson & Johnson
Giuseppe Petralia MD: Nothing to Disclose
Heminder Kaur Sokhi MRCS, FRCR: Nothing to Disclose
Francesco Sanguedolce PhD, MD: Nothing to Disclose
Andrew Gogbashian MD, FRCR: Nothing to Disclose
Roberto Alonzi MD: Nothing to Disclose
Nicola Anyamene: Nothing to Disclose
Giles Hellawell MD, MRCS: Nothing to Disclose

TEACHING POINTS
• Multiparametric MRI (mpMRI) aids management of suspected/proven prostate cancer, but its clinical utility depends on the mpMRI approach, image quality and reporter expertise • mpMRI shows clinically significant disease (CSD), but will also miss cancer; thus interpretation should be aligned with clinical management priorities • Judicious use of mpMRI with clinical parameters reduces under treatment of significant disease and over-diagnosis/treatment of insignificant cancers

TABLE OF CONTENTS/OUTLINE
• Overview individual mpMRI components (T2, diffusion, dynamic contrast enhancement, spectroscopy) with tumor biologic correlates and literature reviews of ability to detect CSD • Tumor detection using a disease prevalence approach and ability of mpMRI to rule in/out CSD • Demonstrate how prebiopsy mpMRI informs on biopsy technique choice improving precision of diagnosis • Show that surgical priorities and approaches are altered by risk group, index lesion locations and extracapsular disease • In low risk disease, show that mpMRI improves precision of patient selection at initial triage for active surveillance • In intermediate risk disease, show how mpMRI sub-groups enables patient selection for duration of androgen deprivation after radiotherapy • In high risk disease, imaging emphasis changes to local and nodal staging, tumor volume and metastatic disease assessments

URE134
Mimics of Prostate Carcinoma: MRI Imaging Features and Histopathological Correlation

Education Exhibits
Location: NA
Certificate of Merit
Selected for RadioGraphics

Participants
Yu Xuan Kitzing MBBS: Nothing to Disclose
Adilson Prando MD: Nothing to Disclose
Celi Varol: Nothing to Disclose
Gregory Stanislaus Karczmar PhD: Nothing to Disclose
Fiona Maclean: Nothing to Disclose
Aytekim Oto MD (Presenter): Research Grant, Koninklijke Philips NV Consultant, Guerbet SA

TEACHING POINTS
The purpose of this exhibit is: 1. To review the range of mimics of prostate carcinoma on multiparametric MRI. 2. To discuss the histopathological findings of the mimics through pathology-proven case series. 3. To compare and contrast the multiparametric MRI findings between the mimics and prostate carcinoma. 4. To understand the potential association between the underlying histopathology and the appearance of the mimics on T2, diffusion weighted imaging and dynamic contrast enhanced sequences.

TABLE OF CONTENTS/OUTLINE

URE135
Modern Imaging Techniques for Metastatic Prostate Cancer: Is the Bone Scan Dead?

Education Exhibits
Location: NA

Participants
Amish Lakhani MBBS, MA (Presenter): Nothing to Disclose
Anwar Roshanali Padhani MD: Advisory Board, Acuitas Medical Ltd Advisory Board, Siemens AG Speakers Bureau, Siemens AG Researcher, Siemens AG Speakers Bureau, Johnson & Johnson
Andrew Gogbashian MD, FRCR: Nothing to Disclose
Roberto Alonzi MD: Nothing to Disclose
Nicola Anyamene MD, FRCR: Nothing to Disclose

TEACHING POINTS
1) Modern imaging techniques such as Choline/NaF PET-CT and whole body MRI can detect bone metastases with increased sensitivity before bone scans; early detection and therapy has been shown to result in survival benefits. 2) Functional imaging methods are able to positively assess therapy response compared to bone scans which can only identify tumor progression; these more accurate assessments of therapy response aids the rational use of targeted therapy for metastatic disease.

TABLE OF CONTENTS/OUTLINE
1) Overview of the current methods and challenges of assessing the presence and response of metastatic prostate cancer to bone. 2) Review the relative performance of planar bone scans compared to modern techniques for detecting bone disease using published meta-analyses. 3) Discuss DW-MRI as a new viable sequence for metastases detection, outlining its added value to standard sequences in whole body (WB) examinations. 4) Provide examples of how WB-DWI overcomes the limitations of morphologic sequences for disease detection and response assessment to standard and targeted therapies. 5) Illustrate the
indications for WB-MRI imaging in routine clinical practice from our database of >2500 WB-MRI examinations, with supportive literature data. 6) Teaching points and future directions.

URE137

MR Imaging before and after Transcatheter Embolización in Benign Prostatic Hyperplasia: What the Radiologist Needs to Know

Education Exhibits
Location: NA
Cum Laude

Participants
Jorge Alberto Ocantos MD (Presenter): Nothing to Disclose
Nestor Hugo Kisilevsky: Nothing to Disclose
Julio Ramon Coronil MD: Nothing to Disclose
Andres Kohan MD: Fellowship funded, Koninklijke Philips NV
Ignacio Ardanaz: Nothing to Disclose
Pablo Francisco Martinez: Nothing to Disclose
Oscar Peralta: Nothing to Disclose
Oscar Hector Damia: Nothing to Disclose
Ricardo D. Garcia-Monaco MD, PhD: Research Consultant, Siemens AG Research Consultant, BTG International Ltd

TEACHING POINTS
To describe prostate normal anatomy, pathophysiology, changes of the gland observed in BPH, clinical manifestations, and treatment options for benign prostatic hyperplasia (BPH). To review technique, indications, contraindications and potential complications of prostatic arterial embolization (PAE). To describe prostatic MR imaging technique. To review MR findings before and after embolización (prostate volume determination, tissue characteristics, isquemic changes and relation central and periferical gland)

TABLE OF CONTENTS/OUTLINE
MR Prostate anatomy: Normal and changes in benign prostatic hyperplasia.
BPH: Pathophysiology and clinical manifestations.
BPH: Treatment options and review of prostatic arterial embolization in particular.
MR Protocol and technique.
MR findings before and after PAE in benign prostatic hyperplasia.
Conclusion and future perspective of MR Imaging before and after PAE.

URE138

Multi-Parametric MRI Findings of Post-Treatment Changes in the Prostate Gland

Education Exhibits
Location: NA
Certificate of Merit
Selected for RadioGraphics

Participants
Berrend Gustian Muller MD (Presenter): Nothing to Disclose
Sandeep Sankineni MD: Nothing to Disclose
Osama Elbuluk: Nothing to Disclose
Kinzya Bernice Grant MD: Nothing to Disclose
Soroush Rais-Bahrami MD: Nothing to Disclose
Annerleim Walton-Diaz: Nothing to Disclose
Harsh Agarwal: Employee, Koninklijke Philips NV
Marcelino Bernardo BS: Nothing to Disclose
Peter Pinto: Nothing to Disclose
Peter L. Choyke MD: Researcher, Koninklijke Philips NV Researcher, General Electric Company Researcher, Siemens AG Researcher, iCAD, Inc Researcher, Aspyrian Therapeutics, Inc Researcher, ImaginAb, Inc Researcher, Aura Baris Turkbey MD: Nothing to Disclose

TEACHING POINTS
Multi-parametric MRI (MP-MRI) has an important role in the management of prostate cancer. The technology has several clinical indications such as lesion detection, biopsy guidance and focal therapy. During the last decade, MP-MRI has been increasingly used in post-treatment follow up of prostate cancer and sometimes in treatment of benign prostatic hyperplasia. Given the large spectrum of treatment approaches (e.g. prostatectomy, focal laser ablation, radiotherapy, hormonal therapy, proton-beam therapy etc.), it is challenging for the interpreting radiologist to accurately evaluate the MP-MRI in the setting of treatment-related changes. The purpose of this exhibit is to present prostate MP-MRI findings of post-treatment patients and to provide tips to aid in the accurate evaluation of such cases.

TABLE OF CONTENTS/OUTLINE

URE139

Post-treated Prostate Cancer: Normal Findings and Signs of Local Relapse on Multiparametric
**Magnetic Resonance Imaging**

*Education Exhibits*

*Location: NA*

**Participants**

Joao Lopes Dias MEd *(Presenter)*: Nothing to Disclose  
Rita Nobre Lucas MD: Nothing to Disclose  
Nuno Vasco Costa: Nothing to Disclose  
Cecilia Isabel Leal: Nothing to Disclose  
Tiago Bilhim MD: Research Consultant, Cook Group Incorporated  
Rui Mateus Marques: Nothing to Disclose

**TEACHING POINTS**

The authors provide a pictorial review of (1) the normal findings and (2) the signs of local tumor relapse after radical prostatectomy, brachytherapy, external beam radiotherapy and hormonal therapy.

**TABLE OF CONTENTS/OUTLINE**

- The use of multiparametric magnetic resonance imaging (mp-MRI) for prostate cancer has increased over the last years, mainly for detection, staging and active surveillance. However, recurrence suspicion in the set of biochemical failure is becoming a significant reason for clinicians to request mp-MRI.  
- Radiologists should be able to recognize the normal post-treatment MRI findings.  
- Fibrosis and atrophic remnant seminal vesicles after prostatectomy are common and must be differentiated from local relapse.  
- Moreover, brachytherapy, external beam radiotherapy and hormonal therapy tend to diffusely decrease the signal intensity of the peripheral zone on T2 weighted images (T2WI) due to the loss of water content, consequently mimicking tumor and hemorrhage.  
- The combination of T2WI and functional studies like diffusion weighted imaging (DWI) and dynamic contrast-enhanced (DCE) improves the identification of local relapse.  
- Tumor recurrence tends to restrict on diffusion images and avidly enhance after contrast administration either within or outside the gland.

**URE140**

*Prostate 3D MR Spectroscopy at 3 Tesla: Technical Challenges and Step-by-Step Evaluation*

*Education Exhibits*

*Location: NA*

**Participants**

Sharad Maheshwari MD *(Presenter)*: Nothing to Disclose  
Abhijit A. Raut MD: Nothing to Disclose  
Pankaj Chhatrala MBBS: Nothing to Disclose  
Tejas Harish Kapadia MBBS: Nothing to Disclose  
Yogini Nilkantha Sawant MBBS: Nothing to Disclose  
Harshad Wankhedkar DMRD: Nothing to Disclose  
Jigar Aiya MBBS, DMRD: Nothing to Disclose  
Charul Goyal MBBS: Nothing to Disclose

**TEACHING POINTS**

The exhibit aims to discuss the technical challenges associated while doing 3D MR Spectroscopy of prostate at 3T MRI. Optimal shimming and placement of saturation bands is critical. Equally challenging is review of MR Spectroscopy data for the entire prostate gland. A step-by-step guide has been provided making it easy for a radiologist.

**TABLE OF CONTENTS/OUTLINE**

1. Patient preparation.  
2. Positioning of the coil and activation of coil elements  
3. Placement of voxel  
4. Placement of saturation bands  
5. Manual Shimming  
7. Reporting format

**URE141**

*Prostate Imaging Reporting and Data System (PIRADS) for Multiparameteric Prostate MRI (MP-MRI) Interpretation: Radiologic-Pathologic Correlation*

*Education Exhibits*

*Location: NA*

**Participants**

Derek William Cool MD, PhD *(Presenter)*: Patent agreement, Eigen  
Eli Gibson MSc: Nothing to Disclose  
Mena Gaed MD: Nothing to Disclose  
Jose A. Gomez: Nothing to Disclose  
Madeleine Moussa: Nothing to Disclose  
Aaron D. Ward PhD: Nothing to Disclose  
Aaron Fenster PhD: License agreement, Eigen  
Stephen E. Pautler MD: Nothing to Disclose  
Joseph Chin MD: Nothing to Disclose  
Jonathan Izawa: Nothing to Disclose  
Glenn Baumann MD: Nothing to Disclose  
Cesare Romagnoli MD: Consultant, Profound Medical Inc

**TEACHING POINTS**

This educational exhibit discusses the European Society of Urogenital Radiology (ESUR) PIRADS framework for MP-MRI interpretation through rad-path correlation. All rad-path correlation was achieved through fiducial-based MRI-to-histology registration post-prostatectomy or through MRI-TRUS fusion biopsy.

1. Non-malignant lesions, such as prostatitis, BPH nodules or prostatic intraepithelial neoplasia (PIN), can mimic prostate...
adenocarcinoma (PCa) on MP-MRI.

2. PIRADS has been developed to standardize and improve MP-MRI interpretation by providing an estimate of malignancy from 1-5.

3. MP-MRI interpretation within the peripheral zone of the prostate differs from interpretation of the central/transitional zone of the prostate. Low ADC is the most reliable predictor of malignancy in the peripheral zone. T2 is the most reliable for differentiating malignancy from BPH nodules in the transitional zone.

4. Low ADC values on DWI are associated with higher-grade malignancy.

**TABLE OF CONTENTS/OUTLINE**

PCa and pathologic Gleason grading system
- T2
- DWI/ADC
- Dynamic contrast enhancement (DCE)
- MR Spectroscopy

MP-MRI appearance of PCa and mimics
- PCa
- PIN
- Prostatitis

ESUR-PIRADS interpretation scheme
- T2
- DWI/ADC
- DCE
- MR Spectroscopy
- Composite PIRADS Score
- Rad-Path Case illustrations

### URE142

**Prostate Treated for Prostatic Carcinoma: Multiparametric Magnetic Resonance (MR) Imaging Recurrence Patterns**

_Education Exhibits_  
_Location: NA_

#### Participants

- Gianpiero Cardone, MD (Presenter): Nothing to Disclose  
- Antonella Messina, MD: Nothing to Disclose  
- Maurizio Papa, MD: Nothing to Disclose  
- Andrea Losa, MD: Nothing to Disclose  
- Massimo Lazzari, MD: Nothing to Disclose  
- Paola Mangili, PhD: Nothing to Disclose  
- Pietro Panizza, MD: Nothing to Disclose  
- Giorgio Guazzoni, MD: Nothing to Disclose  
- Giuseppe Balconi: Nothing to Disclose

#### TEACHING POINTS

To illustrate the most frequent Multiparametric MR imaging appearance of the prostate treated for prostate cancer, after surgical and ablative treatments. To review the most frequent recurrence patterns after prostate surgical and ablative treatments. To evaluate the most effective MR imaging examination techniques.

**TABLE OF CONTENTS/OUTLINE**

1) Surgical and ablative treatments for prostatic carcinoma  
   a) Radical prostatectomy  
   b) Radiotherapy  
   c) Brachytherapy  
   d) Focal Brachytherapy  
   e) Cryoablation  
   f) Focal Cryoablation  
   g) HIFU  
2) Multiparametric MR imaging techniques  
3) MR imaging patterns of the treated prostate:  
   a) Morphology  
   b) Signal intensity  
   c) Contrast enhancement patterns on dynamic studies  
   d) Diffusion  
   e) Spectroscopy  
4) MR most frequent recurrence patterns.

### URE143

**Rare Prostate Tumors: Beyond Adenocarcinoma**

_Education Exhibits_  
_Location: NA_

#### Participants

- Maria Diez Blanco, MD (Presenter): Nothing to Disclose  
- Alejandro Fernandez Florez: Nothing to Disclose  
- Sara Sanchez Bernal, MD: Nothing to Disclose  
- Marta Drake Perez: Nothing to Disclose  
- Jose Maria Navasa-Qmelado: Nothing to Disclose  
- Gerardo Lopez Rasines, MD: Nothing to Disclose

#### TEACHING POINTS

To know the different types of neoplasm in the prostate, both frequent and rare. To present the essential imaging diagnostic attributes of these variants. To emphasize the clinical significance of these variants, when different from usual acinar adenocarcinoma, including clinical presentation and outcome.

**TABLE OF CONTENTS/OUTLINE**

A. Diagnostic imaging:  
   1. US  
   2. TRUS (Trans Rectal UltraSonography)  
   3. CT  
   4. 3T MRI  
B. Variants of usual acinar adenocarcinoma:  
   - Clinical issues  
   - Imaging findings  
C. Update review on recent variants of prostatic carcinoma:  
   1. Microcystic adenocarcinoma  
   2. Pin-like adenocarcinoma  
   3. Large-cell neuroendocrine carcinoma  
   4. Pleomorphic giant cell adenocarcinoma  
D. Top differential diagnoses: Pseudotumoral lesions that mimic prostate neoplasm - Inflammatory pseudotumor - Malakoplakia
URE146
Utility of Advanced Imaging for Lymph Node Staging in Prostate Cancer

Education Exhibits
Location: NA

Participants
Osama Elbuluk (Presenter): Nothing to Disclose
Linda Johnson: Nothing to Disclose
Kinnya Bernice Grant MD: Nothing to Disclose
Sanjeev Sankineni MD: Nothing to Disclose
Maria Lindenborg MD: Nothing to Disclose
Karen Ann Kurdziel MD: Researcher, General Electric Company Researcher, Siemens AG Researcher, Koninklijke Philips NV
Peter Pinto: Nothing to Disclose
Peter L. Choyke MD: Researcher, Koninklijke Philips NV Researcher, General Electric Company Researcher, Siemens AG Researcher, iCAD, Inc Researcher, Aspyrian Therapeutics, Inc Researcher, ImaginAb, Inc Researcher, Aura
Baris Turkbey MD: Nothing to Disclose

TEACHING POINTS
Proper management of prostate cancer is directly tied to correct staging of disease, in particular, accurate lymph node staging. Additionally, every patient’s prognosis is highly dependent upon the ability to accurately detect metastatic disease. Unfortunately, the current gold standard for lymph node staging, surgical pelvic lymph node dissection, can result in significant complications. Pre-operative imaging attempts to provide a non-invasive alternative without sacrificing the reliability of a tissue diagnosis. The purpose of this exhibit is to present the utility of current and experimental imaging modalities available for lymph node staging of prostate cancer.

TABLE OF CONTENTS/OUTLINE
Case presentations will cover representative examples of each of the following modalities from patients with confirmed prostate cancer and lymph node metastases, along with a discussion of the key features and shortcomings of each modality. The list of modalities includes: 1. Conventional CT and MRI 2. PET (FDG, C11-acetate, FACBC) 3. Advanced MRI (ADC and high b DWI) 4. Iron Oxide Imaging 5. Sentinel Node Imaging

URE148
Abnormal Gas in the Genitourinary System on CT: What the Radiologist Needs to Know

Education Exhibits
Location: NA

Selected for RadioGraphics

Participants
Takehiko Gokan MD (Presenter): Nothing to Disclose
Nobuyuki Takeyama MD: Nothing to Disclose
Yoshimitsu Ohgita MD: Nothing to Disclose
Masanori Hirose MD: Nothing to Disclose
Jiro Munechika: Nothing to Disclose

TEACHING POINTS
To review common and important causes of the abnormal gas in the urinary system, which are discussed and appropriate clinical cases are presented. To understand the presence of gas in urinary system is associated with serious clinical disease. To be familiar with the number of causes of abnormal gas on CT will allow the radiologist to provide the appropriate diagnosis and management.

TABLE OF CONTENTS/OUTLINE
The cases will be presented in a quiz format. Key differential diagnostic points, pitfalls, and therapeutic management will be highlighted in the discussion of each case. The cases will include - emphysematous pyelonephritis - emphysematous pyelitis - emphysematous cystitis - renal abscess - Fournier’s gangrene - enterovesical fistula - perforation of the duodenum into perirenal space - traumatic disease - iatrogenic disease

URE150
Benign Disease – but Malignant Manifestation: Pelvis Lipomatosis

Education Exhibits
Location: NA

Participants
Kai Zhao MD (Presenter): Nothing to Disclose
Xiaoying Wang MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the etiological factor and epidemiology of Pelvis Lipomatosis (PL) 2. To review the clinical characteristics of PL 3. To explain radiologists’ role in the diagnosis of PL 4. To introduce the utility of MRI and scan scheme of patient who is suspected of PL 5. To introduce some important prepare tips before scan 6. To explain some key signs and parameters in the diagnosis, such as bladder morphological index and bladder seminal vesicle angle 7. To introduce treatment and follow-up of patient with PL

TABLE OF CONTENTS/OUTLINE
Etiological factor of PL Epidemiology of PL Clinical characteristics of PL Radiologists’ role in the diagnosis of PL Imaging findings IVU CT MRI MR scan scheme Key signs and parameters New MR sequence Sample cases and mimics Treatment and follow-up of patients with PL
Call the Plumber! A Review of Non-calculous Causes of Urinary Obstruction

Participants
Joanna Kee-Sampson MD (Presenter): Nothing to Disclose
Jonathan Schiavi MD: Nothing to Disclose

TEACHING POINTS
At the end of this exhibit, the viewer will be able to: 1. Discuss differential diagnoses for causes of urinary obstruction other than urinary calculi. 2. Differentiate the imaging appearances of various urinary pathologies which can lead to urinary obstruction.

TABLE OF CONTENTS/OUTLINE
1. Neoplasm  a. Urologic • Transitional cell carcinoma • RCC b. Non-urologic • Lymphoma • Pelvic malignancies
2. Iatrogenic a. Ureteral injury • C-section • Ureteral-enteric fistula s/p aortic repair
3. Inflammatory • Retroperitoneal fibrosis
4. Congenital/developmental • Posterior urethral valves • Duplication • Ureteropelvic junction obstruction
5. Bladder outlet obstruction • BPH
There will also be a brief discussion of intervention/appropriate follow-up for each case if applicable.

Contrast-induced Nephropathy: Identifying the Risks and Reviewing Effective Prevention and Management Methods

Participants
Khalid Walid Shaqdan MD (Presenter): Nothing to Disclose
Shima Aran MD: Nothing to Disclose
Elmira Hassanzadeh MD: Nothing to Disclose
Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

TEACHING POINTS
• Contrast induced nephropathy (CIN) is associated with high risk of in-hospital and 1-year mortality • A survey found that less than half of physicians were aware of potential risk factors • Therefore, identifying patients at risk and taking appropriate measures is key in the prevention of contrast induced nephropathy. • The aim of this exhibit is to enhance the radiologists understanding of CIN through a literature review of the most recent guidelines and other sources

TABLE OF CONTENTS/OUTLINE
• Background/literature review
  o Contrast-induced nephropathy (CIN)
    Definition
    Incidence and pathogenesis
    Clinical features
    Most recent CIN guidelines according to:
      • American College of Radiology
      • Canadian Association of Radiologist
      • Identifying the predisposing risk factors
        o Underlying health issues
        o Renal function markers
        o CIN Risk scoring system
      • Choice of contrast agent
        o Ionic and nonionic agents
      • Meta-analysis of benefits
      • Treatment and preventative strategies
        o Protecting renal function
        o Fluid Loading
        o Medications
          N-acetylcysteine
          Calcium Channel blockers
          Theophylline
          Other
      o Special considerations
        • Recent clinical research
        • Unique formulation Deferiprone
        • Renal Guard system
      • Addressing controversial issues

CTA Angiography with 3D Mapping of the Renal Arteries: Normal Anatomy, Pathology and Pitfalls — What the Radiologist Needs to Know

Participants
Elliot K. Fishman MD (Presenter): Research support, Siemens AG Advisory Board, Siemens AG Research support, General
**TEACHING POINTS**

1. What are the major pathologies that involve the renal artery and what is their typical CT appearance?
2. What is the role of CTA and 3D imaging in detection of renal artery pathology?
3. How to interpret CTA of the renal arteries and understanding the range of pathologies involved?
4. Understand the potential pitfalls in lesion detection and in arriving at the correct diagnosis.

**TABLE OF CONTENTS/OUTLINE**

The exhibit will cover a range of topics with discussion of key facts and potential errors in diagnosis. Case studies will be provided to enhance the learning experience. Topics will be addressed from specific imaging categories to specific clinical scenarios.

**Renal Artery Categories**
- Normal anatomy and anatomic variations
- Renal artery stenosis
- Renal artery aneurysms
- Renal artery dissection
- AV fistulae

**Clinical Applications**
- Renal transplant donor
- Renal artery evaluation in tumor staging
- Renal artery involvement in trauma
- Renal causes in hypertension
- UPJ evaluation
- Hematuria evaluation
- Endovascular stent planning

**Misscellaneous**
- Pearls and Pitfalls
- Basic scan protocols
- Injection protocols and pitfalls
- Role of MPR, MIP, and VRT protocols

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**URE155**

**Development of Diagnostic Ultrasound in Urology — beyond Ultrasound Screening**

*Education Exhibits*

Location: NA

**Participants**

- Nagaaki Marugami (Presenter): Nothing to Disclose
- Toshiko Hirai MD: Nothing to Disclose
- Junko Takahama MD: Nothing to Disclose
- Aki Takahashi MD: Nothing to Disclose
- Kimihiko Kichikawa MD: Nothing to Disclose

**TEACHING POINTS**

1. To understand the development of ultrasound (US) soft- and hardware in urology: high-frequency transducer (9-18MHz), 3D image, flow image, elastography, and contrast-enhanced ultrasound (CE-US).
2. To demonstrate the utility of diagnostic ultrasound in diagnosis of urologic disorders: comparison with multimodality imaging.

**TABLE OF CONTENTS/OUTLINE**

1. Introduction: the development of new ultrasound unit: high-frequency transducer (9-18MHz), 3D image, flow imaging, elastography, and CE-US.
2. Case presentation based on the development of new ultrasound unit
   - High-frequency transducer (9-18MHz): Complicated renal cyst, Renal pelvic tumor, Ureteral cancer, Undescended testis, and Testicular torsion.
   - 3D image: Bladder cancer
   - Flow image: Renal artery stenosis, Renal AVM, Renal aneurysm, and High flow priapism
   - Elastography: Renal cell carcinoma, Angiomyolipoma, and Testicular tumor,
   - CE-US: Renal cell carcinoma, Angiomyolipoma, and Testicular torsion
3. Discussion
4. Summary

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**URE156**

**Follow the Stream: Imaging of Urinary Diversions**

*Education Exhibits*

Location: NA

Selected for RadioGraphics

**Participants**

- Lauren Moomjian MD (Presenter): Nothing to Disclose
- Laura R. Carucci MD: Nothing to Disclose
- Adam Klausner: Nothing to Disclose
- George Guruli MD: Nothing to Disclose

**TEACHING POINTS**

- A variety of surgical techniques to reroute the urine stream have been performed and are often encountered on imaging studies.
- Diagnosis of complications relies upon first determining the procedure performed and the alterations made to the GU and GI tract.
- Knowledge of expected postoperative anatomy, examination techniques, and potential complications is essential for accurate diagnosis.

**Purpose/Aim:**
1. Review methods of urinary diversion and expected postoperative anatomy.
2. Discuss the indications for imaging following urinary diversion and examination techniques.
3. Review imaging findings of early and late postoperative complications.

**TABLE OF CONTENTS/OUTLINE**

- Indications for Urinary Diversion
- Methods of Urinary Diversion and Expected postoperative anatomy including continent and incontinent diversion
- Cutaneous Reservoir, Ileal Conduit, Continent Pouch with Stoma, Neobladder
- Indications for Imaging and examination techniques CT, MRI, Pouchography, IVP, US
- Early postoperative complications Leak (GU or GI), Fistula, Abscess, GI or GU obstruction
- Late postoperative complications Stomal stenosis, Strictures, Stones, Fistula, Infection, Hernia, Recurrent tumor

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**URE157**

**Go with the Flow: A Pictorial Review of Non-traumatic Male Genitourinary Emergencies**
**Go with the Flow: A Pictorial Review of Non-traumatic Male Genitourinary Emergencies**

*Education Exhibits*

*Location: NA*

**Participants**

Abigail Victoria Berniker MD (Presenter): Nothing to Disclose  
Oleg Teytelboym MD: Nothing to Disclose  
Stanley Uy Chan MD: Nothing to Disclose  
Justin Edward Mackey MD: Nothing to Disclose

**TEACHING POINTS**

1. A host of non-traumatic conditions can afflict the male genitourinary (GU) system, many of which require prompt diagnoses to facilitate timely treatment and preserve organ function. Radiologists should be familiar with these entities and feel confident providing accurate diagnoses and appropriate management recommendations.

**TABLE OF CONTENTS/OUTLINE**

- Goals: Show the spectrum of emergent, non-traumatic conditions affecting the male GU system through a case-based pictorial format  
- Classify entities by etiology (infectious, vascular, miscellaneous)  
- Review appropriate management  
- Overview Case-based pictorial review

**Upper GU tract**

- Infect: pyelonephritis; perirenal abscess  
- Vasc: renal vascular thrombosis/infarct  
- Misc: radiation nephritis; contrast-induced nephropathy; fornical rupture

**Lower GU tract**

- Infect: epididymoorchitis; pyocele; scrotal abscess; Fournier gangrene; prostatitis  
- Vasc: testicular torsion/infarct, penile thrombosis  
- Misc: malpositioned penile prosthesis, VP shunt, Foley catheter

**Summary**

Males can develop a host of non-traumatic GU conditions that require timely diagnoses and treatment to prevent permanent, often devastating outcomes. Radiologists play an integral role in the workup of these patients; accurate imaging interpretation is essential to expedite treatment and preserve organ function.

**URE159**

**Imaging of Pediatric En-bloc Renal Transplant Complications: A Review of 195 Cases.**

*Education Exhibits*

*Location: NA*

**Participants**

Gary Garlup Tse MD (Presenter): Nothing to Disclose  
Ghaneh Fananapazir MD: Nothing to Disclose  
Michael Thomas Corwin MD: Nothing to Disclose  
John P. McGahan MD: Patent agreement, Roper Industries, Inc  
Christoph Troppmann MD: Nothing to Disclose

**TEACHING POINTS**

1. Review the epidemiology and imaging anatomy of pediatric en bloc transplantation.  
2. Learn the normal radiographic appearance of en bloc renal transplants, as seen on ultrasound, CT, MRI, nuclear medicine studies, and angiography.  
3. Multimodality case review of en-bloc transplant complications as seen on ultrasound, CT, MRI, and nuclear medicine studies.

**TABLE OF CONTENTS/OUTLINE**

- Epidemiology of pediatric en bloc kidney transplantation  
- Common surgical approaches to pediatric en bloc transplantation backbench transplant preparation arterial and venous anastomoses ureteral anastomoses approaches to variant anatomy

Pediatric en bloc normal imaging anatomy Ultrasound MRI CT Angiography Nuclear medicine Multimodality case review of en-bloc transplant complications which can affect either one or both transplanted kidneys (ultrasound, CT, MRI, nuclear medicine, angiography). Vascular renal artery stenosis renal artery thrombosis renal vein thrombosis others Ureters strictures calculi stent migration Peritransplant fluid collections lymphoceles urinomas hematomas others

**URE160**

**Incidental Findings on CT Angiograms for Renal Donors**

*Education Exhibits*

*Location: NA*

**Participants**

Shari Friedman MD (Presenter): Nothing to Disclose  
Liise Kayler MD: Nothing to Disclose  
Robert G. Berkenblit MD: Speaker, Novartis AG

**TEACHING POINTS**

1) CTA allows for detailed assessment of renal vascular anatomy which is crucial in pre-operative planning prior to renal transplant  
2) CTA can detect conditions that may affect a patient's ability to donate a kidney or alter which kidney is ultimately harvested

**TABLE OF CONTENTS/OUTLINE**

- Review imaging technique for performing CTA prior to kidney donation  
- Illustrate variant renal vascular anatomy and discuss those that affect which kidney is harvested or exclude the patient from transplant: multiple renal arteries; multiple renal veins; early arterial branching; renal artery stenosis; significant atherosclerotic disease; left renal vein narrowing/nutcracker syndrome

Present a pictorial atlas of varied incidental imaging findings both inside and outside the kidney that excluded patients from renal donation -renal calculi; evidence of portal venous hypertension; papillary necrosis; renal cysts; renal cell carcinoma; pancreatic nodules

**URE161**

**MDCT of the Bladder: Spectrum of Disease**
**UE162**

**Name the Muscle! Pelvic Floor Muscles Made Easy — An Interactive Case-based Approach**

**Participants**
- Fritz Hofmann MD (Presenter): Nothing to Disclose
- Juan Eugenio Cosme MD: Nothing to Disclose
- Anamari Perochena MD: Nothing to Disclose
- Pamela Cerdio MD: Nothing to Disclose
- Marco Antonio Sarmiento MD: Nothing to Disclose
- Natalia Montoya MD: Nothing to Disclose
- Sandra Ortiz: Nothing to Disclose
- Antonio Hernandez Villegas MD: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is to: Review the anatomy of the muscles of the pelvic floor. Provide fluency and expertise in multimodality imaging appearance of the pelvic floor muscles using sagital, coronal and axial reconstructions. Understand the importance of pathologic pelvic floor involvement.

**TABLE OF CONTENTS/OUTLINE**

- Schematic diagram of the pelvic floor muscles
- Correlation with axial, coronal and sagittal pelvic CT scans.
- Interactive clinical cases and quizzes will be presented to emphasized the exhibit teaching points
- Summary

**URE163**

**Nephrostomies, Nephrectomies and Neoplasms: Upper Genitourinary Tract Interventions and Complications**

**Participants**
- Shaden F. Mohammad MD (Presenter): Nothing to Disclose
- Luyao Shen MD: Nothing to Disclose
- Daniel Jason Aaron Margolis MD: Research Grant, Siemens AG
- Anokh Pahwa MD: Nothing to Disclose
- Monica Deshmukh MD: Nothing to Disclose
- Maitraya K. Patel MD: Nothing to Disclose

**TEACHING POINTS**

Renal and ureteral pathology are commonly encountered on abdominal CT, many of which require urologic intervention. The interventions of the upper tract of the GU system include nephrectomy, nephroureterectomy, extracorporeal shock wave lithotripsy, percutaneous nephrolithotomy and procedures requiring percutaneous renal or ureteral access. Understanding the clinical indications for these procedures, the key preoperative findings, the expected postoperative changes is essential for patient management and appropriate diagnosis. The purpose of this exhibit is to: 1. Describe the most commonly encountered interventions of the upper GU tract and their indications. 2. Discuss the relevant preoperative radiologic findings important to the Urologist, and the expected postoperative imaging appearance of these interventions.

**TABLE OF CONTENTS/OUTLINE**

1. Optimal imaging technique for evaluating the upper GU tract
2. Clinical Indications, relevant preoperative imaging findings, and normal post-operative imaging appearance of: -Nephrectomy -Nephroureterectomy -ESWL/ PNL -Percutaneous nephrostomy access and...
stent placement. 3. Abnormal post-operative findings: - Fluid collections: hematoma, urinoma, abscess, hemostatic agent - Lymphatic disruption - Infection - Vascular compromise, pseudoaneurysm - Ureteral injury - Recurrent tumor

URE164

New Dimensions in Renal Transplant Sonography: Applications of 3-D Ultrasound

Education Exhibits

Location: NA

Participants

William Walter MD (Presenter): Nothing to Disclose
Susan Judith Frank MD: Nothing to Disclose
Mordecai Koenigsberg MD: Nothing to Disclose

TEACHING POINTS

We reviewed 105 sequential 3D US performed for evaluation of renal transplants from 4/1/12-4/1/14 in order to:
1. Familiarize the learner with normal findings on 3D US of the renal transplant and the 3D US appearance of pathological conditions
2. Demonstrate the usefulness of 3D US in evaluation of renal transplants

TABLE OF CONTENTS/OUTLINE

1. Review of literature on 3D US for renal transplant evaluation
2. Review of applications for 3D US in evaluating various clinical indications post-transplant
   a. Evaluating: pain, graft failure, hypertension, fever
   b. Demonstrating information added by 3D US and comparison with standard modalities (2D US, CTA, MRA)
3. Review of normal 3D US findings of renal transplants
4. Review of 3D US appearance of various renal transplant pathology
   a. Evaluate vascular findings with surface-rendered color Doppler: renal artery tortuosity, renal artery stenosis, renal artery/vein thrombosis, AV fistula
   b. Clarify the usefulness of 3D US in assessing and following perigraft collections: lymphocele, abscess, and hematoma
   c. Imaging of collecting system and ureteral pathology: hydronephrosis, ureteral stricture
   d. Evaluation of the urinary bladder: ureteral jets, bladder wall thickening, post-void residual
   e. Correlation of findings with 2D US, CTA, MRA if available

URE165

Penile Color Doppler Sonography: Anatomy, Procedure, Interpretation and Complication

Education Exhibits

Location: NA

Participants

Rohit Kr Khandelwal MD (Presenter): Nothing to Disclose
Chandan Jyoti Das MD: Nothing to Disclose
Sanjay Sharma MD: Nothing to Disclose
Sonia Sandip MD: Nothing to Disclose
Devasenathipathy Kandasamy: Nothing to Disclose

TEACHING POINTS

1. Describe anatomy and procedure of penile color Doppler with emphasis on interpretation. 2. Discuss complication of Papaverine injection and management.

TABLE OF CONTENTS/OUTLINE

Penile erection is a complex phenomenon, which includes coordinated interaction of the nervous, arterial, venous and sinusoidal systems. A defect in any of these systems may result in erectile dysfunction. Penile color Doppler is used to determine the integrity of the vascular mechanism. The exhibit will include the following points- 1. Anatomy 2. Physiology of erection 3. Procedure 4. Interpretation 5. Complication of Papaverine injection and management.

URE166

Pericatheter Cystourethrography after Urethroplasty: How We Do It and What Does the Urologist Want to Know

Education Exhibits

Location: NA

Participants

Ana Tapia Guerrero (Presenter): Nothing to Disclose
Lydia Rojo Carmona: Nothing to Disclose
Marta Atencia Ballesteros MD: Nothing to Disclose
Francisco Javier Machuca Santa-Cruz: Nothing to Disclose
Maria Mercedes Acebal Blanco: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to review the urethral strictures, their treatment and the imaging findings in pericatheter cystourethrography after surgery. Radiologists has to answer the questions that urologist needs to know before to removal urethral catheter.

TABLE OF CONTENTS/OUTLINE
URE167

Renal Manifestations of Hematologic Disorders: A Pictorial Review

Education Exhibits

Location: NA

Magna Cum Laude

Selected for RadioGraphics

Participants

Andrei S. Purysko MD (Presenter): Nothing to Disclose
Hilton M. Leao Filho MD: Nothing to Disclose
Antonio C. Westphalen MD: Nothing to Disclose
Christopher Peter Coppa MD: Nothing to Disclose
Erick Marc Remer MD: Nothing to Disclose

TEACHING POINTS

After viewing this exhibit viewers should be able to:

- List various hematologic conditions that can have renal involvement
- Recognize patterns of renal involvement on imaging that can help narrow their differential diagnosis

TABLE OF CONTENTS/OUTLINE

A) Introduction
B) Patterns of renal involvement

URE168

Role of FDG-PET/CT in Urological Oncology: Staging and Post-treatment Evaluation

Education Exhibits

Location: NA

Certificate of Merit

Participants

Masahiro Okada MD (Presenter): Nothing to Disclose
Itaru Chiba: Nothing to Disclose
Gyou Iida: Nothing to Disclose
Yukiko Nishikuramori: Nothing to Disclose
Yuko Iraha: Nothing to Disclose
Sadayuki Murayama MD, PhD: Nothing to Disclose
KIMEI AZAMA: Nothing to Disclose

TEACHING POINTS

1. To define the utility of urological malignancies on advanced PET/CT scanner.
2. To introduce a new quantitative parameter of peak standardized uptake value (SUVpeak) in addition to conventional parameters of SUVmax and SUVmean.
3. To know the advantage of PET/CT in the evaluation after treatment.
4. To recognize pitfalls of urological malignancies on PET/CT.

TABLE OF CONTENTS/OUTLINE

1. Advanced PET/CT imaging
   a) spatial resolution
   b) quantification to molecular imaging
   c) characterize and monitor the tiniest cancer lesions
2. Utility at pre-treatment
   a) Staging of urological malignancies (prostate, urinary bladder, kidney and testis)
   b) TNM classification
3. Utility at post-treatment
   a) To detect recurrence and metastasis after surgery
   b) To evaluate residual viability of cancer after radiotherapy
   c) To evaluate residual viability of cancer after chemotherapy
4. Pitfalls of PET/CT to diagnose urological malignancies

URE169

Role of the Preoperative CT Analysis in Pelvic Organ Prolapse (POP)

Education Exhibits

Location: NA

Participants

Yukiko Honda MD (Presenter): Nothing to Disclose
Wataru Fukumoto: Nothing to Disclose
Daisuke Komoto MD: Nothing to Disclose
Keizo Tanitame MD: Nothing to Disclose
Shuji Date: Nothing to Disclose
Kazuo Awai MD: Research Grant, Toshiba Corporation Research Grant, Hitachi Ltd Research Grant, Bayer AG Research Consultant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd

TEACHING POINTS

In the TVM procedure, by touch only the urologists make a puncture in the sacrospinous ligament with reference to the ischial spine for mesh fixation. The injury to the internal pudendal artery (IPA) is a complication of TVM. Therefore, we must know the precise anatomy around the ischial spine and sacrospinous ligament; particularly the identification of the IPA is very important. The IPA can be easily identified with CT as opposed to MRI.

TABLE OF CONTENTS/OUTLINE

A. Anatomy necessary for understanding POP
   - Show the precise anatomy around the ischial spine and sacrospinous ligament -
A. Anatomy necessary for understanding POP - Show the precise anatomy around the ischial spine and sacrospinous ligament - Demonstrate visually a common surgical procedure (the tension-free vaginal mesh: TVM) B. The classification and grading of POP C. What we should know to improve surgical safety during the TVM procedure - Accurate identification of the internal pudendal artery - Presence of incidental uterine tumor

URE170
Sonography of the Inguinal Canal: A Comprehensive Review of Pathologic Processes with CT and MR Correlation

Education Exhibits
Location: NA

Certificate of Merit
Selected for RadioGraphics

Participants
Devrim Ersahin MD (Presenter): Nothing to Disclose
Margarita V. Revzin MD: Nothing to Disclose
Jonathan D. Kirsch MD: Nothing to Disclose
Mahan Mathur MD: Nothing to Disclose
Deborah J. Rubens MD: Nothing to Disclose
Leslie M. Scoutt MD: Consultant, Koninklijke Philips NV

TEACHING POINTS
The embryology and normal anatomy of the inguinal canal will be discussed, followed by a review of multiple pathologic conditions. Emphasis will be made on the significant role that gray-scale and Doppler US play in the clinical assessment and management of patients with inguinal pathology.

TABLE OF CONTENTS/OUTLINE
1. Brief summary of inguinal canal embryology. 2. Review of inguinal canal anatomy. 3. Ultrasound protocol for evaluation of the inguinal canal and its contents, optimization of US imaging technique including Doppler 4. Different pathologic processes affecting the inguinal canal will be divided into 6 categories and sonographic characteristics of each of the processes will be reviewed: 1. congenital anomalies of the inguinal canal and its contents (hernias, undescended testes, varicocele, patent processus vaginalis, epididymal cyst, spermatic cord hydrocele) 2. inguinal canal post-surgical complications, such as hematoma, seroma, abscess. 3. neoplasms originating in the inguinal canal or extending from the scrotum (liposarcoma, seminoma, lymphoma, spermatic cord cystadenoma). 4. trauma (testicular retraction, testicular rupture) 5. infectious processes (spermatic cord inflammation with epididymitis/orchitis). 6. vascular compromise (spermatic cord inflammation, infarct)

URE171
Sonography of the Penis: A How-to Review

Education Exhibits
Location: NA

Participants
Javier Azpeitia Arman MD (Presenter): Nothing to Disclose
Rosa M. Lorente-Ramos MD, PhD: Nothing to Disclose
Nuria Santamaria Guinea: Nothing to Disclose
Juan Gredilla: Nothing to Disclose
Jose Manuel Garcia Gomez MD: Nothing to Disclose
Javier Amalio Feltes Ochoa: Nothing to Disclose

TEACHING POINTS
1. To review the study protocol of US of the penis, in order to learn how to perform the exam. 2. To describe diagrammatic and US anatomy of the penis. 3. To illustrate the spectrum of lesions involving the penis, reviewing sonographic appearances of the most prevalent pathologic disorders with correlation with other imaging techniques (MR). 4. To emphasize pitfalls, diagnostic difficulties and differential diagnosis

TABLE OF CONTENTS/OUTLINE
Penis sonography is a widely available imaging technique, which may be helpful in different conditions. Both technique and imaging findings in different entities are presented, highlighting distinguishing features that may aid in detection of lesions and differential diagnosis. We present: 1. US Technique and study protocol 2. Penis Anatomy. -Diagrammatic -US correlation 3. Pathology: - Trauma: hematoma, fracture. - Inflammatory. Peyronie - Tumors: primary, metastases - Surgery: prosthesis, granuloma - Vascular: Mondor's disease, priapism, impotence

URE172
State-of-the-art Cross Sectional Imaging of Lymph Nodes in Common Genitourinary Malignancies: A Current Comprehensive Update

Education Exhibits
Location: NA

Selected for RadioGraphics

Participants
Arti Rama Iyer MD (Presenter): Nothing to Disclose
Sreeharsha Tirumani MBBS, MD: Nothing to Disclose
Raghunandan Vikram MBBS, FRCA: Nothing to Disclose
TEACHING POINTS

1. To review the patterns of nodal spread in select genitourinary malignancies including renal cell carcinoma, upper and lower urinary tract transitional cell carcinoma, endometrial, cervical and ovarian carcinoma, prostate carcinoma and testicular carcinoma. 2. To briefly review the nodal staging and its implications on prognosis and treatment. 3. To provide a current comprehensive update on the role of State-of-the-art cross sectional imaging (MDCT, MRI and FDG-PET) in lymph node staging of these malignancies.

TABLE OF CONTENTS/OUTLINE

Graphical illustration of major nodal stations and major pathways of lymphatic spread, with imaging correlation. Brief overview of Nodal Staging (as per TNM classification), with discussion on its implications on prognosis and treatment. A comprehensive review of literature on the role of MDCT, MRI and 18F-FDG-PET/CT in the evaluation of lymph node metastases. Brief discussion on potential applications of novel imaging techniques such as MR lymphangiography.

URE173

The Female Urethra: An Imaging Review

Education Exhibits

Location: NA

Participants

Katie St. Germain Mason MD (Presenter): Nothing to Disclose
Aarti Sekhar MD: Nothing to Disclose

TEACHING POINTS

1. Though only 4 cm long, the female urethra can present with a wide range of pathology, which is most easily recognized on MR imaging. 2. Urethral diverticula: important to describe location of neck to facilitate transvaginal resection; also recognize complications such as stones, infection and malignancy. 3. Skene's gland cysts: classic distal periurethral location and recognize that they can get infected. Distal urethral tumors are more likely to be squamous cell carcinoma and have a better prognosis. Entire urethral tumors tend to be urothelial carcinoma or adenocarcinoma and have a high rate of invasion and pelvic nodal metastases. 5. Stress urinary incontinence affects 50% of women over the age of 65. Management techniques include mid-urethral slings and bulking agents. These interventions have varying imaging appearance depending on time from injection and their composition.

TABLE OF CONTENTS/OUTLINE


URE175

When Diagnostic Workup Is Needed: Hematospermia at Magnetic Resonance Imaging

Education Exhibits

Location: NA

Selected for RadioGraphics

Participants

Pardeep Kumar Mittal MD (Presenter): Nothing to Disclose
Juan Camilo Camacho: Nothing to Disclose
Nima Kokabi MD: Nothing to Disclose
William C. Small MD, PhD: Nothing to Disclose
Kiran Kumar Maddu MBBS: Nothing to Disclose
Courtney Ann Coursey Moreno MD: Nothing to Disclose

TEACHING POINTS

1. To demonstrate hematospermia (HS) is an idiopathic and self-limiting anxiety provoking condition but MRI plays an important role in the diagnostic workup of men with persistent HS and to discuss potential etiologies. 2. To review image appearance of associated pathologies and role of MRI in evaluating conditions causing hematospermia

TABLE OF CONTENTS/OUTLINE

Pathophysiology of hematospermia: Etiologies of HS: • Congenital (seminal vesicle cyst, mullerian duct /ejaculatory duct cyst) • Infection/inflammation (cystitis, prostatitis, epididymo-orchitis) • Neoplasm (bladder, prostate, testicular and urethral cancer) • Iatrogenic (biopsy, radiation, instrumentation, etc.) • Trauma MRI is the modality of choice for diagnosing HS due to its superior contrast resolution, multiplanar imaging capabilities, and ability to resolve small caliber structures (such as ejaculatory ducts, vasa deferentia, internal architecture of prostate, etc.). SUMMARY MR plays an important role in the diagnostic workup of patients with persistent HS and associated signs and symptoms of the disease. In addition, there is no ionizing radiation involved with MR imaging. Attendees will gain an appreciation for the wide variety of conditions encountered in HS at imaging.

URE176

X-ray Scatter Correction Technology with 2D Anti-scatter Grid: Is Removing X-ray Scatter Able to Correct the Hounsfield Unit of Renal Cyst?

Education Exhibits

Location: NA

Certificate of Merit

Participants
TEACHING POINTS

1. Category of renal cyst location and the effect of high attenuation material in Z-direction on x-ray scatter
2. X-ray scatter is part of the reason for pseudo enhancement.
3. 2D snit-scatter grid is an essential technology as countermeasure of pseudo enhancement on MDCT.

TABLE OF CONTENTS/OUTLINE

Impact of scattered x-ray on image quality X-ray scatter fundamentals and its effect on CT Hounsfield unit measurement
Phantom setup to observe irregularity CT Hounsfield unit on X-ray scatter The phantom design of simulating simple cyst in
 enhancement/ non-enhancement renal Approaches of scatter correction Influence with longitudinal coverage of CT scanners
Comparison of shifted CT Hounsfield unit by the location of high attenuation material Comparison of 2D anti-scatter grid and 1D
anti-scatter grid Clinical impact of pseudo enhancement Statically analysis of the shift in Hounsfield unit measurements in 600 clinical cases of different CT scanner
(Aquilion CXL; Toshiba Medical Systems, Brilliance iCT; Philips Healthcare)

URE177

Abnormalities of the Perinephric Space: A Pictorial Review

Education Exhibits
Location: NA

Participants

Jessica Schreiber-Zinaman MD (Presenter): Nothing to Disclose
Gregory Michael Grimaldi MD : Nothing to Disclose
Priya Kumar Shah MD : Nothing to Disclose

TEACHING POINTS

1. To review the anatomy of the perinephric space
2. To discuss intrinsic and extrinsic disease processes involving the
perinephric space
3. To describe imaging characteristics of each perinephric process

TABLE OF CONTENTS/OUTLINE

4. Differential Diagnosis Considerations

URE179

Fat-containing Retroperitoneal Lesions: Imaging Characteristics, Localization and Differential Diagnosis

Education Exhibits
Location: NA

Certificate of Merit
Selected for RadioGraphics

Participants

Akram Mohamed Shaaban MBCh (Presenter): Contributor, Amirsys, Inc
Maryam Rezvani MD : Nothing to Disclose
Marc Tubay MD : Royalties, Amirsys Inc
Khaled M. Elsayes MD : Nothing to Disclose
Christine O. Menias MD : Nothing to Disclose

TEACHING POINTS

1. The learner should be able to differentiate between primary and secondary retroperitoneal masses
2. The learner should be able to list fat-containing lesions occurring in the retroperitoneal, both primary and secondary.
3. The learner should be able to compile a short differential diagnosis based on the location, imaging features and clinical presentation.

TABLE OF CONTENTS/OUTLINE

I. Imaging features of fat on different imaging modalities
II. Differentiation between primary and secondary retroperitoneal masses
III. Causes and differential diagnosis of fat containing retroperitoneal lesion
A. Renal
1- Angiomyolipoma
2- Lipoma
3- Liposarcoma
4- Replacement lipomatosis
B. Adrenal
1- Myelolipoma
2- Adrenal carcinoma

3- Pheochromocytoma
4- Neurogenic tumors

Primary retroperitoneal lesions
1- Lipoma
2- Liposarcoma
3- Lipomatosis
4- Myelolipoma
5- Primary and metastatic malignant germ cell tumors
6- Dermoid
7- Neurogenic tumors
8- Fat necrosis

URE183

A Private Investigation: Radiologic-pathologic Correlation of Testicular Tumors

Education Exhibits
Location: NA

Participants
Arash Bedayat MD (Presenter): Nothing to Disclose
Larry Z. Zheng MD : Nothing to Disclose
Byron Y. Chen MD : Nothing to Disclose
Morris Hayim MD : Nothing to Disclose
Staci Gagne MD : Nothing to Disclose
Lacey McIntosh DO, MPH : Nothing to Disclose
Hao Steven Lo MD : Nothing to Disclose

TEACHING POINTS
1. Review sonographic findings of seminoma and nonseminomatous tumors of the testis, as well as less common tumors including lymphoma, epidermoid cyst and gonadal stromal tumor. 2. Direct comparison of sonographic findings with gross and histologic pathology findings. 3. Discuss pearls and pitfalls in accurately diagnosing testicular tumors.

TABLE OF CONTENTS/OUTLINE
Classification of testicular tumors. Describe the ultrasound features of testicular tumors and their pathologic correlates. Identify the imaging and non-imaging features of each of these tumors that may allow differentiation from others. Discuss the mimics, diagnostic pitfalls and management of testicular tumors.

URE184

Elastography of Small Testicular Masses: Not all Hard Lesions Are Malignant Nor Benign Lumps are Always Soft, and Some Change Consistency

Education Exhibits
Location: NA

Participants
Michele Bertolotto MD (Presenter): Nothing to Disclose
Paul Singh Sidhu MRCP, FRCR : Speaker, Bracco Group Speaker, Siemens AG Speaker, Hitachi, Ltd
Lorenzo Egido Derchi MD : Nothing to Disclose
Rossana Bussani MD : Nothing to Disclose
Eleni Konstantatou MD, MSc : Nothing to Disclose
Maria Assunta Cova MD : Nothing to Disclose
Francesca Cacciato : Nothing to Disclose
Massimo Valentino MD : Nothing to Disclose

TEACHING POINTS
To illustrate the predominant elastographic features of different small testicular lesions focusing on those with atypical appearance or change their consistency over time. To illustrate the imaging features that allow differential diagnosis between benign and malignant lesions irrespective of elastographic appearance.

TABLE OF CONTENTS/OUTLINE
Real time elastography is an emerging technique in imaging scrotal pathologies. In general, cancers are harder than the surrounding parenchyma and benign condition are soft. However, exceptions exist to this rule. Moreover, lesions can change consistency over time depending on their evolution. Multiparametric imaging and other diagnostic information, such as the patient history and tumor markers, are very useful elements in determining a correct diagnosis. We present a spectrum of benign and malignant small focal testicular lesions presenting with atypical appearance at elastography of which changed in consistency over time. Among them: seminoma, leydigoma, circumscribed fibrotic changes, epidermoid cyst, adenomatoid tumor, lipoma, intratesticular hematoma, inflammatory changes, sarcoidosis, segmental testicular infarction.

URE185

Focal Testicular Lesions: Use of Contrast-enhanced Ultrasound (CEUS) and Real-time Tissue Elastography (RTE) as Adjuvant Sonographic Techniques in Determining Clinical Management

Education Exhibits
TEACHING POINTS

To demonstrate the usefulness of combination of the new techniques of CEUS and RTE as adjuvant methods to normal routine testicular sonography with B-Mode and Color Doppler methods, when assessing abnormalities associated with the acute scrotum or a palpable mass. Judicious use of CEUS and RTE may aid in improving the strategy of appropriate patient management, avoiding an unnecessary orchidectomy.

TABLE OF CONTENTS/OUTLINE

We present the spectrum of the benign and malignant focal testicular lesions with indications for CEUS and RTE utilization. We will demonstrate intra-testicular abnormalities including sex-cord stromal tumours, germ cell tumors, sarcomas, segmental infarcts, abscesses, focal scars, TB granulomas and sarcoidosis. Enhancement patterns of focal lesions in CEUS and RTE patterns will be discussed, with comment on accuracy, and the ability to alter surgical management. RTE color map and visual grading of the lesions will be analyzed. The combination of the standard sonographic techniques with the use of CEUS and RTE are superior to B-Mode and color Doppler alone as it may facilitate a more accurate diagnosis and appropriate clinical management, discriminating the benign from the malignant pathology.

URE186

Lesions without Borders: Scrotal Lesions That Involve Both the Intratesticular and Extratesticular Regions

Education Exhibits
Location: NA

Certificate of Merit

Participants
Helena Gabriel MD (Presenter): Nothing to Disclose
Nancy A. Hammond MD: Nothing to Disclose
Paul Nikolaidis MD: Nothing to Disclose
Massihullah Hamidi MD: Nothing to Disclose
Frank H. Miller MD: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To demonstrate that some disease processes defy conventional intratesticular and extratesticular designations and instead, involve both regions 2. To discuss those disease entities that can affect both the intra- and extratesticular areas and fully describe their typical and atypical imaging features 3. To illustrate that the involvement of both regions can help narrow the differential diagnosis and be a clue to the correct pathology

TABLE OF CONTENTS/OUTLINE

Typical and atypical imaging features of disease processes that can concomitantly involve the intratesticular and extratesticular regions will be illustrated. These disease processes include: Epididymo-orchitis Trauma Tubular ectasia Granulomatous infection, TB Sarcoidosis Lymphoma/Leukemia Vascular processes including varicocele Unusual lesions/ tumors including rete cystadenoma, adenomatoid tumor, and others

URE188

Rare Scrotal Neoplasms; Imaging Features and Pathological Correlation with Impact on Management in the Era of Targeted Therapy

Education Exhibits
Location: NA

Participants
Deborah Borst: Nothing to Disclose
Kaiyan Kang: Nothing to Disclose
Rhoda Reading BS, BA: Nothing to Disclose
Ott Le MD: Research support, Lantheus Medical Imaging, Inc
Shiva Gupta MD: Nothing to Disclose
Khaled M. Elsayes MD (Presenter): Nothing to Disclose
Deepak G. Bedi MBBC: Consultant, Koninklijke Philips NV

TEACHING POINTS

- To discuss various rare testicular neoplasms.
- To describe the diagnostic workup and imaging features of these neoplasms.
- To correlate imaging features with pathological findings and explain the impact of these manifestations on management.

TABLE OF CONTENTS/OUTLINE

- Introduction.
- Pathological Classification of rare testicular neoplasms.
- Epidemiology.
- Laboratory evidences and correlation.
- Imaging Manifestations of these rare neoplasms - Impact of imaging manifestations on management.
- SUMMARY Various rare benign and malignant neoplasms can involve the scrotum and its contents. Examples of these malignancies include Neurofibromatosis, Lymphoma/Leukemia, Teratoma, mixed non-seminomatous germ cell tumor, Metastatic Prostatic Adenocarcinoma, Plasmacytoma, spermatid cord liposarcoma and spermatid cord myeloma. Although rare, radiologist’s familiarity with imaging and clinical features helps in guiding proper management.
Sonography of the Adult Male Pelvis and Scrotum: Pearls and Pitfalls

Education Exhibits
Location: NA

Participants
- Fernanda Samara Mazzariol MD (Presenter): Nothing to Disclose
- Zina Joan Ricci MD: Nothing to Disclose
- Sarah Kyung Oh MD: Nothing to Disclose
- Mordecai Koenigsberg MD: Nothing to Disclose
- Jeffrey Harmon Roberts MD: Nothing to Disclose
- Marjorie Werner Stein MD: Nothing to Disclose

TEACHING POINTS
Review common pitfalls in the interpretation of adult male scrotal and pelvic sonograms: 1. Artifacts, normal anatomic structures and benign pathology may mimic bladder tumors. 2. Bladder and bowel tumors may mimic prostatic neoplasia. 3. Penile prosthesis reservoir can mimic pelvic cystic masses or fluid collections. 4. Not all testicular masses are cancer. 5. Not all serpiginous tubules in the scrotum are varicoceles.

TABLE OF CONTENTS/OUTLINE

Spectrum of Seminoma within the Male Genitourinary System: Clinical-Radiologic-Pathologic Correlation

Education Exhibits
Location: NA

Participants
- Jamie Marko MD (Presenter): Nothing to Disclose
- Darcy Jennifer Wolfman MD: Nothing to Disclose
- Charles Frank Gould MD: Nothing to Disclose
- Claire Widule: Nothing to Disclose
- Grant E. Latini MD: Nothing to Disclose

TEACHING POINTS
1. Seminoma is the most common pure germ cell tumor of the testis, accounting for 35-50% of all germ cell tumors. A rare subtype of seminomas, spermatocytic seminoma, affects an older patient population than classic seminoma. 2. The typical sonographic appearance of testicular seminoma is a hypoechoic mass with vascular flow. As seminomas enlarge, the hypoechoic mass can take on a nodular appearance with intervening echogenic septations. 3. Testicular seminoma commonly spreads via the lymphatics to the retroperitoneal lymph nodes. The lymphadenopathy may be homogeneous in appearance or may show necrosis, calcification and even result in hydronephrosis or vascular invasion. 4. Supernumerary and undescended testes are at increased risk of developing a seminoma. Masses within the inguinal canal or pelvis in a male patient should prompt the reader to examine the scrotum for bilateral spermatocords.

TABLE OF CONTENTS/OUTLINE
1. Introduction 2. Multimodality imaging of seminoma and rare variants with gross and histologic radiologic pathologic correlation. 3. Imaging of the variable appearances of seminoma-related lymphadenopathy, with gross and histologic radiologic pathologic correlation. 4. Imaging of seminomas arising in supernumerary and undescended testes.

MR Imaging of Penile Fracture – A Pictorial Review with Clinical Correlation

Education Exhibits
Location: NA

Participants
- Divya Santosh MBBS (Presenter): Nothing to Disclose
- Aslam Zeeshan MBBS: Nothing to Disclose
- Dave Fleming MRCP, FR CR: Nothing to Disclose
- Mark Robinson MBBS, FCR: Nothing to Disclose

TEACHING POINTS
1. To illustrate the Magnetic Resonance Imaging (MRI) features of this uncommon but acute penile pathology, with clinical and surgical correlation in a case series from our institution over 6 years. 2. We highlight the perils and pitfalls of MRI in the diagnosis of penile fractures.

TABLE OF CONTENTS/OUTLINE
1. MR anatomy of Penis with an overview of our local imaging protocol for penile fracture 2. We discuss the MRI findings and clinical management, in 10 patients who presented with a clinical suspicion of penis fracture. 6 patients had tunical and corporal tear on imaging. 3. We review the available literature and summarise the typical imaging findings with surgical correlation. The
management of penile fracture on the basis of clinical diagnosis alone is limited to certain extent due to the difficulty in
examination and also lack of experience. This exhibit will enable a general radiologist to confidently diagnose this rare penile
pathology. Our cases will illustrate to the readers that imaging is an important adjuvant to clinicians in the appropriate
management of penile fractures.

URE192
Observation vs Emergent Surgery: A Radiologist’s Guide to Renal Trauma

Participants
- Daniel F. Hadland MD (Presenter): Nothing to Disclose
- Rustain Lee Morgan MD, MS: Nothing to Disclose
- Jacqueline Hill MPH: Nothing to Disclose
- Ryan Michael Ash MD: Nothing to Disclose

TEACHING POINTS
A strong understanding of kidney anatomy and clinical presentation of patients with renal trauma severe as a foundation for
accurate radiologic assessment. The purpose of this exhibit is to review methods for accurately grade renal trauma. Through
this exhibit, we aim to improve radiologists’ ability to make accurate assessments of renal trauma to improve patient
management and clinical outcomes. This will be achieved by reviewing renal anatomy, mechanisms of injury, and clinical
presentation associated with renal trauma. We will also include a discussion on the strengths and limitations, as well as a
pictorial review demonstrating key imaging features of different modalities for assessing renal trauma.

TABLE OF CONTENTS/OUTLINE
- Review renal anatomy, specifically focusing how it relates to renal trauma and mechanisms of injury
- Discuss clinical presentation of renal trauma, including:
  - Common presentations of renal trauma
  - Pathophysiology related to systemic effects of renal trauma
- Provide a pictorial review of the following key points:
  - The American Association for the Surgery of Trauma Renal Grading System
  - Limitations and benefits of different imaging modalities for assessing renal trauma

URE193
The Role of Ultrasonography in Evaluating Patients with Suspected Penile Fracture

Participants
- Ferekh Salim MBChB, MRCP (Presenter): Nothing to Disclose

TEACHING POINTS
The penile corpora and tunica albuginea are well visualised using a high frequency linear array probe. Penile trauma often occurs
as an injury sustained during sexual intercourse. Although the diagnosis is usually obvious on the basis of clinical history and
clinical signs, the diagnosis is not always straightforward. Sonographic signs of penile fracture include discontinuity of the tunica
albuginea indicating a tear, there is often an associated overlying haematoma Prompt surgical repair is indicated in patients with
tears of the tunica albuginea Ultrasound provides a quick, non-invasive and inexpensive method of assessing patients
with suspected penile injury

TABLE OF CONTENTS/OUTLINE
- Discussion of normal sonographic appearances of the penile corpora Clinical signs and mechanism of injury leading to penile
  fracture Sonographic technique used to evaluate the penile corpora Discussion of sonographic appearances of fracture of penile
corpora Illustrated examples of cases of patients seen at our institution with fractured corpora

URE194
Traumatic Posterior Urethral Injuries: Imaging Findings, Classification, and the Radiologist’s
Potential Role in Primary Urethral Realignment

Participants
- Kai Z. Kinder MD (Presenter): Nothing to Disclose
- Arthur Adrian Lee MD: Nothing to Disclose
- Stuart E. Braverman MD: Nothing to Disclose

TEACHING POINTS
The purpose of this educational exhibit is: 1. To review traumatic posterior urethral injuries, including etiology, clinical
signs/symptoms, and clinical significance. 2. To review urethral anatomy and injury classification systems. 3. To provide
indications for urethrography and an image-based approach to findings of posterior urethral injuries on CT and urethrography. 4.
To discuss clinical management and outcomes. 5. To highlight the radiologist’s potential role in primary urethral realignment
and illustrate related fluoroscopic-guided techniques.

TABLE OF CONTENTS/OUTLINE
- Etiology, risk factors, clinical findings, and significance of posterior urethral injuries Urethral anatomy and urethral injury
A Review of Interventional Radiology Treatment Approaches for Unique Arterial Causes of Gastrointestinal Hemorrhage

TEACHING POINTS
1. Highlight the critical role of cross-sectional imaging and interventional radiology (IR) in diagnosing and managing acute arterial gastrointestinal hemorrhage. 2. Review indications for IR intervention in cases of acute arterial gastrointestinal hemorrhage. 3. Multiple transcatheter embolization options exist for management of acute gastrointestinal hemorrhage, including coil embolization, glue embolization, covered stent deployment, and thrombin injection. Sometimes, utilizing a combination of techniques is needed for appropriate treatment in complex cases.

TABLE OF CONTENTS/OUTLINE
Discuss indications for IR intervention in cases of acute arterial gastrointestinal hemorrhage. Review of imaging findings with focus on CT scan and conventional angiography: -Contrast extravasation -Pseudoaneurysm Review transarterial techniques for managing unique causes of acute arterial gastrointestinal hemorrhage: -Coil embolization -Glue embolization -Stent graft deployment -Thrombin injection Clinical examples provided: -Standard embolization techniques -Unique combinations of therapies to manage complex arterial causes of gastrointestinal hemorrhage -Correlation with cross-sectional imaging will be provided Summary/Conclusions

Chronic Mesenteric Ischemia and its Treatment: A Pictorial Essay

TEACHING POINTS
Discuss the normal anatomy of the mesenteric arterial supply and collateral pathways involved in chronic mesenteric ischemia using pictorial illustrations. Discuss the pathophysiology, clinical presentation, and imaging findings in chronic mesenteric ischemia. Review the indications and strategies for endovascular treatment of chronic mesenteric ischemia along with current literature review of outcomes and complications associated with such treatment in comparison to surgical revascularization.

TABLE OF CONTENTS/OUTLINE
Pictorial and multimodality imaging review of normal mesenteric vascular supply and collateral pathways seen in chronic mesenteric ischemia. Clinical consequences of mesenteric ischemia. Diagnostic imaging in chronic mesenteric ischemia. Indications and contraindications for endovascular treatment. Strategies for endovascular treatment (both stent placement and angioplasty). Outcomes and complications associated with endovascular treatment in comparison to surgical revascularization.

Endovascular Treatment of Active Bleeding due to Iatrogenic Injury

TEACHING POINTS
Active bleeding due to iatrogenic injury that occurs after variable medical procedure or surgery can be required emergency hemostasis. In the past, surgical hemostasis was preferred, but now the endovascular treatment is preferred, because it is easy to implement and also excellent treatment result. The purpose of this exhibit is to show endovascular treatment for active bleeding due to iatrogenic injury after variable medical procedure or surgery.
TABLE OF CONTENTS/OUTLINE

1. Introduction
2. Epidemiology
3. Active bleeding after medical procedure
   1) Percutaneous liver biopsy
   2) RF ablation of the liver
   3) Endoscopic Retrograde Biliary Drainage
   4) Percutaneous biliary drainage
   5) Balloon Dilatation of duodenum
   6) Colonoscopic polypectomy
   7) Transrectal ultrasonographic prostate biopsy
   8) Dilatation and Curratage of the uterus
   4. Active bleeding after surgery
   1) Lobar hepatectomy
   2) Pancreatectomy
   3) Distal gastrectomy
   4) Hartmann's operation
   5) Transvaginal hysterectomy
   6) Uterine myomectomy
   7) Transvaginal salpingooophorectomy

**vie004-b**

**Bariatric Effects of Decreased Serum Ghrelin Levels: Literature Review and Future Applications**

Education Exhibits
Location: VI Community, Learning Center

Participants
Monzer A. Chehab MD (Presenter): Nothing to Disclose
Wendy Miller MD: Nothing to Disclose
Kerstyn Zalesin MD: Nothing to Disclose
Purushottam Krishna Dixit MD: Nothing to Disclose

TEACHING POINTS
1. The role of Ghrelin as a hunger stimulating hormone has gained significant notoriety as a potential target for weight loss therapy.
2. Familiarity with the published physiologic, surgical and interventional literature on the bariatric effects of Ghrelin may help guide future therapies directed at decreasing serum Ghrelin levels such as Left Gastric Artery Embolization (LGAE).

TABLE OF CONTENTS/OUTLINE

1. Physiology of Ghrelin as an orexigenic (hunger stimulating hormone)
2. Relationship between Gastric Fundus resection and decreased serum Ghrelin levels in humans
3. Relationship between decreased serum Ghrelin levels and weight loss in humans
4. Effect of Left Gastric Artery Embolization on decreasing Ghrelin producing cells in the gastric fundus and serum Ghrelin levels in mammals
5. Future role of Left Gastric Artery Embolization as a novel therapy for weight loss in humans.

**vie005-b**

**Pictorial Overview Of Aortic Endovascular Graft Endoleaks With Correlation To Stent Graft Neck Length**

Education Exhibits
Location: VI Community, Learning Center

Participants
Firas Ramahi (Presenter): Nothing to Disclose
Maria Habib: Nothing to Disclose
Michael Henderson Hamblin MD: Nothing to Disclose

TEACHING POINTS
1. Provide a detailed pictorial review of various aortic graft endoleaks with special focus on stent graft neck length.
2. Discuss the applicable clinical relevance and management of aortic graft endoleaks.

TABLE OF CONTENTS/OUTLINE

- Review abdominal aortic aneurysm (AAA) endovascular stent graft repair cases performed at our institution since 1/1/2007.
- Identify cases with aortic stent graft endoleaks with special attention to their corresponding stent graft neck length and possible correlation.
- Provide a pictorial review of the various types of endovascular stent endoleaks (type 1 - 5 endoleaks).
- Discuss management of the endoleaks and clinical relevance.

**vie006-b**

**Endovascular Management of Arterioportal Fistulas**

Education Exhibits
Location: VI Community, Learning Center

Participants
Gregory Ramsey MD: Nothing to Disclose
Scott G. Smith DO: Nothing to Disclose
Justin Muhlenberg MD, MBA (Presenter): Nothing to Disclose
Rajeev Suri MD: Nothing to Disclose

TEACHING POINTS
At the end of this presentation the learner should have knowledge of the:
- Common causes and clinical manifestations of arterioportal fistulas (APFs)
- Diagnostic imaging findings and classifications of APFs
- Recommended treatments and followup of APFs
- Endovascular management of APFs including angiographic findings, embolization techniques, materials, contraindications, possible complications, and post-interventions followup.

TABLE OF CONTENTS/OUTLINE

A. Common Causes of APFs
B. Clinical Manifestations related to APFs
C. Diagnostic Imaging Findings of APFs
D. Classifications of APFs
Clinical Application of Color-coded DSA in Lower Extremity Vascular Disease Treatment: A Preliminary Study

**Participants**

Wei Qiu (Presenter): Nothing to Disclose
XI GUO: Nothing to Disclose

**TEACHING POINTS**

**Purpose:** To evaluate the feasibility of applying color-coded DSA to quantitatively assess the clinical outcome of angioplasty for lower extremity vascular disease.

**Material and Methods:**
- 12 patients with lower extremity vascular disease were treated with endovascular angioplasty (11 male, 1 female, mean age 72.55±7.46). Both DSA series before and after stent implantation were analyzed with a color-coded DSA tool (syngo iFlow, Siemens Healthcare, Forchheim, Germany) which quantitatively calculates the time intensity curve of each pixel on the DSA image. A reference region of interest (ROI) was set at the outflow the pigtail catheter while several other ROIs were set at distal end of the treated vessel segment. Various parameters such as ROI area, time-to-peak (TTP) value was derived to determine the vessel patency. Ankle Brachial Pressure Index (ABI) examination was conducted pre- and postoperatively with doppler ultrasound as a verification of the result from color-coded DSA technique.

TABLE OF CONTENTS/OUTLINE

- Principle
- Method
- Prognosis
- Conclusion

Vascular Findings in Ehlers Danlos, Marfan and Loeys Dietz Syndrome: A Pictorial Review

**Participants**

Arman Yaghoubian MD (Presenter): Nothing to Disclose
Daniel Sheeran MD: Nothing to Disclose
Patrick T. Norton MD: Nothing to Disclose
Klaus D. Hagspiel MD: Research Grant, Siemens AG

**TEACHING POINTS**

1. To review the imaging spectrum of vascular findings in patients with EDS type IV, Marfan and Loeys-Dietz Syndromes.
2. To review the basic genetics and pathophysiology behind EDS type IV, Marfan and Loeys-Dietz Syndromes.

**TABLE OF CONTENTS/OUTLINE**

- Ehlers-Danlos Syndrome type IV (EDS type IV) - Autosomal dominant inheritance caused by a number of identified mutations within the COL3A1. - Multiple arterial aneurysms (especially visceral aneurysms), short segment dissections, vessel occlusion, arteriovenous fistula and/or frank rupture. Marfan Syndrome - Autosomal dominant inheritance caused by a number of identified mutations within the FBN1 gene. - Common involvement of the aortic root with annuloaortic ectasia and aortic dissection. Loeys-Dietz Syndrome (LDS) - Autosomal dominant inheritance caused by mutations of the TGF-β receptor genes.

Clinical course is more aggressive than EDS type IV and Marfan syndrome with earlier presentation and considerably worse survival though there is phenotypic overlap between the syndromes. Almost all patients (>98%) will have aortic root aneurysms and aortic dissection is the leading cause of death. Distant arterial aneurysms and tortuosity. Distinguishing features including hypertelorism, cervical instability, craniosynostosis, and Chiari malformation.

Vascular Imaging of Toxic Vasculopathies

**Participants**

Jed Alan Hummel MD (Presenter): Nothing to Disclose
Ikponmwosa Iyamu MD: Nothing to Disclose
Samir Kulkarni MD: Nothing to Disclose
Joseph Stephen Zerr MD: Nothing to Disclose
Sanjeeva P. Kalva MD: Consultant, CeloNova BioSciences, Inc

**TEACHING POINTS**

To discuss toxic vasculopathies with illustrative case examples. The presentation will cover etiologies including cocaine, amphetamine, and heroin related vasculopathies, ergotism, chemotherapy, and thromboangiitis obliterans. To briefly review the basic underlying pathophysiology of vasculitides, utilizing graphic illustration and case examples aimed at allowing the reader to better understand the mechanism that produces angiographic characteristics. To review grading and classification of vasculitides based on diagnostic features including location, vessel size, and morphological appearance. To review differential diagnoses and...
distinguishing features To discuss most appropriate imaging modalities To discuss catheter-directed therapy considerations

TABLE OF CONTENTS/OUTLINE
Introduction: Review of features and basic pathophysiology of vasculitides with illustrative case examples Diagnostic clues regarding vessel size and location Angiographic appearances with case examples Grading and classification Discussion: Toxic Vasculopathies Etiologies Common and distinguishing imaging characteristics with discussion of differential diagnoses and potential mimics Clinical presentations Selection of best imaging modalities Catheter directed therapy considerations

VIE012-b
Dual-energy CT: Vascular Applications, Basic Physical Principles and limitations

Education Exhibits
Location: VI Community, Learning Center

Participants
Shima Aran MD (Presenter): Nothing to Disclose
Khalid Walid Shaqdan MD: Nothing to Disclose
Elmira Hassanzadeh MD: Nothing to Disclose
Efren Jesus Flores MD: Nothing to Disclose
Hani H. Abujudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

TEACHING POINTS
Dual-energy CT (DECT) enhances the capability of single energy CT with several new applications for advanced imaging of vascular pathologies. With low kVp dataset vascular attenuation is increased and therefore it is helpful in assessment of smaller or more poorly opacified vessels. This results in reduction of contrast utilization and radiation exposure. The availability of virtual noncontrast images are critical in detection of vascular calcifications and endoleaks. The other key advantages of DECT for vascular imaging are the availability of advanced postprocessing application, bone subtraction and calcification removal techniques. Appropriate use of DECT techniques can save radiation dose, decrease interpretation time, or improve diagnostic accuracy.

TABLE OF CONTENTS/OUTLINE
1. Physical principles of DE or spectral CT on basis of photoelectric and Compton interactions as well as material decomposition. 2. Available techniques of DE data acquisition, for example, dual source CT scanners, fast kilovoltage switching and sandwich detector techniques. 3. Image processing and reconstruction of DECT data. 4. Clinical application of DECT for diagnosis of vascular pathologies. 5. Sample cases. 6. Limitations of DECT such as the effects on image quality, artifacts and radiation dose.

VIE013-b
CT Angiography of Spontaneous Visceral Artery Dissection: A Pictorial Review

Education Exhibits
Location: VI Community, Learning Center

Participants
Kevin Ching MD (Presenter): Nothing to Disclose
Anil Kumar Dasyam MD: Nothing to Disclose
Mitchell E. Tublin MD: Nothing to Disclose
Matthew Thomas Heller MD: Nothing to Disclose
Biatta Sholosh MD: Nothing to Disclose
Amir Borhani MD: Nothing to Disclose

TEACHING POINTS
1. Spontaneous visceral artery dissection is an uncommon cause of abdominal pain that may involve the celiac trunk, superior mesenteric, renal, and inferior mesenteric arteries. Extension into more distal branches is also common. 2. Because the diagnosis is rarely suspected initially, visceral artery dissection is often suggested from subtle findings on portal venous phase CT. Subsequent CT angiography confirms dissection and better characterizes the extent of vascular involvement. 3. The management of spontaneous visceral artery dissection is determined by the organ involved and extent of distal malperfusion.

TABLE OF CONTENTS/OUTLINE
1. Overview of spontaneous visceral artery dissection a. Clinical presentation b. Etiologies of spontaneous visceral artery dissection. c. Association with inherited connective tissue diseases. 2. Discuss imaging work-up, CTA protocol, and pertinent findings. 3. Quality images of visceral artery dissection evaluated with 64-slice CT and 3D reconstructions: examples include the celiac axis, superior mesenteric, renal, common hepatic, and splenic arteries. 4. Complications of distal malperfusion. 5. Treatment and recommendations for follow up imaging and multi-disciplinary care.

VIE014-b
Imaging Beyond the Lumen: Vessel Wall Imaging in Large-Vessel Vasculitis Utilizing Black–Blood MRI

Education Exhibits
Location: VI Community, Learning Center

Participants
Mahmud Mossa-Basha MD (Presenter): Nothing to Disclose
Wen Lin MD: Nothing to Disclose
Myriam Guevera: Nothing to Disclose
Tal Gazitt: Nothing to Disclose
Grant Hughes MD: Nothing to Disclose

TEACHING POINTS

Takayasu arteritis (TA) and Giant-cell arteritis (GCA) are relatively uncommon vasculitides which may present with nonspecific clinical symptoms. Delayed diagnosis of these entities can lead to a high degree of morbidity. The purposes of this exhibit are:

To review conventional imaging methods used for diagnosis and monitoring of TA and GCA
To demonstrate the value of vessel wall imaging (VWI) in both the diagnosis and monitoring of TA and GCA
To show how VWI can be used as a problem-solving tool when assessing clinically equivocal cases of TA and GCA

TABLE OF CONTENTS/OVERVIEW

- Background Clinical symptomatology and pathophysiology of TA and GCA
- Imaging Overview Review conventional imaging modalities used in diagnosis of TA and GCA
- VWI Demonstrate classic imaging findings of TA and GCA using Black Blood MRI
- VWI Advantages Discuss ability to track response to treatment using VWI
- Identify ways in which VWI can be used as a problem-solving tool in clinically equivocal cases
- Potential Pitfalls

VIE015-b
Small But Volatile: Review of Indications, Technical Considerations and Complications of Percutaneous Ablation of Adrenal Tumors

Education Exhibits
Location: VI Community, Learning Center
Certificate of Merit

Participants
- Zoe Anne Miller MD (Presenter): Nothing to Disclose
- Bradley Bryan Pua MD : Nothing to Disclose
- Jonathan Jo : Nothing to Disclose
- Daisy Qinjun Huang MD : Nothing to Disclose
- Kyungmouk Steve Lee MD : Nothing to Disclose
- David Craig Madoff MD : Nothing to Disclose

TEACHING POINTS
Percutaneous ablation in the adrenal gland is less well-studied compared to the liver and lung. Ablation techniques in these organs are not always applicable because of the unique anatomy and physiology of the adrenal gland. The purpose of this exhibit will review:

1) Anatomy and physiology of adrenal gland
2) Indications for adrenal ablation
3) Adrenal neoplasms
4) Adrenal metastases
5) Pheochromocytoma

Pre-ablation planning appropriate for various adrenal lesions
Ablation techniques and complications unique to adrenal gland anatomy and physiology

TABLE OF CONTENTS/OVERVIEW

1) Anatomy and physiology of adrenal gland
2) Indications for adrenal ablation
   Adrenal neoplasms
   Adrenal metastases
   Pheochromocytoma
3) Pre-ablation Planning
   pre-ablation biopsy
   urine/serum hormone assays
   premedication protocol with alpha-adrenergic blocking drugs
4) Ablation types of ablation: RF, cryoablation, microwave appropriate intraprocedural monitoring (central and arterial lines)
5) Post-Ablation Imaging

VIE017-b
US-guided Percutaneous Radiofrequency Ablation of Liver Tumors; Tips and Tricks to Ensure Safe and Successful Procedure

Education Exhibits
Location: VI Community, Learning Center
Certificate of Merit

Participants
- Jin Woong Kim MD (Presenter): Nothing to Disclose
- Sang Soo Shin MD : Nothing to Disclose
- Suk Hee Heo MD : Nothing to Disclose
- Hyo Soon Lim MD : Nothing to Disclose
- Yong-Yeon Jeong MD : Nothing to Disclose
- Heoung-Keun Kang MD : Nothing to Disclose

TEACHING POINTS
1. To overview the current principles of US-guided radiofrequency ablation (RFA) of liver tumors including indications and how to do procedure.
2. To illustrate various technical tips to ensure effective and successful procedure.
3. To demonstrate how to minimize collateral damage during RFA.

TABLE OF CONTENTS/OVERVIEW

A. Overview of the current status of US-guided RFA of liver tumors
   1. Indications
   2. How to do procedure
   3. Possible complications related with RFA
   4. Various technical tips to ensure effective and successful procedure
   5. How to select RFA electrode
   6. Optimal targeting route of electrode according to the location of liver tumors
   7. "No-touch" technique
   8. "Cutting edge" technique
   9. How to minimize possible complications during RFA
   10. The role of artificial ascites when performing RFA
   11. How to decide infusion route of artificial ascites according to the location of liver tumors
   12. Perihepatic and Sub- hepatic B. Sub-xiphoid (left subphrenic) and Gastrohepatic (lesser sac)
   13. How to effectively handle electrodes under the ultrasound
   14. Key factors for safe and successful placement of electrodes
   15. Training on how to breathe
   16. Securing of safe route
   17. "Bypass" targeting
   18. Several measures to reduce risk of tumoral seeding
   19. Leverage (lifting) technique

VIE018-b
Comparison of Gadolinium- versus Iron-based MRA Blood Pool Contrast Agents used in Assessment of Peripheral Vascular Disease

Education Exhibits
Location: VI Community, Learning Center
Participants

Vignesh Amal Arasu MD (Presenter): Nothing to Disclose
Warren J Gasper: Nothing to Disclose
Ryan Thomas Downey MD: Nothing to Disclose
Stefanie Weinstein MD: Nothing to Disclose
Rizwan Aslam MBCh: Research support, Bayer AG
Thomas A. Hope MD: Speaker, Guerbet SA Research Grant, General Electric Company

TEACHING POINTS

1. Understand indications of gadolinium- versus iron-based blood pool contrast agents for MRA vascular examinations.

2. Understand strengths/limitations of different blood pool contrast agents in evaluation of peripheral vascular disease.

TABLE OF CONTENTS/OUTLINE

1. Background
   a. Overview of peripheral vascular disease and imaging techniques
   b. Pharmacology of agents
      i. Conventional extracellular fluid gadolinium-based agents
      ii. Blood pool gadolinium-based: Gadofosveset Trisodium
      iii. Blood pool iron-based: Ferumoxytol
   c. Indications
   d. Review of literature on safety and efficacy with respect to kidney function
   e. Technique
      a. Administration
      b. Bolus timing
      i. Test bolus
      ii. Bolus tracking
      iii. Time resolved acquisition
      iv. Dual bolus technique
   f. MRA acquisition parameters

3. Imaging appearance
   a. Normal
      i. Conventional MRA
      ii. TRICKs
      iii. High resolution steady state imaging
      iv. Low resolution dynamic imaging
   b. Proximal lower extremity disease
   c. Distal lower extremity disease
   d. Upper extremity disease

4. Advantages/Disadvantages
   a. Safety profile
   b. Bolus timing
   c. Dose
   d. Image resolution

VIE019-b

Bridging the Gap: The Role of Interventional Radiology in the Management of Patients with End-Stage Liver Disease Awaiting Liver Transplantation

Education Exhibits
Location: VI Community, Learning Center

Participants

Nazanin Hajarol Asvadi MD (Presenter): Nothing to Disclose
Priyanush Kandakatla MD: Nothing to Disclose
Colin J. McCarthy MD: Nothing to Disclose
Arash Anvari MD: Nothing to Disclose
Raul Nirmal Uppot MD: Nothing to Disclose
Ronald Steven Arellano MD: Nothing to Disclose

TEACHING POINTS

1. To discuss the selection criteria utilized by several national organization for patients awaiting liver transplantation.
2. To describe the multifaceted role interventional radiology (IR) in the management of patients with end-stage liver disease awaiting liver transplantation.

TABLE OF CONTENTS/OUTLINE

1. Review of incidence of end-stage liver disease worldwide and liver transplantation as a definite therapy for these patients.
2. Review of Milan criteria and survival rate in HCC patients.
3. Describe United Network for Organ Sharing (UNOS) and its transplant allocation policies regarding waiting period in different regions and drop off rate while awaiting liver transplantation.
4. Discuss the role of interventional radiology (biopsy, thermal ablation, embolization, imaging) in the management of patients awaiting liver transplantation.

VIE020-b

Do the Differences Make any Difference? A Worldwide Comparison of Society Guidelines for FNA of Thyroid Nodules Seen On Ultrasound

Education Exhibits
Location: VI Community, Learning Center

Participants

Priyanush Kandakatla MD (Presenter): Nothing to Disclose
Anthony Edward Samir MD: Nothing to Disclose

TEACHING POINTS

1. To review the indications for FNA of thyroid nodule seen on ultrasound based on current society guidelines throughout the World.
2. Comparing the similarities and differences between these guidelines.

TABLE OF CONTENTS/OUTLINE

1. Description of the following guidelines for FNA of thyroid nodules seen on ultrasound:
   a. ATA (American Thyroid Association)
   b. AACE (American Association of Clinical Endocrinologists)
   c. ETA (European Thyroid Association)
   d. SRU (Society of Radiologists in Ultrasound)
   e. KSTR (Korean Society of Thyroid Radiology)
3. Examples of cases where different guidelines may result in discordant actions.

VIE022-b

Dissection of the Cervical Internal Carotid Artery—The Role of Doppler Ultrasonography: Pictorial Essay

Education Exhibits
Participants

Lelivaldo Antonio de Britto Neto MD : Nothing to Disclose
Carlos A P Ventura PhD : Nothing to Disclose
Thiago De Vasconcelos Saraiva MD : Nothing to Disclose
Diego Bortolazzi Bezerra Nunes MD : Nothing to Disclose
Priscila Pimentel Collier MD : Nothing to Disclose
Miguel Jose Francisco Neto MD (Presenter): Nothing to Disclose
Marcelo Buarque Gusmao Funari MD : Nothing to Disclose

TEACHING POINTS

To demonstrate the major findings in carotid artery dissection on the Doppler ultrasonography. To review and illustrate role of Doppler ultrasonography in carotid artery dissection and their complications. What cannot miss in the ultrasonography report of carotid dissection?

TABLE OF CONTENTS/OUTLINE

Cervical artery dissections (CAD) are more common in the internal carotid arteries (ICA), 70% in the cervical and petrous segments, mainly 2-3 cm distal to the carotid bulb. These segments are easily accessible by ultrasound. The Doppler ultrasound (Doppler US) can make initial screening, diagnosis and monitoring of dissection in the proximal segments of the ICA. Computed tomography (CT) and magnetic resonance imaging (MRI) are the best methods in the evaluation of CAD. The present study aims to describe by practical cases the role and major abnormalities in the Doppler US of ICA dissections. Doppler US is a low cost exam that can assist in the diagnosis and monitoring of dissection. That can demonstrate the tapering column flow with abnormal pulsed wave Doppler up to 90% of cases of dissection. Moreover, it is able to determine the flow dynamics of the dissection. CT and MRI do not allow determining the flow dynamics. It is important for all radiologist know the major abnormalities in carotid artery dissection on the Doppler US.

VIE023-b

Radiology and Interventional Radiology in Complex Pelvic Trauma: Suggesting a Trauma Pathway

Education Exhibits

Location: VI Community, Learning Center

Participants

Yaron J. Berkowitz MBChir, MRCS (Presenter): Nothing to Disclose
Joel Dunn FRCP, MBBS : Nothing to Disclose
Elizabeth Ann Dick MD, FRCP : Nothing to Disclose
Jasvinder Daurka : Nothing to Disclose
Angus Lewis : Nothing to Disclose
An Thanh Ngo BMBS, MRCP : Nothing to Disclose
Elika Kashef FRCP : Consultant, W. L. Gore & Associates, Inc

TEACHING POINTS

The viewer will be able to answer the following questions after viewing the exhibit: 1. Identify injury patterns in complex pelvic fractures. 2. What imaging modalities are appropriate in pelvic trauma? 3. When should dual phase (arterial and PV) or combined single phase 'combi' CT protocolling be used? 4. When to perform a cystogram? 5. Who need vessels embolisation and/or IVC Filter insertion? We suggest the adoption of an intelligent, step wise, one stop ,multidisciplinary approach to imaging and intervention in this often multiply injured patient group.

TABLE OF CONTENTS/OUTLINE

- Characterising pelvic trauma injury patterns - Dual phase versus Combined Phase CT - Cystograms, urethograms and delayed phase CTs - Intervention (Embolisation and IVF filters) - A suggested simplified, one-stop pathway

VIE024-b

Endovascular Management for the Non-Matured Arteriovenous Fistula

Education Exhibits

Location: VI Community, Learning Center

Participants

Brandon Michael Shearer DO (Presenter): Nothing to Disclose
Alexander Edward Trebelev MD : Nothing to Disclose
Brian Anthony Bianco DO, MBA : Nothing to Disclose

TEACHING POINTS

Nationwide measures continue to encourage the creation of arteriovenous fistulas (AVF) in patients requiring long-term dialysis. However, AVFs are plagued with high primary failure rates due to multiple causes. Salvage techniques of the non-maturing fistula are vital not only for patient care but for health-care cost containment reasons. The purpose of this educational exhibit is to provide a review of the pathophysiology of the non-matured AVF, its diagnosis, and salvage techniques with a focus on endovascular management. A pictorial case based review utilizing retrospectively identified patients with a non-maturing AVF will be presented.

TABLE OF CONTENTS/OUTLINE


VIE025-b
Transradial Access for Dialysis Interventions: A Pictorial Review

Education Exhibits
Location: VI Community, Learning Center

Participants
Shaun Jeffrey Gonda MD (Presenter): Nothing to Disclose
James Bret Winblad MD: Nothing to Disclose
Travis McKenzie DO: Nothing to Disclose

TEACHING POINTS
1. To review transradial access, technical tips and patient selection.
2. To depict different dialysis access interventions that can be performed from a transradial approach.

TABLE OF CONTENTS/OUTLINE
1. Clinical findings for patient selection
2. Technique and tip for obtaining radial artery access
3. Evaluation of dialysis access from transradial approach.
4. Endovascular treatment of dialysis access from transradial approach

How to Make the 'Snip' Easy

Education Exhibits
Location: VI Community, Learning Center

Participants
Zubin Irani MD (Presenter): Nothing to Disclose
Rahmi Oklu MD, PhD: Nothing to Disclose

TEACHING POINTS
This pictorial exhibit aims to educate about Port catheter problems encountered and solutions for addressing these; in particular focusing on port catheters being too long. 1. Problems long chest port catheters may create / present with. 2. Present author's step by step technique for port catheter revisions.

TABLE OF CONTENTS/OUTLINE
1. Chest Port placement demographics 2. Complication of chest port placements 3. Pictorial technique of chest port revision for catheters that are too long 4. Outcomes using the presented author's technique

Increasing Interventional Radiology Exposure in Medical Schools

Education Exhibits
Location: VI Community, Learning Center

Participants
Rahul Nayyar MD (Presenter): Nothing to Disclose
Nicole A. Keefe MD: Nothing to Disclose
Nicholson Stephen Chadwick MD: Nothing to Disclose
Krishna K. Das MD: Nothing to Disclose
Alok Bharat Bhatt MD: Nothing to Disclose
Venkatesh Perumal Krishnasamy MD: Nothing to Disclose
George Vatakencherry MD: Nothing to Disclose
Chadi Zeinati MD: Nothing to Disclose

TEACHING POINTS
A main goal for the SIR Medical Student Council (MSC) was to increase IR awareness and education. This has been done by completing a dedicated Medical Student Lecture Series. The lectures will be accessible by anyone who requests their use for educational purposes. They can be used in the basic science or clinical years of medical school. Topics include: Intro to IR, Peripheral Arterial Disease, Interventional oncology, Carotid Disease, Thoracic/Abdominal Aortic, Chronic liver disease, Leg Ulcers, DVT, IR Frontiers, GI bleeding, Varicose Veins, and Trauma IR. Members of the MSC volunteered for the different topics. A template for content organization was provided. Upon completion of the presentation, the lectures were reviewed by 2 IR physicians.

TABLE OF CONTENTS/OUTLINE
The medical student lecture series, created by the SIR MSC, will expose medical students to IR throughout medical school, which will be critical with the dual certificate. This should draw more medical students to IR by exposing them to the different modalities within IR. The series stresses the clinical aspect of IR, which is something most medical students are not aware of. We will debut this lecture series with this educational exhibit and also show step by step instructions how to obtain these lectures for your institution.

Approaching Quality Improvement in Interventional Radiology
Participants

Benjamin White MD (Presenter): Nothing to Disclose
Stephen Phillips Reis MD : Nothing to Disclose
Seth Toomay MD : Nothing to Disclose
Patrick D. Sutphin MD, PhD : Nothing to Disclose
Anil Kumar Pillai MD : Nothing to Disclose
Sanjeva P. Kalva MD : Consultant, CeloNova BioSciences, Inc

TEACHING POINTS

- Recognize the difference between quality improvement and quality assurance
- Understand the DMAIC (Define, Measure, Analyze, Improve and Control) model, Six Sigma process, and Driver Diagram project mapping
- Understand the criteria that determine a strong and meaningful QI project

TABLE OF CONTENTS/OUTLINE

Quality assurance (QA) versus quality improvement (QI)
Define QA and QI
Goals of QA vs QI
Situations in which QA is important
Benefits of QI over QA
Using ongoing QA to help identify possible QI projects
Goals of a QI Project
Better outcomes
Safer care
Lower cost
Faster service
Criteria for a Successful QI Project
Important to patient
Meaningful to you
Needs improvement
Feasible (start small, definable, achievable)
Reproducible metrics
Examples of Quality Improvement Projects in IR
Reducing Mediport waiting times
Reducing Mediport infection rates
Increasing inferior vena cava filter retrieval rates
Reducing radiation dose during angiography procedures
First case start time
Time to intervention for trauma
Arteriovenous fistula/graft patency and flow rates at dialysis after maintenance therapy
Automated case tracking of interventional procedures

VIE031-b

CT-guided Autologous Blood Patch for the Post Lung Intervention Pneumothorax

Education Exhibits
Location: VI Community, Learning Center

Participants

Anshuman Kumar Bansal MD (Presenter): Nothing to Disclose
Scott J. Genshaft MD : Nothing to Disclose
William T. Derry MD : Nothing to Disclose
Fereidoun G. Abtin MD : Nothing to Disclose
Antonio Joel Gutierrez MD : Nothing to Disclose
Robert D. Suh MD : Nothing to Disclose

TEACHING POINTS

Pneumothorax is a common complication of percutaneous thoracic interventions, complicating up to 50% of procedures.
Pneumothoraces with persistent air leak can be difficult to treat, and at times require thoracic surgery for definitive management.
Blood patching uses clot formation to seal persistent air leaks from the lung parenchyma.
We present the use of a two-catheter image-guided blood patch technique to seal the persistent air leak, drain the intrapleural air, and oppose the pleural surfaces.

TABLE OF CONTENTS/OUTLINE

1. Overview of pneumothorax
2. Clinical assessment and management of post-intervention pneumothorax and hospital management
3. Pneumothorax prevention
4. Two-catheter technique for CT-guided pleural blood patch placement
   a. Percutaneous autologous blood patch
   b. Pneumothorax aspiration
   c. Thoracostomy catheter management
   d. Pleural blood patch placement
   e. Alternative management with synthetic sealants

VIE032-b

Implications of Lipiodol Deposition Pattern on Non-contrast CT Immediately After TACE: Correlation with Pathological Findings

Education Exhibits
Location: VI Community, Learning Center

Participants

Nicholas Ralph Turman MD (Presenter): Nothing to Disclose
Shiliang Sun MD : Nothing to Disclose
Fadi Mohamad Youness MD : Nothing to Disclose
Sanjeev Laroia MD : Nothing to Disclose
Mark Karwal : Nothing to Disclose
Leana A. Guerin MD : Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to:
1. To demonstrate types of lipiodol deposition pattern on noncontrast CT performed one day after TACE and its predicting value for tumor destruction - correlated with pathology and imaging findings
2. Comparing the outcomes of the groups of patients with/without subsequent particle embolization

TABLE OF CONTENTS/OUTLINE

1. Overview of lipiodol deposition pattern on noncontrast CT performed one day after TACE and its predicting value for tumor destruction - correlated with pathology and imaging findings
   a. Full homogeneous deposition pattern within target tumor
   b. Full heterogeneous deposition pattern within target lesion
   c. Partial geographic deposition defect pattern
   d. Also comparing the outcomes of the groups of patients with/without subsequent particle embolization

VIE033-b
Pictorial Review of the Re-intervention Techniques after TIPS Placement (Transjugular Intrahepatic Portosystemic Shunt) According to Clinical Manifestations

Education Exhibits
Location: VI Community, Learning Center

Certificate of Merit

Participants
Bryan G. Belikoff MD, PhD (Presenter): Nothing to Disclose
Seung Kwon Kim MD : Nothing to Disclose
Carlos Javier Guevara MD : Nothing to Disclose
Kristen Alexa Lee MD : Nothing to Disclose
Guillermo Gonzalez-Araiza MD : Nothing to Disclose

TEACHING POINTS
Recognize the clinical manifestations after TIPS placement and know the various TIPS re-intervention techniques including basic and advanced TIPS revisions, TIPS reduction, parallel TIPS, and additional procedures such as Denver shunt and BRTO procedure according to clinical manifestations

TABLE OF CONTENTS/OUTLINE
Background: Transjugular intrahepatic portosystemic shunt (TIPS) is an established and effective treatment for the complications of portal hypertension. Herein, we present a pictorial review of the basic to advanced re-intervention techniques after TIPS placement according to clinical manifestations. Clinical manifestations/Procedure details: 1. Initial poor clinical response - TIPS revision, parallel TIPS, Denver shunt for intractable ascites 2. Hepatic encephalopathy or hepatic failure - TIPS reduction 3. Stenosis on Doppler US with/without symptom -TIPS venogram with/without revision 4. Total occlusion of TIPS stent on Doppler US or TIPS venogram Parallel TIPS Transhepatic or Transplenic approach Thrombolysis - mechanical or catheter directed 5. Recurrent symptoms after initial clinical response TIPS revision with possible variceal embolization for bleeding Recurrent bleeding after TIPS revision with variceal embolization -- Parallel TIPS or BRTO for gastric varices

VIE034-b
Assessment of Mesocaval Shunts and Associated Complications: The Diagnostic and Therapeutic Role of Radiologists

Education Exhibits
Location: VI Community, Learning Center

Participants
Jad Zouheir Chokr MD : Nothing to Disclose
Bedros Tasiakian MD (Presenter): Nothing to Disclose
Karim Jean Rebeiz MD : Nothing to Disclose
Sahar Semaan MD : Nothing to Disclose
Aghiad Al-Kutoubi MD : Nothing to Disclose
Walid Faraj : Nothing to Disclose
Charbel Saade MS : Nothing to Disclose
Mohammad Khalife MD : Nothing to Disclose
Fadi M. El-Merhi MD : Nothing to Disclose
Ali A. Haydar MD, FRCR : Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To understand the anatomy and pathophysiology of mesocaval shunts. To illustrate the pearls and pitfalls of computed tomography, Doppler ultrasound and digital subtraction angiography in the assessment of mesocaval shunts. To demonstrate the role of the radiologist in diagnostic and interventional management of complications.

TABLE OF CONTENTS/OUTLINE
• Anatomy and pathophysiology • Clinical indications • Imaging findings • Complications • Interventional techniques and applications • Pearls and Pitfalls

VIE035-b
Renal Arteriovenous Shunts: Clinical features, Imaging Appearance and Transcatheter Embolization Based on its Angioarchitectures

Education Exhibits
Location: VI Community, Learning Center

Selected for RadioGraphics

Participants
Miyuki Maruno MD (Presenter): Nothing to Disclose
Hiro Kiyosue MD : Nothing to Disclose
Shuichi Tanoue MD : Nothing to Disclose
Yoshiko Sagara MD : Nothing to Disclose
Junji Kashitani MD : Nothing to Disclose
Norio Hongo : Nothing to Disclose
Shunro Matsuoka MD : Nothing to Disclose
Hiromu Mori MD : Nothing to Disclose

TEACHING POINTS
The teaching points of this exhibit are: 1. Etiology and clinical features of various types of renal arteriovenous shunts (rAVSs) 2.
The imaging features of rAVSs 3. The classifications of rAVSs 4. The endovascular treatments for rAVSs based on its etiology and angioarchitectures

TABLE OF CONTENTS/OUTLINE
A. Etiology and clinical features of rAVSs B. Imaging features of rAVSs • Normal anatomy of renal arteries and veins • Imaging features of rAVSs on CT, MRI and angiography C. Classifications of rAVSs • rAVMs; cirrhotic type, angiomatous type, aneurysmal type • Traumatic rAVFs D. Endovascular treatment • Endovascular treatment for rAVSs • Treatment techniques of transcatheter embolization, including selection of embolic materials, catheters, and other adjunctive techniques, based on their types and angioarchitectures. The rAVSs is a rare pathological communication between renal arteries and veins, which can cause retroperitoneal hemorrhage, massive hematuria, pain and high-output heart failure. Transcatheter embolization has been accepted as a less-invasive and effective treatment; however it has a risk of complications including renal infarction and pulmonary embolism. For the safe and effective treatment, treatment strategy based on the types and angioarchitectures of rAVSs are mandatory.

VIE036-b
Inferior Vena Cava Embryogenesis: What Every Interventionalist Must Know before Placing an IVC Filter

Education Exhibits
Location: VI Community, Learning Center

Participants
Dominic Semaan MD, JD (Presenter): Nothing to Disclose
Matthew Osher MD : Nothing to Disclose
Mehran Salari MD : Nothing to Disclose

TEACHING POINTS
- The various congenital anomalies in the development of the Inferior Vena Cava. - IVC Filter placement options when a congenital variant arises.

TABLE OF CONTENTS/OUTLINE
1. Embryologic development of the IVC 2. Most commonly presenting IVC variants - Review fluoroscopic presentations 3. Review of the literature and options in IVC filter placement when a congenital variant is presented 4. Presentation of some slightly less common variants and suggestions on IVC filter placement 5. Conclusion

VIE037-b
Through the Looking Glass: Alice in Wond-IR-Land—Potential Use of Google Glass in the World of IR

Education Exhibits
Location: VI Community, Learning Center

Participants
Raul Nirmal Uppot MD (Presenter): Nothing to Disclose
Synho Do PhD : Research Grant, Koninklijke Philips NV
Debra Ann Gervais MD : Research Grant, Covidien AG
Anthony Edward Samir MD : Nothing to Disclose
Robert L. Sheridan : Nothing to Disclose
Florian J. Fintelmann MD, FRCP : Nothing to Disclose
Peter Raff Mueller MD : Consultant, Cook Group Incorporated
Ronald Steven Arellano MD : Nothing to Disclose
Raymond W. Liu MD : Nothing to Disclose
Alvin Yiu Chun Yu MD : Nothing to Disclose

TEACHING POINTS
1. Google Glass is a wearable computer with a optical head mounted display which has many potential uses in Interventional Radiology. It can potentially be used for interventional procedures, interventional rounds, education, and monitoring. 3. Current limitations include ensuring patient privacy, HIPPA compliance, and maintaining sterility during procedures.

TABLE OF CONTENTS/OUTLINE

VIE038-b
Prevention and Management of Air Embolism during Vascular Interventional Procedures—Everything you Wanted to Know, but Were Afraid to Ask

Education Exhibits
Location: VI Community, Learning Center

Certificate of Merit

Participants
Colin J. McCarthy MD (Presenter): Nothing to Disclose
Mohammad Ghasemi-rad MD : Nothing to Disclose
Thabele Mbuso Leslie-Mazwi MD : Nothing to Disclose
Rahmi Oklu MD, PhD : Nothing to Disclose
**TEACHING POINTS**

1. To discuss the risk and prevention of air embolus during endovascular procedures. 2. Review the physiological effects of venous and arterial air embolism. 3. Outline the initial and advanced management of air embolism.

**TABLE OF CONTENTS/OUTLINE**

1. Review the estimated incidence of air embolus and identify high-risk procedures in interventional radiology. 2. Discuss imaging findings and clinical presentation following air embolus, including the hemodynamic effects such as elevated pulmonary arterial pressure and resultant right heart failure. 3. Important steps to reduce the risk of air embolus. 4. Outline management techniques including supportive therapy, positioning, aspiration and hyperbaric oxygen treatment (HBOT).

**VIE039-b**

**Liver-on-a-chip: Personalization in Interventional Oncology?**

*Education Exhibits*  
*Location: VI Community, Learning Center*

**Participants**  
Sidhartha Tavri MBBS (Presenter): Nothing to Disclose  
Mohammad Ghasemi-rad MD: Nothing to Disclose  
Rahul Anil Sheth MD: Nothing to Disclose  
Richard L. Hesketh: Nothing to Disclose  
Berk Usta PhD: Nothing to Disclose  
David S. Kong PhD: Nothing to Disclose  
Rahmi Oklu MD, PhD: Nothing to Disclose

**TEACHING POINTS**

i) to address the limitations of the current in vitro tools and animal models in the drug discovery process ii) to review recent advances in the microfluidics technology towards the development of the organ-on-a-chip platform. We will use liver-on-a-chip as the primary example. iii) to review the liver tumor-on-a-chip platform for testing anti-cancer drugs and interventions, highlighting relevance to interventional oncology.

**TABLE OF CONTENTS/OUTLINE**

1) Overview of the traditional drug discovery process, highlighting the current lack of predictive in vitro tools and animal models for translation from bench to bedside. 2) Organ-on-a-chip: describe advances in microfluidics and microfabrication platforms and development of 3D cell culture models to mimic in vivo human environment. 3) Discuss liver-on-a-chip devices to mimic healthy liver physiology, investigate liver diseases, and test the toxicity of potential therapeutic drugs. 4) Compare and contrast the complimentary role of tumor-on-a-chip technology in interventional oncology for biomarker discovery, chemotherapeutic sensitivity and specificity analysis, developing targeted therapy, and monitoring treatment. Novel microfluidic designs containing microscopic probes can enable the study of IRE, microwave, cryo- and RFA on tumor tissue on a chip in real-time video microscopy will be discussed.

**VIE040-b**

**IR Targeted Liver Decellularization and Cell Therapy: Fantasy or Reality to Improve Liver Function?**

*Education Exhibits*  
*Location: VI Community, Learning Center*

**Participants**  
Sidhartha Tavri MBBS (Presenter): Nothing to Disclose  
Mohammad Ghasemi-rad MD: Nothing to Disclose  
Rahul Anil Sheth MD: Nothing to Disclose  
Richard L. Hesketh: Nothing to Disclose  
Basak Uygun PhD: Nothing to Disclose  
Berk Usta PhD: Nothing to Disclose  
David S. Kong PhD: Nothing to Disclose  
Rahmi Oklu MD, PhD: Nothing to Disclose

**TEACHING POINTS**

1) Review various methods of ‘decellularization’ technologies in general and specifically in liver. 2) Review the current status of stem cell therapy in regenerative medicine specifically focusing on hepatocyte derivation from pluripotent cells and fibroblasts.

**TABLE OF CONTENTS/OUTLINE**

1. List the current challenges in the definitive management of liver failure with orthotopic transplantation by a brief review of UNOS/OPTN data. 2. Decellularization - definition - overview of various methods of decellularizing tissue/organs including physical, chemical and enzymatic methods with their limitations, with focus on liver - briefly illustrate role of irreversible electroporation as an alternative method with literature review 3. Stem cell therapy - review the various autologous and allogeneic cell sources i.e., embryonic, fetal, inducible pluripotent stem cells, adult derived stem cells, primary tissue or organ-derived cells - review seeding techniques and list the endpoints of tissue engineered organs - describe advantages of a decellularized scaffold for stem cell therapy. 4. The role of interventional radiologists in targeted decellularization of tissues, targeted stem cell therapy and monitoring its fate by imaging in vivo.

**VIE041-b**

**Time-Driven Activity Based Costing in Interventional Radiology**

*Education Exhibits*  
*Location: VI Community, Learning Center*

**Participants**  
Katelyn Brinegar (Presenter): Nothing to Disclose  
Roy Gordon Bryan MD, MBA: Nothing to Disclose  
Mohammad Ghasemi-rad MD: Nothing to Disclose
TEACHING POINTS
1) Demonstrate need for accurate costing in radiology operations as the healthcare environment changes. 2) Introduce Time-Driven Activity Based Costing (TDABC) as a valuable new tool to develop accurate costing processes in interventional radiology 3) Provide potential applications of TDABC in multiple imaging care processes

TABLE OF CONTENTS/OUTLINE
Healthcare costs in the US total 20% of gross domestic product and focus has turned to reducing these costs. Payors are placing increasing importance on delivering value, quality care at the lowest cost and are changing payment models to support high value services in healthcare. In contrast to traditional fee-for-service models, where a specific event is reimbursed, new bundled payment models are being initiated to cover a full episode of care. With these new reimbursement models, radiologists must know their costs to ensure services provided are reimbursed fairly. Until now, costs have been allocated to services based on reimbursement, leaving physicians without an accurate assessment of what it actually takes to provide healthcare. TDABC provides a flexible and versatile method to assess the costs of delivering quality services. Without accurate costing methods IR may leave the table with a smaller share of the pie, unable to demonstrate their value throughout the patient care cycle.

VIE042-b
How Low Can You Go: A Pictorial Primer to Radiation Dose Reduction in Interventional Radiology

Education Exhibits
Location: VI Community, Learning Center

Participants
Michelle Morgan RT (Presenter): Nothing to Disclose
Ram Kishore Reddy Gurajala MBBS, FRCR: Nothing to Disclose
Kevin Wunderle: Nothing to Disclose
Charles Martin MD: Nothing to Disclose
Karunakaravel Karuppasamy MBBS, FRCR: Nothing to Disclose

TEACHING POINTS
The goal is • To list dose reducing methods in an Interventional Radiology (IR) system • To demonstrate simple steps that should be taken routinely • To display advanced methods and warnings systems available

TABLE OF CONTENTS/OUTLINE

VIE043-b
The Microenvironment in Hepatocellular Carcinoma: Mind the Gap!

Education Exhibits
Location: VI Community, Learning Center

Participants
Richard L. Hesketh (Presenter): Nothing to Disclose
Berk Usta PhD: Nothing to Disclose
Mohammad Ghasemi-rad MD: Nothing to Disclose
Rahul Anil Sheth MD: Nothing to Disclose
Rahmi Oklu MD, PhD: Nothing to Disclose

TEACHING POINTS
1. Tumor microenvironment in HCC is unique both in composition, its interaction with the surrounding chronically inflamed liver and inhibits drug delivery to intracellular targets. 2. Gap junctions control intercellular communication and tumor homeostasis and are down regulated in HCC. 3. Combination of drugs and therapeutic interventions has potential to overcome the intrinsic barriers to drug delivery. 4. Regulation of gap junctions could potentially lead to enhanced effects of anti-tumor drugs.

TABLE OF CONTENTS/OUTLINE
Significant advances in our understanding of the drivers of HCC have been possible with the advent of the 'omic age. Despite the increasing number of possible targets, drug treatment fails to induce long term remission. Specific mutations that lead to drug resistance occur but recently the role of the tumor microenvironment has been increasingly implicated in determining drug resistance. This exhibit will describe the characteristics of the tumor microenvironment that impede drug delivery and the role of gap junctions in tumorigenesis. It will emphasize future chemotherapeutic and interventional tools that have the potential to overcome these barriers and promote drug delivery and efficacy, ultimately improving survival for this silent killer. The value of microfluidic technology including liver-on-a-chip will be discussed.

VIE044-b
Interventional Radiology in Palliative Management of Intractable Pain in the Abdomen

Education Exhibits
Certificate of Merit

Participants

Naveen Kulkarni MD (Presenter): Nothing to Disclose
Ashraf Thabet MD : Nothing to Disclose
Raul Nirmal Uppot MD : Nothing to Disclose
Mihir M Kamdar MD : Nothing to Disclose
Peter Raff Mueller MD : Consultant, Cook Group Incorporated
Avinash Ranesh Kambadakone MD, FRCR : Nothing to Disclose

TEACHING POINTS

The purpose of this educational exhibit is: 1) to review the various image guided palliative procedures for management of intractable pain in the abdomen and 2) to discuss the indications, technique and patient management principles of the image guided techniques for palliative pain management.

TABLE OF CONTENTS/OUTLINE

1. Review the various image guided palliative care procedures for pain relief in the abdomen including celiac plexus neurolysis, hypogastric neurolysis and cryoablation. 2. Discuss basic principles and anatomic considerations for interventional palliative pain procedures. 3. Discuss step-by-step technique for the image guided procedures. 4. Illustrate the interventional techniques with tips for successful treatment using a pictorial review. 5. Discuss the patient care issues before, during and after procedure including management of complications. 6. Summary and Conclusions

VIE100

Radiologists as Pain Relievers: Ultrasound Guided Truncal Nerve Blocks for Pelvic Cancer Pain Management

Education Exhibits

Location: VI Community, Learning Center

Participants

Nayha Handa MBBS (Presenter): Nothing to Disclose
Krithika Rangarajan MBBS : Nothing to Disclose
Sanjay Thulkar : Nothing to Disclose
S. Bhatnagar : Nothing to Disclose

TEACHING POINTS

Nerve block or neurolysis is a procedure in which a chemical is injected under image guidance to ablate nerves and thus block pain. They are used to treat intractable pain in cancer patients. 1) To enlist the sites of nerve blocks with their relevant anatomy in patients with pelvic cancers. 2) To review the utility of ultrasound as a guiding modality for these procedures 3) To review their indications, contraindications and potential complications.

TABLE OF CONTENTS/OUTLINE

Outline -Sites Superior Hypogastric plexus Ganglion impar Caudal epidural block -Anatomy -Indications -Technique -Role of imaging guidance :Ultrasound, CT, Fluoroscopy -Post Procedure care -Complications -Follow up

VIE102

A Radioembolization Quiz: What the Radiologist Needs to Know

Education Exhibits

Location: VI Community, Learning Center

Participants

Jason C. Hoffmann MD : Consultant, Merit Medical Systems, Inc
Amanjit S. Baadh MD (Presenter): Nothing to Disclose
Obaib Shaib : Nothing to Disclose
Ahmed Fadl MD : Nothing to Disclose

TEACHING POINTS

Radioembolization is an extremely valuable interventional oncology tool in treatment of primary and metastatic hepatic malignancy. This procedure allows interventional radiologists to target liver tumors with lethal radiation dose while minimizing normal hepatic parenchymal exposure. In most patients, this is extremely well-tolerated and can be performed as an outpatient. Non-target embolization (radiation-induced lung, liver, or bowel injury) is a rare, but potentially serious and life-threatening complication. It is important for radiologists to understand critical information about the procedure, including patient selection, mechanism of action, risks, and imaging that routinely is obtained before and after the procedure.

TABLE OF CONTENTS/OUTLINE

Presentation will be in quiz format. Major teaching points about indications and contraindications of radioembolization will be reviewed. Differences between the two radioembolization products will be covered. Eight cases will be utilized to cover this points as well as highlight outcomes from major research studies. Cases will include: -Primary liver tumors -Metastatic disease to the liver -Highlight normal anatomy as well as key anatomical variants -Importance of mapping angiography and nuclear medicine scintigraphy -Adjunctive techniques that may aid in uptake of dose into the tumors and/or improve safety.

VIE103

Acute Lower Gastrointestinal Bleeding: Evaluation, Management, and Pitfalls

Education Exhibits

Location: VI Community, Learning Center
**TEACHING POINTS**

Overview: Acute lower gastrointestinal bleeding can lead to significant morbidity and mortality without appropriate treatment. The role of interventional radiology is crucial in patients that have persistent bleeding despite medical and endoscopic treatment. In this educational exhibit we will review the following: • ACR Appropriateness Criteria for the radiologic management of lower gastrointestinal tract bleeding. • The practical utilization of radiologic modalities (CT/Nuclear medicine) • Underlying etiologies that can lead to lower GI bleeding • The role of Interventional Radiology in the therapeutic management with endovascular angiography and transcatheter embolization • Provides insight into the essential role of Interventional Radiology in the management of acute GI bleeding.

**TABLE OF CONTENTS/OUTLINE**

• Introduction • Clinical evaluation and patient management • Review ACR appropriateness criteria • The utilization of CTA and Nuclear Medicine • Angiographic evaluation and management • Use of gelfoam, PVA, coils, onyx, glue in the management of lower GI bleeding • Review technical approach to lower GI bleeding specifically using a case-based approach • Conclusions and Future Directions

**VIE104**

**Aortic Arch: Posttherapy Imaging Evaluation of Congenital and Acquired Diseases**

*Education Exhibits*

*Location: VI Community, Learning Center*

**Participants**

Mariana Santos Ferreira Horta (Presenter): Nothing to Disclose  
Carla Rodrigues Saraiva MD : Nothing to Disclose  
Marcio Ferreira Madeira MD : Nothing to Disclose  
Ines Carmo Mendes MD : Nothing to Disclose

**TEACHING POINTS**

To describe and illustrate the pre- and posttherapy MDCTA and MRA imaging findings of congenital and acquired aortic arch diseases. To detail MDCTA and MRA imaging strategies for the repaired aortic arch. To explain the surgical and endovascular approaches of the congenital and acquired condition involving the aortic arch, including procedures involving the ascending and descending aorta and the supra-aortic trunks. To display possible complications after surgical and endovascular aortic arch repair.

**TABLE OF CONTENTS/OUTLINE**

1. Description of CTA and MRA imaging advantages and disadvantages for the evaluation of the repaired aortic arch. 2. Spectrum of congenital (vascular rings, aortic hypoplasia, aortic coarctation, interrupted aortic arch) and acquired diseases (atherosclerotic, inflammatory and post-dissection aneurysms, type A dissections, penetrating ulcers) that often require surgical and endovascular interventions. 3. Description and review of the imaging findings of surgical and endovascular techniques. TEVAR, hybrid surgeries, elephant trunk procedure and its variants, “arch first” technique, surgical reimplantation techniques and stenting of the supra-aortic vessels. 4. Post-treatment normal aspects and complications of surgical and endovascular approaches. 5. Final considerations

**VIE105**

**Arterial Upper Extremity Run Off: Technique and Imaging Findings**

*Education Exhibits*

*Location: VI Community, Learning Center*

**Participants**

Prashant Nagpal MD (Presenter): Nothing to Disclose  
Ashish Rajendra Khandelwal MD : Nothing to Disclose  
Sandeep Subhash Hedgire MD : Nothing to Disclose  
Sachin Shyamsunder Saboo FRCSI, MD : Nothing to Disclose  
Ayaz Aghayev MD : Nothing to Disclose  
Frank John Rybicki MD, PhD : Research Grant, Toshiba Corporation  
Michael Lally Steigner MD : Speaker, Toshiba Corporation

**TEACHING POINTS**

1. Understand the role of CT Angiography (CTA) and MR Angiography (MRA) of the upper extremity for the diagnosis of acute arterial pathologies. 2. Identify the technical factors for optimal upper extremity angiography. 3. Review imaging appearance of various common pathologies involving the upper extremity arteries.

**TABLE OF CONTENTS/OUTLINE**

1. Role of the CT and MR upper extremity run off, especially in appropriate clinical setting. 2. Technical parameters for optimal imaging evaluation of upper extremity arteries. 3. Case based review of various pathologies involving the upper extremity arteries with emphasis on use of CT angiography in emergency setting. 4. Summary

**VIE106**

**Carotid Artery Stenting: Avoiding a Surgical Pain in the Neck**

*Education Exhibits*
Participants

Hebah Taufik MBBS (Presenter): Nothing to Disclose
Alexander Theodore Chapman MBBS, BSc : Nothing to Disclose
Allan Irvine : Nothing to Disclose

TEACHING POINTS

Our centre has a relatively small volume of carotid artery stenting cases. A robust pathway is essential for the selection and follow-up of these cases. Rigorous audit ensures that the outcomes in smaller hospitals are comparable to national figures.

TABLE OF CONTENTS/OUTLINE

Carotid artery stenting (CAS) is recommended as a second-line treatment for symptomatic patients unsuitable for endarterectomy. The British Society of Interventional Radiologists (BSIR) developed the United Kingdom Carotid Artery Stent Registry (UKCASR) to monitor and report outcomes of CAS. Recently published outcomes for 953 symptomatic and 201 asymptomatic cases undergoing CAS in UK hospitals between 1998-2010. 30-day outcomes for stroke/myocardial infarction/death rate was 5.5% and death rate was 1.7% for symptomatic cases. For asymptomatic cases, 2.8% and 0.6%, respectively. At our district general hospital, we analysed 44 cases. 30-day outcome of stroke/myocardial infarction/death rate for both symptomatic and asymptomatic cases was 0%. Post-procedure duplex scans at our institution were suboptimal. 34.8% of symptomatic cases and 15.4% of asymptomatic cases were followed up within the recommended 6 week period. Using ECST, NASCET, NICE guidelines, along with the report published by UKCASR and our own experiences, we have proposed a CAS Patient Pathway.

VIE107

CRUSHING the NIDUS Management Strategies of Non-CNS High Flow AVMs

Education Exhibits

Location: VI Community, Learning Center

Participants

Donald J. Perry MD (Presenter): Nothing to Disclose
Gregor Martin Dunham MD : Nothing to Disclose
Sandeep Vaidya MD : Nothing to Disclose

TEACHING POINTS

1. Arteriovenous malformation (AVM) management variables include location, nidus size and complexity, feeding vessel size, flow speed, and patient comorbidities. 2. AVM nidus elimination is the goal of embolization. Various techniques and agents utilized to optimally permeate and obliterate the nidus. 3. Surgical resection of limited utility due to high rate of recurrence. Utilized in small and very large lesions when AVM fully resectable or too bulky for adequate embolization.

TABLE OF CONTENTS/OUTLINE


VIE108

Deep Inferior Epigastric Artery: Often Overlooked but with Clinical Significance

Education Exhibits

Location: VI Community, Learning Center

Participants

Anthony Dennis Mohabir MD (Presenter): Nothing to Disclose
Gregory Michael Grimaldi MD : Nothing to Disclose
Priya Kumar Shah MD : Nothing to Disclose
Eric John Gandras MD : Nothing to Disclose
Daniel Mark Puterman MD : Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:
1. To review the anatomy and embryology of the deep inferior epigastric artery. 2. To explain the significance of the deep inferior epigastric artery as it pertains to breast flap reconstructive surgery. 3. To demonstrate pathology involving the deep inferior epigastric artery which can be easily overlooked.

TABLE OF CONTENTS/OUTLINE


VIE109

Detecting Aortic Graft Complications: A Spectrum of CT Findings
**TEACHING POINTS**

- Aortic graft complications greatly influence long-term morbidity and mortality rates of abdominal aortic aneurysm (AAA) repair.
- Increased detection of graft-related complications are achieved with a better understanding of imaging characteristics
- The aim of this exhibit is to describe aortic graft complications and illustrate key imaging findings

**TABLE OF CONTENTS/OUTLINE**

- Background/Literature review
  - Types of stent grafts
    - Vanguard
    - Endologix
    - Zenith
  - Imaging techniques for graft surveillance:
    - Plain radiograph
    - CT
    - MRI
    - Digital subtraction angiography
    - Ultrasound
    - Nuclear medicine studies
  - Protocol in Post-Endovascular Aneurysm Repair Surveillance
    - Radiographic features of complications:
      - Endoleaks
      - Para-anastomotic aneurysm
      - True
      - False
      - Graft-enteric erosion/fistula
      - Graft Infection
      - Colon Ischemia
      - Graft Thrombosis
      - Device migration
    - Alternative to imaging for post-EVAR surveillance
      - Pressure monitoring sensors

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**VIE110**

**Embolotherapy: Identifying Risks and Choosing the Right Agent**

**TEACHING POINTS**

- Embolotherapy has become an increasingly popular procedure in the field of interventional radiology.
- There are numerous embolic agents, each with its own characteristics that makes it ideal for certain situations.
- Familiarity with these characteristics can help in selecting the appropriate agent depending on the goal of embolization.
- The aim of this exhibit is to describe the several types of commonly used embolizing agents, and a systematic method to determine when to use each agent.

**TABLE OF CONTENTS/OUTLINE**

- Background
  - Embolic agents
    - Important physical and biological properties
    - Large vessel embolic agents
      - Coils
      - Balloons
      - Amplatzer vascular plug
      - Guide wires
      - Suture material
      - Autologous clot
    - Small vessel embolic agents
      - Particulate embolic agents
      - Liquid agents
      - Powder substances
      - Determining embolization agent according to:
        - Size of vessel
        - How long should the vessel stay occluded
        - Should embolized tissue remain viable
      - Advantages and disadvantages of embolization
      - Methods to decrease certain adverse effects
      - Complications of embolization agents
**VIE111**

Endoleaks: The Achilles’ Heel of Endovascular Aortic Aneurysm Repair (An image-based Review of the Diagnosis and Management of Endoleaks)

*Education Exhibits*
*Location: VI Community, Learning Center*

**Participants**
Ekow A. Mills-Robertson MD (Presenter): Nothing to Disclose

**TEACHING POINTS**
1. Discuss the different imaging options utilized for aortic aneurysm surveillance after EVAR.
2. Review the detection and characterization of different endoleak types.
3. Explain the general approach to endoleak management based on imaging findings.

**TABLE OF CONTENTS/OUTLINE**
1. Introduction of EVAR and its advantages/disadvantages
2. Different imaging modalities used for aneurysm size surveillance (US, CT, MRI, DSA)
3. Classification scheme for types of endoleaks
4. Case examples of different endoleak types
5. Endoleak management strategy based on imaging findings

**VIE112**

Endovascular Treatment of Hemoptysis, Our Experience Over a 13 year Period

*Education Exhibits*
*Location: VI Community, Learning Center*

**Participants**
Alex Roberto Ramirez MD (Presenter): Nothing to Disclose
Paula Hernandez Mateo MD: Nothing to Disclose
Juan Pablo Gibbs MD: Nothing to Disclose
Jose Mendez Montero: Nothing to Disclose
Javier Armijo: Nothing to Disclose
Marco Leyva Vasquez Lacedo MD, MSc: Nothing to Disclose

**TEACHING POINTS**
1. To know the importance of hemoptysis as a life-threatening condition, with a variety of underlying causes, that deserves urgent investigation and intervention.
2. To discuss the use of computed tomographic angiography (CTA) in the detection of the site and cause of hemoptysis.
3. To review the relevant anatomy, interventional techniques, success rate, complications and long term results of bronchial artery embolization (BAE) as endovascular treatment of hemoptysis.
4. To present our experience in the endovascular treatment of hemoptysis, along with the results of a 13-years period.

**TABLE OF CONTENTS/OUTLINE**
We will review the major features of the diagnostic and endovascular treatment of hemoptysis, with emphasis in our institutional experience, including:
- Relevant anatomy
- Causes
- Role of the Computed Tomography Angiography (CTA) and Digital Subtraction Angiography (DSA) in the diagnosis of hemoptysis with radiological findings
- Indications for treatment
- Bronchial artery embolization technique.
- Outcomes including complications.
- Short and long term follow-up

**VIE113**

Evaluating and Managing Endoleaks

*Education Exhibits*
*Location: VI Community, Learning Center*

**Participants**
Joanna Kee-Sampson MD (Presenter): Nothing to Disclose
Aaron Himchak MD: Nothing to Disclose

**TEACHING POINTS**
At the conclusion of this exhibit, the viewer will: 1) Be able to detect and differentiate the various types of endoleaks on CT angiography and conventional angiography. 2) Have a basic understanding of the procedural aspects of endoleak repair and be familiarized with post-repair results. 3) Have an understanding of the surveillance of endoleaks.

**TABLE OF CONTENTS/OUTLINE**
This will be presented in a quiz format: 1) Brief background on endovascular aneurysm repair (EVAR). 2) Introduction of endoleaks (clinical significance, natural history, risk factors) 3) Diagnosis and clinical surveillance of endoleaks (CT, CTA, duplex
ultrasound) 4) Types I-V endoleaks will each be discussed in terms of: a. Definition b. Specific imaging findings (CTA, angiography) c. Repair of each type of endoleak i. Type I and III (balloon dilatation, relayering endograft, extending endograft, endoanchors) ii. Type II (embolization) iii. Type IV (self-limited) iv. Type V (treatment controversial, will present literature review) 5) Follow-up of endoleaks post repair

VIE115
Finding the NIDUS: Detection and Work-up of Non-CNS AVMs

Education Exhibits
Location: VI Community, Learning Center

Selected for RadioGraphics

Participants
Gregor Martin Dunham MD (Presenter): Nothing to Disclose
Donald J. Perry MD : Nothing to Disclose
Jeffrey Harold Maki MD, PhD : Research Consultant, Merge Healthcare Incorporated Research support, Bracco Group Research support, Bayer AG Speakers Bureau, Lantheus Medical Imaging, Inc
Sandeep Vaidya MD : Nothing to Disclose

TEACHING POINTS
1. Non-CNS lesions can occur anywhere, most commonly in the limbs and pelvis. Radiology plays a crucial role in detection, work-up, and management.
2. Complex tortuous anatomy must be delineated for proper management.
3. Ultrasound provides easy confirmation of suspected AVM and quantitative analysis.
4. Appropriate MR sequencing and proper CT and MR contrast timing vary based on location and size of AVM.
5. Angiography historically gold-standard for diagnosis, however currently reserved for management.

TABLE OF CONTENTS/OUTLINE
1. Initial presentation: patient characteristics; symptoms; dermatologic findings; syndromes- von Klippel- Trenaunay-Weber and Osler-Weber-Rendu. 2. Definition and classification: AVM vs. hemangioma vs. venous angioma vs. other vascular anomalies; Hamburg classification. Depicted with imaging and illustrations. 3. Diagnosis and Work-up: ultrasound including velocity waveform analysis and duplex doppler; MRA and CTA including sequencing, contrast timing, and 3-D reconstructions; Angiography; Radionucliotide-labeled microsphere shunt study; work-up algorithm. Depicted with imaging, video, 3-D reconstructions, and illustrations.

VIE116
Flow-Diverter Devices for Intracranial Aneurysm Treatment: How, When and Why

Education Exhibits
Location: VI Community, Learning Center

Participants
Teresa Gonzalez De La Huebra Labrador (Presenter): Nothing to Disclose
Roberto Correa Soto : Nothing to Disclose
Ricardo Corrales Pinzon : Nothing to Disclose
Aurymar Fraino : Nothing to Disclose
Jesus Garcia Alonso : Nothing to Disclose
Jose Antonio de las Heras Garcia : Nothing to Disclose
Luis Velasco Pelayo : Nothing to Disclose

TEACHING POINTS
To review the indications of endovascular treatment of intracranial aneurysms, with special emphasis on the use of flow-diverter devices.
To become familiar with the procedure and potential complications.

TABLE OF CONTENTS/OUTLINE
- Intracranial aneurysm
- Diagnostic imaging
- Endovascular treatment
- Flow-diverter devices:
  - Indications
  - Contraindications
  - Procedure
  - Complications

VIE117
Gastrointestinal Bleeding in Patients with Left Ventricular Assist Devices— Interventional Radiology’s Role in Diagnosis and Management

Education Exhibits
Location: VI Community, Learning Center

Certificate of Merit
Participants
Ashley Elizabeth Prosper MD (Presenter): Nothing to Disclose
Michael David Katz MD: Nothing to Disclose

TEACHING POINTS
• Review the mechanics of Left Ventricular Assist Devices (LVADs) and their effects on cardiovascular physiology
• Discuss the multiple risk factors for bleeding in patients with LVADs
• Review the most likely sites of gastrointestinal bleeding in patients with LVADs
• Discuss an approach to the evaluation of gastrointestinal bleeding in LVAD patients and how IR plays a role

TABLE OF CONTENTS/OUTLINE
• Schematic review of LVADs and their mechanics
• Discussion of altered perfusion in patients with LVADs including continuous flow and decreased pulse pressure
• An explanation of coagulopathy in the LVAD patient: anticoagulation, decreased vWF, platelet destruction and angiodyplasia
• A stepwise approach to evaluating GI bleeding in LVAD patients
• Selected angiographic case review from our institution
• When to consider empiric embolization

VIE118
How We Do It: Evaluation and Management of Acute Upper Gastrointestinal Bleeding

Education Exhibits
Location: VI Community, Learning Center

Participants
Jennifer Frances Feneis MD (Presenter): Nothing to Disclose
Raja Ramaswamy MD: Nothing to Disclose
Kevin Charles McCammack MD: Nothing to Disclose
Gerant M. Rivera-Sanfeliz MD: Nothing to Disclose

TEACHING POINTS
Overview: Acute upper gastrointestinal bleeding can lead to significant morbidity and mortality without appropriate treatment. The role of interventional radiology is crucial in patients that have persistent bleeding despite medical and endoscopic treatment. In this educational exhibit we will review the following:
• ACR Appropriateness Criteria for the radiologic management of upper gastrointestinal tract bleeding
• The practical utilization of radiologic modalities (CT/Nuclear medicine)
• Underlying etiologies that can lead to acute upper GI bleeding
• The role of Interventional Radiology in the therapeutic management with endovascular angiography and transcatheter embolization
• Provide insight into the essential role of Interventional Radiology in the management of acute upper GI bleeding.

TABLE OF CONTENTS/OUTLINE
• Introduction
• Clinical evaluation and patient management
• Review ACR appropriateness criteria
• The utilization of CTA and Nuclear Medicine
• Angiographic evaluation and management
• Use of gelfoam, PVA, coils, onyx, glue in the management of upper GI bleeding
• Review technical approach to upper GI bleeding specifically using a case-based approach
• Conclusions and Future Directions

VIE119
Interventional Radiology (IR) in the Management of Visceral Artery Pseudoaneurysms: A Review of Techniques and Embolizing Agents

Education Exhibits
Location: VI Community, Learning Center

Participants
Madhusudhan Kumble Seetharama MD, FRCR (Presenter): Nothing to Disclose
Shivanand Ramachandra Gamanagatti MBBS, MD: Nothing to Disclose
Deepnarayan Srivastava: Nothing to Disclose
Arun Kumar Gupta MBBS, MD: Nothing to Disclose

TEACHING POINTS
1. To illustrate various techniques and embolizing agents used in the management of visceral artery pseudoaneurysms. 2. To discuss and review the performance of each technique and / or embolizing agent.

TABLE OF CONTENTS/OUTLINE
1. Brief review of pathophysiology of visceral artery pseudoaneurysms.
2. Various techniques (endovascular, percutaneous and endoscopic) and embolizing agents used in the management of visceral artery pseudoaneurysms.
3. Advantages and disadvantages or risks of each technique and / or embolizing agent.

VIE120
Introduction of Occlusion Balloons in Anterior Division of the Hipogastric Artery as a Prophylaxis Measure for Intraoperative Blood Loss in Cases of Placenta Accreta

Education Exhibits
Location: VI Community, Learning Center

Participants
Neus Rus Calafell (Presenter): Nothing to Disclose
Mercedes Perez-Lafuente: Nothing to Disclose
Carla Gonzalez Junyent MD: Nothing to Disclose
Maria Pardo-Antunez: Nothing to Disclose
Miguel Angel Macedo Pascual MD: Nothing to Disclose
Antoni Segarra Medrano: Nothing to Disclose
Arantxa Gelabert Barragan : Nothing to Disclose

TEACHING POINTS
- Imaging findings in the diagnosis of placenta accreta during the gestation using ultrasound and MRI.
- The placement of angioplasty occlusive balloons can reduce the risk of bleeding in cases of placenta accreta.

TABLE OF CONTENTS/OUTLINE
The main objective is describe our experience in placement of angioplasty occlusive balloons into the anterior trunk of hypogastric arteries in order to reduce the intraoperative bleeding in patients with placenta accreta. Thus, a descriptive analysis of the procedure will be shown. Firstly, angioplasty balloons are placed into the anterior division of hypogastric arteries through bilateral catheterization of common femoral artery. Secondly, the balloons are inflated in order to check the arteries are totally occluded and, subsequently, they are attached to the arterial sheaths and these are then set to the patient's skin. Patients undergo caesarean delivery and, if necessary, the balloons are inflated in order to get intraoperative proper hemostasis. Finally, the balloons are removed immediately after the caesarean procedure but arterial sheaths are removed 24h later depending on patient's evolution. The intraoperative blood loss can be reduced by using angioplasty balloons in patients suffering from placenta accreta. This may improve the prognosis of these patients.

VIE121

It's Not Always Only Medical! Type B Aortic Dissection: What the Vascular Surgeon Wants to Know before and after the Intervention

Education Exhibits
Location: VI Community, Learning Center

Participants
Mickael Ohana MD, MSc (Presenter): Nothing to Disclose
Aissam Labani MD : Nothing to Disclose
Mi-Young Jeung MD : Nothing to Disclose
Yannick Georg MD, MSc : Nothing to Disclose
Fabien Thaveau : Nothing to Disclose
Christof Karmonik PhD : Nothing to Disclose
Jean Bismuth : Nothing to Disclose
Nabil Chaife MD, PhD : Nothing to Disclose
Catherine Roy MD : Nothing to Disclose

TEACHING POINTS
Become familiar with CT and MRI acquisitions protocols used in type B aortic dissection. Be able to radiologically define a complicated acute type B aortic dissection. Exploit information from CTA and 4D-angioMRI to locate entry/reentry tears and achieve precise sizing before endovascular treatment. Learn how to follow-up type B dissections in the acute and the chronic settings, according to whether they were treated surgically or medically.

TABLE OF CONTENTS/OUTLINE
1. Introduction 1.1 Definition and physiopathology 1.2 Prevalence and prognosis 1.3 Current therapeutic management 2. Imaging protocols 2.1 CTA 2.2 MRA 3. Surgical indications 3.1 Malperfusion 3.2 Periaortic hematoma / hemorrhagic pleural effusion 3.3 Aneurysmal evolution 4. What to look for before endovascular or open surgery 4.1 Entry/reentry tears 4.2 Sizing 5. How to follow-up these patients 5.1 Recommended CTA/MRA intervals 5.2 What to look for after open or endovascular surgery 6. What to look for after initial medical treatment 6. Conclusion

VIE122

Minimally-Invasive Interventions in the Treatment of Non-Traumatic Splenic Disorders—A Whirlwind Tour of Splenic Vascular Anomalies, Gastric Varices Secondary to Sinistral Hypertension, and Hypersplenic Thrombocytopenia

Education Exhibits
Location: VI Community, Learning Center

Certificate of Merit

Participants
John J. Park MD, PhD (Presenter): Nothing to Disclose
Jinha Park MD, PhD : Speakers Bureau, Bayer AG Advisory Board, Guerbet SA Advisory Board, Koninklijke Philips NV
Jonathan M. Kessler MD : Nothing to Disclose

TEACHING POINTS
Although trauma remains a key indication for many minimally-invasive splenic interventions, other non-traumatic indications are becoming more common as advances in transcatheter techniques offer novel and viable alternatives to surgery. As a result, it is important to have a firm understanding of splenic anatomy and the pathophysiology behind these other treatable types of splenic disorders. 1. Review the anatomy and pathophysiology involved in selected non-traumatic splenic disorders, including splenic vascular anomalies, gastric varices due to sinistral portal hypertension, and hypersplenic thrombocytopenia. 2. Provide the reader with the various indications, diagnostic imaging, interventions, contraindications, and potential complications related to non-trauma related splenic interventions. 3. Study real case examples of different splenic interventions in order to showcase various imaging and interventional techniques in the treatment of various spleen-related disorders.

TABLE OF CONTENTS/OUTLINE
A. Splenic anatomy B. Pathophysiology of selected disorders related to the spleen. C. Current indications for splenic interventions in the non-trauma setting. D. Highlight minimally-invasive techniques employed in the treatment of disorders related to the spleen. E. Key imaging and interventional points related to splenic interventions.

VIE123

Nellix Endograft Repair of Aortic Aneurysm: Pictorial Review of the Normal and Abnormal CT Appearances
Nellix endoprosthesis is a novel and increasingly utilised device for aorto-iliac aneurysm repair, with unique CT appearances that alter with time and are prone to misinterpretation. We present a pictorial review based on our institutional experience of more than 60 Nellix cases.

1. Review the NELLIX device: principle, materials and procedure of deployment.
2. Understand early and long term CT features following stent insertion.
3. Outline surveillance, including CT protocols and the roles of Duplex and angiography.
4. Review device related complications.

TABLE OF CONTENTS/OPTION
1. NELLIX device- composition, indications, contraindications
2. NELLIX deployment technique.
3. Short and long term post insertion device appearances.
4. CT surveillance protocol and the role of ancillary imaging modalities.
5. Potential complications and their remedies.
6. Unrecognised pitfalls and future challenges.
Early hemorrhage is often caused by technical failure to achieve hemostasis. Late hemorrhage is often caused by ulcers, vascular erosions, pseudoaneurysms, fistulas or anastomotic dehiscence. CT angiography may help identify the bleeding site in hemodynamically stable patients. DSA delineates vascular anatomy and also guides endovascular treatment. GDA stump is the most common location of hemorrhage. Less common locations include the hepatic artery, celiac axis, splenic artery, and inferior pancreaticoduodenal artery. Bleeding from an anastomotic ulcer is rare. Endovascular treatments include embolization and stent grafting. If bleeding occurs from a pseudoaneurysm, packing of the pseudoaneurysm should be avoided since the weak wall is associated with a high risk of rebleeding.

TABLE OF CONTENTS/OUTLINE


VIE128
Recanalization of Chronic Total Occlusions Using the Crosser™ Vibrational Atherectomy Catheter

Education Exhibits
Location: VI Community, Learning Center

Participants
Alex C. Penn MD (Presenter): Nothing to Disclose
Jeffrey Chil-jek Sung MD, MBA: Stockholder, Pfizer Inc Stockholder, Gilead Sciences, Inc

TEACHING POINTS
To understand the indications, methods of use and factors which may affect technical success of the Crosser™ (Bard Peripheral Vascular, Tempe, AZ) high-frequency vibrational catheter for traversal of chronic total occlusions.

TABLE OF CONTENTS/OUTLINE
A. Anatomy (Vascular anatomy and anatomy of occlusive lesions) B. Diagnostic Imaging (US, CTA, diagnostic angiography) C. Review of Indications, Contraindications D. Treatment (Use of the Crosser™ device for traversal of CTOs) E. Follow-up Management F. Outcomes (include complications)

VIE129
Segmental Arterial Mediolysis (SAM): A Pictorial Review

Education Exhibits
Location: VI Community, Learning Center

cum laude

Participants
Jay Patel MD (Presenter): Nothing to Disclose
Joanna Kee-Sampson MD: Nothing to Disclose
Nishith Patel MD: Nothing to Disclose
Thaddeus M. Yablonsky MD: Nothing to Disclose
Sean Keith Calhoun DO: Nothing to Disclose

TEACHING POINTS
1. Review the history, pathophysiology and clinical presentation of SAM
2. Learn imaging features of SAM on a variety of modalities
3. Discuss the differential diagnosis and treatment options for SAM

TABLE OF CONTENTS/OUTLINE
• History • Pathophysiology • Clinical presentation • CTA and MRA findings • Angiographic findings • Complications - thrombosis, arterial wall hemorrhage, dissection, ischemia, aneurysm rupture • Differential diagnosis - vasculitis, fibromuscular dysplasia, atherosclerotic disease, arterial trauma, inflammatory pseudoaneurysm • Treatment - medical/conservative therapy, angioplasty, embolization • Conclusion

VIE130
Slow the Flow: The Role of Interventional Radiology in Managing Obstetrical Emergencies

Education Exhibits
Location: VI Community, Learning Center

Participants
Rebecca Zener MD (Presenter): Nothing to Disclose
Daniele Patrice Wiseman MD, FRCP: Nothing to Disclose
Amol Mujoomdar MD: Speaker, Cook Group Incorporated Speaker, Covidien AG

TEACHING POINTS
The purpose of this exhibit is: 1. To review the clinical problem and diagnosis of invasive placenta 2. To discuss the role of interventional radiology in the management of invasive placenta 3. To review the role of interventional radiology in the management of post-partum hemorrhage from both invasive placenta, and other causes

TABLE OF CONTENTS/OUTLINE
Clinical and diagnostic overview of the invasive placenta spectrum (placenta accreta, increta and percreta) Review of the imaging diagnosis of invasive placenta Internal iliac artery balloon occlusion for invasive placenta Role (prophylactic, emergent)
# VIE131

**Some of Peritoneal and Retroperitoneal Bleedings Could be SAM!**

**Education Exhibits**

Location: VI Community, Learning Center

## Participants

- Hiroshi Kondo MD: Nothing to Disclose
- Yukichi Tanahashi MD (Presenter): Nothing to Disclose
- Hiroshi Kawada MD: Nothing to Disclose
- Yoshifumi Noda MD: Nothing to Disclose
- Satoshi Goshima MD, PhD: Nothing to Disclose
- Masayuki Kanematsu MD: Nothing to Disclose

## TEACHING POINTS

Segmental arterial mediolysis (SAM) is a rare condition and presents with intra-abdominal bleeding which may result in a life-threatening situation. Unruptured aneurysms were rarely exacerbated and could be followed-up by contrast-enhanced CT. Understanding and recognizing radiologic features of SAM is critical for an accurate diagnosis and determination of appropriate treatments.

## TABLE OF CONTENTS/OUTLINE

- Review the various clinical manifestations of SAM.
- Presentation of characteristic imaging findings of SAM including string of beads, fusiform and saccular formation of aneurysms, and arterial wall thickening and dissection.
- Review the clinical indications and treatment options of transcatheter arterial embolization.
- Discussion of the diagnostic problems and the treatment strategies.

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# VIE132

**Takayasu Arteritis: Current Status of Imaging Diagnosis**

**Education Exhibits**

Location: VI Community, Learning Center

## Participants

- Kenichi Yokoyama MD (Presenter): Nothing to Disclose
- Toshiaki Nitatori MD: Nothing to Disclose
- Masamichi Imai: Nothing to Disclose
- Toshiya Kariyasu: Nothing to Disclose
- Maiko Yoshida MD: Nothing to Disclose
- Makiko Nishikawa: Nothing to Disclose
- Yusuke Kinoshita: Nothing to Disclose
- Yayoi Tsukahara: Nothing to Disclose
- Masanaka Watanabe: Nothing to Disclose

## TEACHING POINTS

1. Recent advances in imaging modalities allow not only early diagnosis but also detailed assessment of localization and activity of vascular lesions of Takayasu arteritis (TA) including aorta and its branches, coronary artery, and pulmonary artery. 2. These imaging modalities also provide the information of fatal or serious arterial complication of TA and may be helpful for planning and modifying treatment.

## TABLE OF CONTENTS/OUTLINE

- The pictorial review of the imaging findings of TA and its differential diagnosis
  - Aorta and its branches
  - Coronary artery
  - Pulmonary artery
  - Iliac and femoral artery
  - Others
- Recent advances in imaging modalities for evaluating vascular lesions of TA
  - Multidetector-row CT or CT angiography
  - MRI or MR angiography
  - FDG-PET/CT
  - Others
- The characteristics and the role of imaging for the fatal or serious arterial complication of TA
  - Aortic regurgitation
  - Aortic aneurysm, dissection, atypical coarctation of aorta
  - Renal arterial stenosis
  - Others

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# VIE133

**Technical Recommendations for Intra-arterial Therapy in Rat Liver Tumor Model**

**Education Exhibits**

Location: VI Community, Learning Center

- Cum Laude

## Participants

- Hideyuki Nishiofuku (Presenter): Nothing to Disclose
- Toshihiro Tanaka MD: Nothing to Disclose
- Yasushi Fukuoka: Nothing to Disclose
- Takeshi Sato: Nothing to Disclose
- Hiroshi Anai MD, PhD: Nothing to Disclose
- Kimihiko Kichikawa MD: Nothing to Disclose
- Shinzaku Maeda: Nothing to Disclose
- Tetsuya Masada: Nothing to Disclose

## TEACHING POINTS

Rat liver tumor models have been improved and are widely used for various preclinical studies in interventional oncology. Most of the previous studies of intra-arterial therapy were performed under laparotomy, with the insertion of catheter via gastroduodenal artery. Recently, image-guided angiographic techniques have been developed. The purpose of this exhibit is: (1) To learn about the techniques of preparation of rat liver tumor models. (2) To learn about the interventional techniques for
intra-arterial therapy in rat. (3) To learn about the anatomical variations of hepatic artery in rat.

TABLE OF CONTENTS/OUTLINE
Contents (1) Cell culture methodologies and tumor implantation procedures, e.g. direct injection, portal vein injection and splenic parenchymal injection. (2) Tumor cell lines and animal models in terms of hepatocellular carcinoma and colorectal cancer, e.g. McA-RH7777 in SD rat and RCN-9 in F344 rat. (3) Transcatheter arteriography techniques, carotid artery approach and femoral approach with or without the combination of laparotomy. (4) Type and frequency of the anatomical variations of hepatic artery. (5) Applications for clinical studies. Summary Image-guided intra-arterial therapy in rat liver tumor model is feasible and useful for preclinical studies in interventional oncology.

VIE134

The Role of Diagnostic and Interventional Radiology in the Management of Visceral and Renal Artery Pseudoaneurysms

Education Exhibits
Location: VI Community, Learning Center

Participants
Anthony Cox MBBS: Nothing to Disclose
Priti Dutta MD (Presenter): Nothing to Disclose
Anthe Maria Papadopoulos MBBS: Nothing to Disclose
Anthony Goode: Nothing to Disclose
Nick Woodward MBBS: Nothing to Disclose
Kate Steiner MBBS: Nothing to Disclose
Neil Hunter Davies MBBS: Nothing to Disclose

TEACHING POINTS
Pseudoaneurysms arising from visceral and renal arteries are potentially life-threatening entities frequently requiring urgent or emergent treatment. State-of-the-art cross-sectional imaging with increased sensitivity in the detection of small or clinically silent lesions enables early diagnosis and prompt therapeutic intervention. Endovascular techniques now have an established role in their treatment. This poster aims to review the aetiology, clinical presentation, cross-sectional and angiographic imaging appearances of visceral and renal pseudoaneurysms according to anatomic location and to illustrate the endovascular treatment options.

TABLE OF CONTENTS/OUTLINE
Visceral and renal artery pseudoaneurysms are presented according to anatomic location reviewing their aetiology and natural history, clinical presentation, cross-sectional imaging appearances and angiographic findings. Particular considerations with regards to planning endovascular treatment are reviewed and the endovascular method employed for definitive treatment is illustrated.

VIE135

Transcatheter Embolization Techniques with N-Butyl Cyanoacrylate (NBCA)

Education Exhibits
Location: VI Community, Learning Center

Participants
Hiro Kiyosue MD (Presenter): Nothing to Disclose
Shuichi Tanoue MD: Nothing to Disclose
Miyuki Maruno MD: Nothing to Disclose
Norio Hongo: Nothing to Disclose
Hiromu Mori MD: Nothing to Disclose

TEACHING POINTS
The teaching points of this exhibit are: 1. General property of n-butyl cyanoacrylate (NBCA) 2. Basic technique of transcatheter embolization with NBCA 3. Specific and additional techniques for effective embolization for various vascular lesions

TABLE OF CONTENTS/OUTLINE
A. General property of NBCA • Adhesive liquid • Anionic polymerization (affected by temperature, concentration, flow velocity, and concentration of anion) B. Basic technique of transarterial embolization with NBCA • preparation of NBCA-lipiodol mixture • selection of concentration of NBCA • flushing catheter lumen with glucose • injection of NBCA C. Specific and additional techniques for various vascular lesions • Target vascular lesions: (Pseudo)aneurysms/extravasation, multiple arteriovenous fistulas, arteriovenous malformations with nidus, a high-flow large arteriovenous fistula, and gastroesophageal varices • Injection techniques: sandwich injection/continuous injection, wedged catheter/free flow, low-concentration/high-concentration • Additional techniques: devascularization of non-target feeder, flow control with coils or balloon, dual injection, warming NBCA

VIE136

Vascular Complications of Pancreaticoduodenectomy (The Whipple Procedure): Diagnosis and Treatment

Education Exhibits
Location: VI Community, Learning Center

Magna Cum Laude

Participants
Steven Li-Wen Hsu MD: Nothing to Disclose
Anil Kumar Pillai MD: Nothing to Disclose
Stephen Phillips Reis MD: Nothing to Disclose
Clayton K. Trimmer DO: Nothing to Disclose
Sanjeeva P. Kalva MD: Consultant, CeloNova BioSciences, Inc
TEACHING POINTS

1. Review pancreaticoduodenectomy and its indications
2. Discuss vascular complications of pancreaticoduodenectomy and the associated imaging findings
3. Role of endovascular treatment in post-pancreaticoduodenectomy hemorrhage and vascular complications

TABLE OF CONTENTS/OUTLINE

- Pancreaticoduodenectomy procedure and its indications
- Vascular complications of pancreaticoduodenectomy
- Review of International Study Group for Pancreatic Surgery definitions for post-pancreatectomy hemorrhage
- Diagnostic imaging in the characterization of vascular complications
- Indications and contraindications for endovascular treatment of vascular complications associated with pancreaticoduodenectomy

VIE137

Vascular Complications Related to Arteriotomy Access and Closure: A Pictorial Review

TEACHING POINTS

- Review various techniques and approach for percutaneous arterial access.
- Review the vascular complications associated with arterial access and closure and their imaging features.
- Review management of vascular complications related to percutaneous arterial access and closure.
- Briefly discuss techniques to minimise vascular complications related to arterial access and closure with emphasis on noninvasive imaging.

TABLE OF CONTENTS/OUTLINE

- Introduction
- Techniques: Retrograde/Antegrade, Single/Double wall, Image guidance
- Approaches: Common femoral, Brachial, Radial, Axillary, Infrapopliteal
- Vascular Complications: Access and non arteriotomy closure device related: Hematoma, Pseudoaneurysm, Arteriovenous fistula, Dissection
- Arteriotomy closure device related: Acute thrombosis, Vessel obstruction due to intravascular foreign body, Pseudoaneurysm.
- Management: US guided thrombin injection, Surgery, Percutaneous interventions
- Techniques to minimise complications: Image guidance, pre and post physical examination, Noninvasive imaging.

VIE138

Vascular Compression Syndromes Seen in Athletes

TEACHING POINTS

- After reviewing this exhibit, participants will be able to:
  1. Recognize the multimodality imaging findings associated with various vascular compression syndromes seen in athletes.
  2. Describe the anatomic abnormality associated with each syndrome.

TABLE OF CONTENTS/OUTLINE

- Each of the following areas will be discussed in regards to each disease entity:
  - Anatomy
  - Pathophysiology
  - Multimodality imaging evaluation
  - Management
  - Disease entities will include the following:
    - Upper extremity: Thoracic outlet syndrome
    - Effort thrombosis
    - Quadrilateral Space Syndrome
    - Lower extremity: May-Thurner Illiac endofibrosis, Popliteal artery entrapment

VIE139

Vascular Emergency!: Mycotic Aneurysms of the Aorta and Its Branches: Multimodality Imaging Findings with Clinical Correlation and Post Treatment Follow-up

TEACHING POINTS

- The purpose of this exhibit is:
  1. To describe the normal arterial structure and pathophysiology of mycotic aneurysms.
  2. To review the clinical manifestations of mycotic aneurysms located in different parts of the aorta and its branches.
  3. To depict the
usual imaging findings with different modalities: ultrasound, CT, MRI and PET-CT. 4. To discuss prognosis and different
treatment options. 5. To illustrate post imaging findings.

TABLE OF CONTENTS/OUTLINE
1. Normal anatomy and histology of arteries 2. Pathophysiology of infected/mycotic aneurysms. 3. Clinical presentation -
Thoracic aorta - Abdominal aorta - Branches of the aorta 4. Multimodality imaging findings with sample cases - US - CT - MRI -
PET CT 5. Treatment: Surgical - Endovascular - Medical 6. Prognosis 7. Follow-up imaging

VIE140
Vascular Steal Syndromes: Angiographic Imaging Spectrum and Endovascular Management

Education Exhibits
Location: VI Community, Learning Center

Participants
Justin Muhlenberg MD, MBA (Presenter): Nothing to Disclose
Rajeev Suri MD : Nothing to Disclose

TEACHING POINTS
Define vascular steal syndromes as distinct clinical entities resulting from preferential shunting of blood away from a target
circulation resulting in clinical symptoms. Highlight imaging features and endovascular management of steal syndromes with a
brief comment on surgical management. Intended for radiology residents, fellows and practicing radiologists, this exhibit aims to
create awareness and highlight treatment options for vascular steal syndromes.

TABLE OF CONTENTS/OUTLINE
Introduction and Teaching Points Pathophysiology of Vascular Steal Syndromes Common Etiologies for Vascular Steal
Syndromes Discussion of Various Vascular Steal Syndromes and Endovascular Management Dialysis associated steal syndromes
Subclavian steal syndrome TIPS and/or portosystemic collateral steal resulting in hepatic encephalopathy Splenic artery steal
resulting in liver ischemia post liver transplant Vascular malformation associated steal causing distal tissue ischemia AAA Type II
Endoleak Conclusion and Reiteration of Teaching Points

VIE141
Where Is the Leak? Case Based Review of Standard Classification of Endoleaks in Patients with Endovascular AAA Repair and Diagnosing a New Variant of Endoleak

Education Exhibits
Location: VI Community, Learning Center

Participants
Nishith Patel MD (Presenter): Nothing to Disclose
Jay Patel MD : Nothing to Disclose
Thaddeus M. Yablonsky MD : Nothing to Disclose
Sean Keith Calhoun DO : Nothing to Disclose

TEACHING POINTS
1. Review the indications, patient preparation, and common approaches for various AAA repair. 2.. Learn the imaging features of
conventional endoleaks with pathophysiology of complications 3. Describe a new endoleak entity that has not been previously
described in the literature. 4. Discuss possible treatment options. After completing this educational exhibit, the reviewer will be
familiar with the indications, patient preparation and common approaches for AAA intervention. The reviewer will also be
confident in their ability to diagnose, formulate treatment options and manage common complications of endovascular repair.

TABLE OF CONTENTS/OUTLINE
1. Pathophysiology of Abdominal Aortic Aneurysms 2. Discuss the indications, patient preparation, and common approaches for
AAA repair 3. Review of imaging features, treatment options and common complications of standard endovascular AAA repair. 4.
Present images of endoleaks that do not fit in standard classification, the new endoleak? 5. Potential Treatment options for the
adventitial supply endoleak.

VIE142
Advanced Iterative Model Reconstruction in Improving Image Quality of CT Angiography

Education Exhibits
Location: VI Community, Learning Center

Participants
Kenneth K. Lau (Presenter): Nothing to Disclose
Nicholas David Ardley : Nothing to Disclose
Kevin Buchan : Employee, Koninklijke Philips NV
Theodore Lau : Nothing to Disclose

TEACHING POINTS
CT abdominal angiography (CTA) plays a vital role in diagnosing and monitoring conditions such as stenosis, occlusion,
thrombo-embolism, aneurysm, dissection, endoleak and gastrointestinal bleed. Its advantages in comparison to digital
subtraction angiography (DSA) are shorter acquisition time, non-invasive nature and less procedural complications. Vessel wall
calcification may cause beam-hardening artifact that obscures the vessel lumen. The latest Iterative model reconstruction (IMR)
is a knowledge-based algorithm that improves low contrast resolution, reduces image noise and artifact. The aim of this exhibit
is to assess the diagnostic utility of IMR in CTA.

TABLE OF CONTENTS/OUTLINE
The data sets of CTA of thoracic and abdominal aorta, pulmonary, renal, mesenteric arteries, carotid and cerebral arteries of 156
patients were reconstructed using IMR and iDose IRs. 1. The vessel contours and definitions were better visualized down to small vessel with IMR than iDose due to image noise reduction. 2. Less beam-hardening artifacts from vessel wall calcified plaques allow accurate luminal assessment. 3. The presence of embolism and dissection were better depicted on IMR CTA. IMR is superior to conventional iterative reconstruction and aids more accurate vascular pathology assessment.

VIE143

Aortic Endoprosthesis Follow-up: How, When and Why CT Angiography?

Education Exhibits
Location: VI Community, Learning Center

Participants
Maria Eugenia Maccarone MD: Nothing to Disclose
Carlos Capunay MD: Nothing to Disclose
Javier Vallesos MD, MBA (Presenter): Nothing to Disclose
Patricia M. Carrascosa MD: Research Consultant, General Electric Company

TEACHING POINTS
To describe the multiphasic CT angiography protocol study To define the follow up imaging after stent graft placement To recognize the multiphasic CT angiography as the best choice of non-invasive method to detect and classify endoleaks and other complications

TABLE OF CONTENTS/OUTLINE
Complications after aortic endoprosthesis placement Classification of Endoleaks Imaging techniques: Digital angiography MR angiography Ultrasound CT angiography Follow up imaging after stent graft placement: When CT angiography?

VIE144

Breast Reconstruction with DIEP and SGAP Flaps – Role of Pre-Operative CT Angiogram

Education Exhibits
Location: VI Community, Learning Center

Participants
Gregory Aaron Bonci MD (Presenter): Nothing to Disclose
Bohdan Pomahac MD: Nothing to Disclose
Dimitris Mitsouras PhD: Nothing to Disclose
Stephanie A. Caterson MD: Nothing to Disclose
Amir Imamzadeh MD: Nothing to Disclose
Meaghan Mackesy MD: Nothing to Disclose
Edward J. Caterson MD, PhD: Nothing to Disclose
Frank John Rybicki MD, PhD: Research Grant, Toshiba Corporation

TEACHING POINTS
Perforator flaps offer cosmetically superior results with significantly less morbidity than TRAM flaps. Choice of flap is dependent on patient anatomy and quality of vasculature. Pre-operative CTA effectively maps perforators, decreases operative time, and decreases morbidity/complications. Post-processing may also help to determine exact tissue volume to be harvested for more targeted reconstruction.

TABLE OF CONTENTS/OUTLINE
1. Autologous breast reconstruction basics (patient selection, aim, timing of surgery, advantages over breast implants). 2. Overview and evolution of flap options with focus on deep inferior epigastric perforator (DIEP) and superior gluteal artery perforator (SGAP) flaps. 3. Overview of pre-operative imaging including Doppler ultrasound, CTA, and MRA. Brief review of literature demonstrating the advantages of CTA with regard to duration of surgery, length of hospitalization, and complication rates. 4. Importance of angiosomes in perforator flap surgery. Alteration of imaging protocols to better determine flap vascular supply and reduce likelihood of fat necrosis. 5. Future directions include 3D printing of perforator flaps for more customized pre-operative planning.

VIE145

Clinical Applications of Single-source Dual-energy CT with Fast kVp Switching in CT Angiography: What the Radiologist Needs to Know

Education Exhibits
Location: VI Community, Learning Center

Participants
Haruhiko Machida MD (Presenter): Nothing to Disclose
Isao Tanaka: Nothing to Disclose
Rika Fukui: Nothing to Disclose
Yun Shen PhD: Employee, General Electric Company Researcher, General Electric Company
Takuya Ishikawa: Nothing to Disclose
Eiko Ueno MD: Nothing to Disclose
Etsuko Tate: Nothing to Disclose
He Qing Wang MSc: Nothing to Disclose

TEACHING POINTS
To review limitations of conventional CT angiography (CTA) To describe basic principles and various techniques in single-source dual-energy CT (DECT) with fast kVp switching to overcome these limitations To illustrate various clinical applications and
advantages using these techniques by presenting clinical images

**TABLE OF CONTENTS/OUTLINE**

- Limitations of conventional CTA
- Iodine contrast medium (CM)/radiation dose
- Insufficient vessel contrast enhancement (CE)
- Severe calcification
- Limited tissue characterization/perfusion assessment
- Metallic/beam-hardening (BH) artifacts
- Basic principles and various techniques in DECT
- BH correction
- Monochromatic imaging (MI)
- Material density imaging (MDI)
- Energy level (keV)-CT value (HU) curve
- Effective atomic number (Z) histogram
- Iterative reconstruction (IR)
- Various clinical applications and advantages

CM dose reduction/improved vessel CE: low-keV MI/iodine (water) MDI with IR
- Radiation dose reduction: water (iodine) MDI
- Replacing non-CE CT/IR
- Calcium reduction: iodine (calcium/hydroxyapatite) MDI
- Lipid-rich plaque detection: fat (water) MDI
- keV-HU curve/effective Z histogram
- Differentiation among CM, calcification, fresh hematoma: MDI
- Tissue perfusion assessment: iodine (water) MDI

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**VIE146**

Contrast Medium Delivery Strategies and Radiation Dose Parameters Affecting CT Angiography

**Education Exhibits**

**Location:** VI Community, Learning Center

**Participants**

- Charbel Saade  MS (Presenter): Nothing to Disclose
- Fadi M. El-Merhi  MD : Nothing to Disclose
- Ali A. Haydar  MD, FRCR : Nothing to Disclose
- Ghaleb Ghusayni : Nothing to Disclose
- Salam Al-Hamra : Nothing to Disclose
- Mukbil H. Hourani  MD : Nothing to Disclose
- Bedros Taslakian  MD : Nothing to Disclose
- Hussain Al-Mohiy : Nothing to Disclose

**TEACHING POINTS**

- Optimal opacification of the arteries is essential for CTA
- Matching timing with vessel dynamics significantly improves vessel opacification
- This leads to increased arterial opacification and reduced venous opacification
- This can also lead to a reduced volume of contrast agent.
- This can also lead to reduced radiation dose

**TABLE OF CONTENTS/OUTLINE**

- A. Vascular Anatomy
- B. contrast media parameters that affect bolus shaping
- C. scanner parameters that affect vascular opacification
- D. scanner and contrast parameters affect radiation dose
- E. stenosis and aneurysm effects on blood/contrast circulation
- F. Pearls and Pitfalls
- G. Outcomes

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**VIE147**

Dual Energy CT Angiography with Reduced Iodine Load: A Comprehensive and Practical Approach

**Education Exhibits**

**Location:** VI Community, Learning Center

**Certificate of Merit**

**Participants**

- Patricia M. Carrascosa  MD : Research Consultant, General Electric Company
- Carlos Capunay  MD (Presenter): Nothing to Disclose
- Javier Vallejos  MD, MBA : Nothing to Disclose
- Alejandro Deviggiano  MD : Nothing to Disclose
- Gaston Rodríguez Granillo : Nothing to Disclose

**TEACHING POINTS**

1. To review the indications, diagnostic imaging, potential benefits and limitations of performing a dual-energy CT angiography with reduced iodine contrast volume.
2. To understand the advantages of dual energy CT in vascular imaging.

**TABLE OF CONTENTS/OUTLINE**

- A. Introduction to dual energy CT
- Physics
- Image analysis
- Spectral imaging
- Material decomposition
- Calcium and bone subtraction
- C. CT image acquisition
- Technical parameters
- Radiation issues
- D. Contrast injection protocol
- E. Diagnostic Imaging
- F. Potential indications
- Outcomes

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**VIE148**

Eyes Wide Open: Impending Death Signs in Cardiovascular Disease; What Every Radiologist Should Fear

**Education Exhibits**

**Location:** VI Community, Learning Center

**Participants**

- Alvaro Acosta  Bustillos (Presenter): Nothing to Disclose
- Sergio A. Criales Vera  MD : Nothing to Disclose
TEACHING POINTS

1. There are some MDCT findings of impending death in cardiovascular disease that the radiologist should be aware in order to communicate immediately to the medical and surgical team.

2. This signs are aortic rupture, collapse of the true lumen in aortic dissection, contrast-fluid levels in the vena cava, cardiac tamponade, intramural hematoma more than 3 cm, and others.

3. To provide relevant information to the medical team which might be crucial for the appropriate treatment.

TABLE OF CONTENTS/OUTLINE

PURPOSE/AIM: Review the most common signs of impending death in cardiovascular disease. Describe imaging findings in Multidetector Computed Tomography (MDCT) of impending death in cardiovascular disease. Describe relevant information for clinicians and surgeons provided by MDCT. CONTENT ORGANIZATION: (Introduction) common signs of impending death in cardiovascular disease and its clinical relevance. MDCT technique requirements and special considerations. MDCT findings of impending death: of coronary arteries, heart chambers, pericardium, thoracic and abdominal aorta, supraaortic and mesenteric vessels, and IVC. Relevant information for the clinicians and surgeons that might aid in treatment planning.

VIE149

Nitroglycerin Sprays Benefit the Vessel Depiction Performance Improvement in Abdominal CTA

Education Exhibits
Location: VI Community, Learning Center

Participants
Ryusuke Kujirai RT (Presenter): Nothing to Disclose
Susumu Sato RT: Nothing to Disclose
Ryohei Horisawa RT: Nothing to Disclose
Yutaka Suzuki RT: Nothing to Disclose
Kenichi Ando RT: Nothing to Disclose

TEACHING POINTS

Our facility is using nitroglycerin spray in for the purpose of widening the coronary artery in coronary CTA. There is work to dilate the blood vessels throughout the body as well as expand the coronary arteries to nitroglycerin. We have investigated whether also useful in abdominal CTA to use this effect. It was studied in 15 patients taken at 120kV and 80kV. Without nitroglycerin (80kV/120kV) with nitroglycerin (80kV/120kV) Compared patient is 70.4 years average age. Each image was visually evaluated according to the fifth rated of image quality and vascular depiction performance displays in VR. Quality and vascular depiction performance is improved easily by using nitroglycerin. This effect is greater than the effects obtained at a low tube voltage. There was no significant difference 120KV and 80kV using nitroglycerin. It is possible to be used for different parts and integrated tube voltage.

TABLE OF CONTENTS/OUTLINE

Nitroglycerin Spray is possible to enhance the depiction performance while still ensuring the quality of the CTA.

VIE150

Novel Contrast-Injection Protocol for High Resolution Abdominal CT-Angiography: Vascular Visualization Improvement with Vasodilator

Education Exhibits
Location: VI Community, Learning Center
Certificate of Merit

Participants
Minori Hoshika (Presenter): Nothing to Disclose
Norimi Nishiyama : Nothing to Disclose
Yuki Kobayashi : Nothing to Disclose
Yoshihiro Takeda MD : Nothing to Disclose

TEACHING POINTS

To review the advantages and limitations of CT-Angiography(CTA). To provide an explanation of the new examination method and conventional examination methods. Review the usefulness of abdominal CTA with vasodilator (nitroglycerin).

TABLE OF CONTENTS/OUTLINE

- Method and characteristic of vascular visualization in CTA. - Description of the high resolution in CTA method: Comparison of GroupA (with nitroglycerin/n=23) and GroupB (without nitroglycerin/n=26) during abdominal CTA. The usefulness of CTA as an operation tool is reported. There is a limitation to the spatial resolution in comparison with Angiography, as rendering the peripheral blood vessels is difficult. In CTA with vasodilator as an operation tool, made available in nearly all cases in Group A, visualization of the pancreaticoduodenal artery and inferior pancreatic artery. Visualization in Group B (without nitroglycerin group) was only about 30% capability. We had same result in case we describe the inferior pancreatic artery. We conclude it is useful to use nitroglycerin for better describing image. Vascular depiction performance is enhanced by the use of the vasodilator. In this new method, without iodine content, flow rate was also increased, and blood vessel depiction performance is possible.
Optimal Protocol of Scanning Mode for Reducing Contrast Medium Dose and Radiation Dose in Carotid CT Angiography: Low kVp or Low keV Scan

Education Exhibits
Location: VI Community, Learning Center

Participants
Yunjing Xue MD (Presenter): Nothing to Disclose
Qing Duan MD: Nothing to Disclose
Lihong Chen : Nothing to Disclose
Bin Sun : Nothing to Disclose

TEACHING POINTS
1. To describe the basic principles and feasibility of low-tube-voltage carotid CT angiography and Spectral Imaging using ASiR reconstruction in combination with a lower contrast medium dose with clinical data and images. 2. Illustrate optimization of low dose CT scan and low dose contrast medium injection protocol.

TABLE OF CONTENTS/OUTLINE
1. Basic principle and clinical value of low-tube-voltage and GSI monochromatic carotid CT angiography. 2. Optimization of low dose contrast medium injection protocol. 3. Carotid artery image quality evaluation and ASiR optimization. 100-kVp protocol had significantly higher carotid enhancement and sharpness of the artery compared with the 120-kVp protocol. GSI protocol could provide similar image quality of carotid artery to 120-kVp protocol. 4. Both GSI and 100-kVp protocol could significantly reduce the noise of carotid and main branches of thoracic aorta images compared with that of 120-kVp protocol. 5. The GSI (60kev) scan with 50% ASiR and 3 ml/s injection velocity has lowest CM dose and can provide more information of plaque and tissue differentiation. 6. We can balance the image quality, useful information (vessel, plaque, stent, tumor), radiation dose and contrast medium dose all kinds of CT scans parameters to choose the optimized CTA protocol to achieve the best clinical effect.

Subtraction CT Angiography for Peripheral Arterial Occlusive Disease Using Semi-automated Position Matching Method

Education Exhibits
Location: VI Community, Learning Center

Participants
Ryoichi Tanaka MD (Presenter): Nothing to Disclose
Kunihiro Yoshioka MD : Nothing to Disclose
Kenta Muranaka : Nothing to Disclose
Akihiko Abiko : Nothing to Disclose
Shigeru Ehara MD : Nothing to Disclose

TEACHING POINTS
The aims of this exhibit are to 1) understand basic concept of subtraction CT angiography. 2) get to know the difference between manual position matching technique and semi-automated position matching technique. 3) come to know the diagnostic accuracy of subtraction CT angiography in comparison with invasive angiography.

TABLE OF CONTENTS/OUTLINE
A. Back ground: the limitations in current imaging procedures for peripheral arterial occlusive disease - including invasiveness in conventional angiography, radiation dose, renal dysfunction due to arteriosclerosis, and time consuming post processing and evaluation.
B. Advantage of subtraction CT angiography: its accuracy in comparison with digital subtraction angiography.
C. Position matching technique for subtraction CT angiography: the basic technique required in scanning and post-processing techniques
D. Clinical application: Presentation in case with severe arterial calcification including cases who underwent hemodialysis

The Application Value of Quantitative Iodine-based Substance Mappings in Diagnosing Pulmonary Embolism (PE)

Education Exhibits
Location: VI Community, Learning Center

Participants
Tingting Lin (Presenter): Nothing to Disclose
Jiang Ning Dong : Nothing to Disclose

TEACHING POINTS
1. To assess the value of ration-based iodine substance mappings of CT imaging in diagnosing PE 2. To reflect the effects of different types of PE and diameters of emboli 3. To provide more morphological and functional information for the diagnosis of PE

TABLE OF CONTENTS/OUTLINE
Relationship of perfusion changes of ration iodine-based substance mappings with embolized locations of conventional CTPA, Perfusion changes of ration iodine-based substance mappings - different types of PE - diameters of emboli Future directions and summary
Upper Extremity CTA: Clinical Applications in the Subacute Setting

Education Exhibits
Location: VI Community, Learning Center

Participants
Radhika B. Dave MD (Presenter): Nothing to Disclose
Dominik Fleischmann MD: Research support, Siemens AG

TEACHING POINTS
1. Arterial phase images are crucial for the evaluation of aneurysm, stenosis, and occlusion in vasculitis. Delayed venous phase images are helpful to evaluate for wall enhancement. 2. Vasculitis demonstrates smoothly tapered luminal narrowing compared to irregular luminal contour seen in stenosis secondary to atherosclerotic disease. 3. Imaging with the extremity in both the adducted and abducted positions can facilitate the diagnosis of thoracic outlet syndrome. 4. Warming of the hand prior to CTA can be helpful to differentiate true arterial stenoses from vasospasm.

TABLE OF CONTENTS/OUTLINE
Upper extremity CTA has found a niche in the assessment of acute vascular injury. However, its less well-known subacute applications involve evaluation of vasculitis, vascular malformations, overuse syndromes, and connective tissue diseases.
- Vasculitis: Aneurysms, stenosis, and wall thickening
- Arteriovenous malformations: Delineation of arterial and venous supply
- Evaluation of subfacial and intramuscular components Relationships to neurovascular bundles
- Compression syndromes such as thoracic outlet syndrome: Variations of patient positioning to facilitate diagnosis Imaging findings
- Connective tissue disorders: Vascular and extravascular imaging findings Imaging techniques to facilitate diagnosis of true arterial stenoses

VIE155
Arteriovenous (AV) Grafts and Fistulas for Hemodialysis Access—The Role of MDCT with CT Angiography and 3-D Reconstructions in Delineating Anatomy and Identifying Complications

Education Exhibits
Location: VI Community, Learning Center

Participants
Sameer Ahmed MD (Presenter): Nothing to Disclose
Siva P. Raman MD: Nothing to Disclose

TEACHING POINTS
1. Understand different available options for hemodialysis, including arteriovenous (AV) grafts, AV fistulas, hemodialysis catheters, and peritoneal dialysis, including the benefits and downsides of each method
2. Understand the normal imaging appearance on MDCT of AV grafts and fistulas, including different potential locations for their placement and their relationship to adjacent vasculature
3. Understand proper construction of a CT protocol designed to evaluate a graft or fistula
4. Recognize a number of complications of grafts and fistulas that may be visible on MDCT.

TABLE OF CONTENTS/OUTLINE
1. Introduction
   • Different types of hemodialysis access options available and their appropriateness in different situations
   • Detailed discussion of grafts and fistulas, including the manner in which they are placed and the difference between grafts and fistulas
2. Anatomy
   • Locations in which grafts and fistulas can be placed
   • Different possible vascular communications which can be created
   • Original artwork illustrating both fistulas and grafts from our in-house medical illustrator
3. MDCT appearance of normal grafts and fistulas.
4. Complications which can be recognized on MDCT, with case examples
   • Stenosis
   • Thrombosis
   • Aneurysms/Pseudoaneurysms
   • Ischemia/Steal syndrome
   • Infection

VIE156
Dialysis Access in a Nutshell

Education Exhibits
Location: VI Community, Learning Center

Participants
Aparna Srinivasa Babu MD (Presenter): Nothing to Disclose
Salmi Simmons MD: Nothing to Disclose

TEACHING POINTS
• Routes of dialysis access • Relevant anatomy and physiology • Pictorial illustration based instruction on types of dialysis access • Recognition of different types of dialysis access routes on imaging studies • "Fistula first" initiative • Novel approaches and anticipated developments
TABLE OF CONTENTS/OUTLINE

After establishing the magnitude of the problem that renal disease poses in today's society, we will introduce the readers to the historical perspective of dialysis. Subsequently, we will explore the anatomical and physiological principles involved in obtaining and maintaining an access route for dialysis. The “Fistula first” initiative will be discussed in this section. This will be followed by a discussion of types of dialysis access, including HD catheters, grafts, fistulas and PD catheters. Potential complications and their management will be examined. We will demonstrate multimodality imaging appearances of catheters, grafts and fistulas, with pictorial illustration of imaging findings to provide a better understanding. This section will also focus on imaging characteristics that enable recognition of different types of catheters, grafts and fistulas. Finally, we will summarize our presentation and take a brief peek into future trends and emerging innovations.

VIE157

To Stent or Not to Stent? Comprehensive Review of Endovascular Stent Indications, Complications, and Controversies in Dialysis Access

Education Exhibits
Location: VI Community, Learning Center

Participants

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<th>Name</th>
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<tr>
<td>Michael Ginsburg MD</td>
<td>(Presenter)</td>
<td>Nothing to Disclose</td>
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<tr>
<td>Jonathan Matthew Lorenz MD</td>
<td></td>
<td>Nothing to Disclose</td>
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<tr>
<td>Sean P. Zivin MD</td>
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TEACHING POINTS

1. To review the common categories of endovascular stents
2. To describe the indications for endovascular stent placement in hemodialysis access with an up-to-date literature review
3. To learn about potential stent complications and become familiar with management of fractured, misplaced and migrated endovascular stents

TABLE OF CONTENTS/OUTLINE

Dialysis Access Endovascular Stent Categories - Self-expandable stents (Bare metal stents) • Stainless steel • Nitinol alloys - Stent grafts (Covered Stents) - Balloon expandable stent (Mostly unsuitable for central and peripheral venous interventions) - Drug-eluting stents (Not yet evaluated clinically) Indications for Stent Placement in Dialysis Vascular Access Abnormalities, Up-to-Date Literature Review and Case Based Examples - Recurrent stenosis - Elastic lesion - Vein rupture - Venous anastomosis stenosis - Extinsic compression - Pseudaneurysm formation - In-stent retenosis Endovascular Stent Complications, Controversies and Case Based Illustration of Management Options - Stent Fracture - Stent Misplacement - Stent Migration

VIE158

Totally Implantable Venous Access Systems (Ports): Post-procedural Complications and Management

Education Exhibits
Location: VI Community, Learning Center

Participants

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<tr>
<td>Katsuhiro Kobayashi MD</td>
<td>(Presenter)</td>
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<td>Rahul Nayyar MD</td>
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<td>Mohammed Jawed MD</td>
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<td>Dianbo Zhang MD</td>
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<td>Nothing to Disclose</td>
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<tr>
<td>Mark Alfred Sultenfuss MD</td>
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<tr>
<td>Mitchell Ira Karmel MD</td>
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TEACHING POINTS

1. Review venous anatomy relevant to proper port placement
2. Describe patient-related and port placement technique-related risk factors for postprocedural port complications
3. Discuss port-related postprocedural complications and their management

TABLE OF CONTENTS/OUTLINE

1) Central venous anatomy relevant to proper port placement
2) Proper port placement technique with emphasis on patient-related and port placement technique-related risk factors for postprocedural port complications
3) Postprocedural port complications and their management - infectious (port site infection, catheter-related blood stream infection) - mechanical (catheter migration, kink/fracture, catheter fragment embolization, Twiddler’s syndrome, etc.) - thrombotic (fibrin sheath formation, venous stenotic/thrombotic)
4) Diagnostic algorithm for malfunctioning ports
5) Conclusions

VIE159

Magnetic Resonance Angiography Applications in Reconstructive Plastic Surgery

Education Exhibits
Location: VI Community, Learning Center

Participants

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<td>Ana Fernandez (Presenter)</td>
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<td>Ana Alvarez Vazquez</td>
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<td>Chawar Hayoun</td>
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<td>Mar Jimenez De La Pena</td>
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<td>Vicente Martinez de Vega</td>
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TEACHING POINTS

- to know the several techniques that are available for the preoperative mapping of perforating vessels: Doppler ultrasound, computed tomography-angiography (CTA), and, more recently, magnetic resonance angiography (MRA). - to emphasize the role of MRA for being a technique free of ionizing radiation and provides accurate anatomical information. Despite being a minority issue in the field of radiology, advances in reconstructive surgery perforator flaps make it necessary to deep in the knowledge
TABLE OF CONTENTS/OUTLINE
- Review of MRA techniques used in mapping perforators. - MRA applications in DIEP, gluteal, thigh and lower limb flaps.

VIE160

A Resident-Driven How-To Guide for the Creation of Low-Cost Gelatin Phantoms for Training in Ultrasound and Fluoroscopically Guided Percutaneous Procedures

Education Exhibits
Location: VI Community, Learning Center

Participants
Stephen Aaron Balfour MD (Presenter): Nothing to Disclose
Pratik S. Patel DO: Nothing to Disclose
David Scott Pryluck MD: Nothing to Disclose

TEACHING POINTS
The construction of gelatin-based phantoms for teaching radiology residents and medical students to perform ultrasound and fluoroscopically-guided procedures can be easily accomplished with readily available materials and little cost. By viewing this exhibit, learners will gain the fundamental knowledge to assemble a variety of phantom models, including solid visceral organs and vascular structures, for laboratory training of residents and medical students at their home institutions. This exhibit will also demonstrate a proposed curriculum for formally implementing phantom models in resident and medical student education.

TABLE OF CONTENTS/OUTLINE
1) Brief review of medical literature regarding the construction of gelatin-based phantoms for resident and medical student education.
2) Pictorial guide with detailed descriptions for assembling gelatin-based phantoms of visceral organs including liver and kidney for simulation of percutaneous procedures.
3) Pictorial guide with detailed descriptions for assembling gelatin-based phantoms of vascular structures for simulation of venous and arterial access.
4) A review of suggested training curriculum incorporating gelatin-based phantoms in radiology resident and medical student education.

VIE161

Advanced Image Guided Percutaneous Technique for the Placement of Peritoneal Dialysis Catheters

Education Exhibits
Location: VI Community, Learning Center

Certificate of Merit

Participants
Todd Ellis Drasin MD, MPH (Presenter): Nothing to Disclose
Paul Erik Dybbro MD: Nothing to Disclose

TEACHING POINTS
1. Importance of peritoneal dialysis in renal replacement therapy armamentarium
2. Advantages/disadvantages of image guided percutaneous catheter placement vs gold standard advanced laparoscopic catheter placement.
3. The pre-procedure considerations, procedural technique, and post procedure protocols that make up our advanced image guided percutaneous technique for the placement of peritoneal dialysis catheters.
4. Data supports that, in selected patients, the advanced percutaneous and laparoscopic techniques are comparable with respect to technical success, catheter survival, and complications.

TABLE OF CONTENTS/OUTLINE
A. Role of peritoneal dialysis in renal replacement therapy
   1) What is peritoneal dialysis?
   2) Advantages/disadvantages versus hemodialysis
   B. Current peritoneal dialysis catheter placement gold standard - advanced laparoscopic technique
   1) Critical technical components that define the ‘advanced laparoscopic’ technique
   C. Advanced image guided percutaneous technique for the placement of peritoneal dialysis catheters
   1) Pros and cons relative to surgical gold standard
   2) Pre-procedure considerations
   3) Procedural steps with imaging correlation
   4) Post procedure care
D. Outcomes
   1) Technical success, catheter survival, complications

VIE162

Billing and Coding for Procedures: A Necessary Primer for Interventional Radiologists

Education Exhibits
Location: VI Community, Learning Center

Certificate of Merit

Participants
Kevin Ching MD (Presenter): Nothing to Disclose
Christopher John Friend MD: Nothing to Disclose
Ernesto Santos MD: Nothing to Disclose
Rakesh Khubchand Varma MBBS, MD: Nothing to Disclose
Kevin Michael McCluskey MD: Nothing to Disclose
TEACHING POINTS
1. An astute knowledge of billing and coding is essential for interventional radiologists as under billing may jeopardize the finances of a practice while overbilling constitutes medical fraud. 2. Physicians must be informed of specific terminology, the break down of physician reimbursement, and importance of accurate billing and coding. 3. Our exhibit reviews need to know information on this topic in a straightforward and understandable format.

TABLE OF CONTENTS/OUTLINE
1) Appropriate usage of current procedural terminology (CPT) codes and modifiers 2) Relative based relative value work scale (RBRVS), Relative value units (RVU), Conversion factors (CF) and how to calculate payment 3) What makes up a Global Payment 4) Professional fees: physician work, practice expense, and malpractice expense 5) Geographic practice cost index (GPCI): why the cost of care varies by region 6) ICD-9: an appropriate indication is essential for payment 7) Global periods: what is included after the procedure and for how long 8) Coding for multiple procedure on the same day and bundling of payments 9) Current RVU's for common interventional radiology procedures 10) Key concepts will be emphasized using case examples of everyday procedures.

VIE163
Choosing the Right Path: A Percutaneous Biopsy Quiz

Education Exhibits
Location: VI Community, Learning Center

Participants
Adam DeFoe MD (Presenter): Nothing to Disclose
Louis Morel MD : Nothing to Disclose
Adam Stibbe MD : Nothing to Disclose
Shawn Stone : Nothing to Disclose

TEACHING POINTS
- Explore the best routes for percutaneous biopsy of multiple lesions/organs via a quiz format, with emphasis on the shortest, safest path.
- Learn which modality to choose for percutaneous biopsy of different lesions.
- Learn the common risks and complications associated with percutaneous biopsies.
- Apply the above knowledge to future cases, including on board exams.

TABLE OF CONTENTS/OUTLINE
Lesions warranting biopsy will be presented as one or more CT images, followed by multiple choice quiz questions regarding percutaneous biopsy of the lesion. These questions include: Which lesion (if multiple) will you select to biopsy? What modality would you choose for biopsy guidance? Which route will you take to access the lesion? The questions will be followed by justification for the best answer to emphasize the learning objectives, including images depicting the actual biopsy. A brief discussion of risks and complications will also be included with each case.

VIE164
Endovascular Management of Complicated Aortic Dissections

Education Exhibits
Location: VI Community, Learning Center

Participants
John Bao Minh Chung MD (Presenter): Nothing to Disclose
Avnesh Sinh Thakor MBCHIR, PhD : Nothing to Disclose
Richard James Cormack MD : Nothing to Disclose
Roshni Pravin Patel MRCS, BSc : Nothing to Disclose
Darren Klass MD, PhD : Nothing to Disclose

TEACHING POINTS
1.) The reader will recognize what constitutes a complicated aortic dissection.
2.) The reader will be aware of the treatment algorithm to manage patients presenting with complicated aortic dissections.
3.) The reader will understand the methodology of treating such patients endovascularly using a combination of proximal covered stents as well as non-covered dissection stents.

TABLE OF CONTENTS/OUTLINE
Introduction: - Define what constitutes a complicated aortic dissection; - Discuss the prevalence of this condition and the population cohort it usually affects; - Discuss morbidity/mortality associated with untreated complicated aortic dissection. Historical Treatment Algorithm: - Outline initial medical management, followed by consideration for surgery; - Discuss traditional surgical repair and outcomes from surgical treatment. Endovascular Management Algorithm: - Outline requisite steps to stabilize patient and evaluate vascular anatomy; - Discuss how to size covered stent grafts as well as non-covered stents; - Step-by-step guide to placement of a dissection endovascular prosthesis; - Discuss our center’s experience with a small patient cohort (n=6 at time of abstract submission), including clinical presentation, therapy provided, and short to medium term outcomes.

VIE165
How to Improve Teaching in Interventional Radiology: Description and Comparison of Methods for Composing and Building Vessel Models for Real Life Simulation

Education Exhibits
Location: VI Community, Learning Center

Certificate of Merit
Participants
Marcus Treitl MD (Presenter): Nothing to Disclose
Maximilian F. Reiser MD: Nothing to Disclose
Karla Maria Treitl MD: Nothing to Disclose

TEACHING POINTS
We developed different methods to build low cost silicone vessel models that allow for repeat production of custom made vessel trees that simulate real life patient anatomy and allow e.g. real life simulation of a future procedure. We compare hand made wax forms for production of silicone models to high tech 3D printing with silicone and low cost 3D printing with plastic and the behavior and realism of these models in a perfusion model. The steps for manufacturing of these models are described in detail and advise is given how to implement these procedures into the own departmental workflow.

TABLE OF CONTENTS/OUTLINE
A. Problem of teaching interventional procedures. B. Role of custom made silicone simulators in future. C. Analysis of possible ways the build low cost silicone vessel models. D. Building reproducible wax models. E. Options for 3D design of vessel models for 3D printing out of CT data sets. F. Using desktop 3D printers with PLA plastic. F. Using 3rd party 3D silicone printers. G. Description of the behavior and haptic of the available models. H. How to set up a silicone vessel production and their use for teaching in the own department. I. Future and outlook.

VIE166
Image Acquisition and Guidance Systems: An Introduction for Interventional Radiology Trainees

Education Exhibits
Location: VI Community, Learning Center

Participants
Alex Singleton MD (Presenter): Nothing to Disclose
Lulu He DO: Nothing to Disclose
Michelle Morgan RT: Nothing to Disclose
Ram Kishore Reddy Gurujala MBBS, FRCR: Nothing to Disclose
Charles Martin MD: Nothing to Disclose
Karunakaravel Karuppasamy MBBS, FRCR: Nothing to Disclose

TEACHING POINTS
The goal of this exhibit is To help radiology residents and fellows improve equipment utilization in an interventional radiology (IR) suite. To describe commonly used image acquisitions and post processing tools. To compare the relative radiation dose and image quality of acquisition methods. To exhibit cases demonstrating different acquisition methods and their application.

TABLE OF CONTENTS/OUTLINE
A. Introduction: A new user is often puzzled at the user interface in an advanced IR system. Understanding different image acquisition methods allows us to use them to our advantage. This exhibit attempts to demystify the role played by these acquisition methods. B. Digital Radiography Single digital exposure Fluoroscopy C. Digital subtraction Radiography Road-map Reference image fade D. C-Arm Cone-beam Computed Tomography (CBCT) 3D anatomical demonstration 3D-3D volumetric fusion Needle guidance system Live 2D over 3D guidance Live scheme display E. Cases F. Summary: Radiologists-in-training are often overwhelmed by the complex user interface in an interventional radiology suite. Familiarity with the basic modes of image acquisition and utilization will enhance trainee participation during procedures and their interaction within IR team.

VIE167
Modular Design of a Mobile Web-app for Clinical Decision Support, Education, Reference, and Communication for Interventional Radiology

Education Exhibits
Location: VI Community, Learning Center

Participants
Loyrirk Temiyakarn MD (Presenter): Nothing to Disclose
Neil Shah MD: Nothing to Disclose
Adeel Siddiqui MBBS: Nothing to Disclose
Asim F. Choudhri MD: Nothing to Disclose

Background
The role of the modern interventional radiologist (IR) is constantly evolving. Keeping up to date with the latest techniques and criteria can be a daunting task, especially in a busy practice. Mobile decision support tools can help overcome this barrier at all levels of training. Modular mobile web-apps have the potential to educate while lowering communication barriers and facilitating safe, timely, efficient, and effective patient care.

Evaluation
A modular mobile web-app decision support and reference tool was designed for IRs to include appropriateness criteria, grading systems, radiation dose comparison, radiation dose tracking for patients and IRs, reference material on anatomy, catheters and drugs, and patient instructions. Separate modules were optimized for different levels of training including medical students, residents, fellows, and staff physicians. Modules were also tailored for separate facilities within an academic medical center. Additional modules to aid communication included shift/call schedules, contact information, and integrated text paging.

Discussion
Although the quality improvement metrics are still being collected, initial feedback on the design has been overwhelmingly positive. Feedback will be used to improve and optimize the web-app and develop new modules as the demand arises.

Conclusion
Mobile decision support, reference, education, and communication tools have potential to benefit interventional radiologists at all training levels in providing safe, timely, efficient, and effective patient care. A modular web-app ensures dynamic, up-to-date
information customizable for all levels of training and all facilities within multi-facility academic medical centers.

### VIE168

**Multidisciplinary Approach of Vascular Anomalies: Classification, Diagnosis and Treatment**

**Education Exhibits**

**Location:** VI Community, Learning Center

**Participants**

- Nerea Hormaza MD (Presenter): Nothing to Disclose
- Juliana Mesa: Nothing to Disclose
- Beatriz Mateos-Goni: Nothing to Disclose
- Ruth Gonzalez Sanchez: Nothing to Disclose
- Inaki Escudero: Nothing to Disclose
- Armando Gozalo Garcia: Nothing to Disclose
- Xabier Tomas Izquierdo Penafiel MD: Nothing to Disclose
- Maria Rosario Gonzalez-Hermosa: Nothing to Disclose

**TEACHING POINTS**

- To review the spectrum of vascular anomalies according to ISSVA 1996 classification, radiological diagnosis and treatment.
- To recognize some misnomers for frequently seen vascular anomalies which the radiologist should be aware of.
- To remark the importance of Vascular Anomalies Committees to achieve a correct diagnostic and therapeutic management of these lesions.

**TABLE OF CONTENTS/OUTLINE**

Vascular anomalies encompass a broad spectrum of lesions, often described using an overlapping and confusing terminology. Since 1996 there is a broadly accepted classification published by the ISSVA based on the histological characteristics. The importance of Vascular Anomalies Committees lies in the need for an unified diagnosis through the experience of multiple experts which enables a correct management. Multiple imaging techniques are available such as US-Doppler, MRI, CT, angiography, plain film: the utility of each modality is shown in this exhibit. Considering that imaging guided procedures are frequently the treatment of choice, interventional techniques are also shown. A pictorial review of vascular anomalies is made showing some complex cases that were presented in the Vascular Anomalies Committee of our institution. Imaging clues are provided to recognize and to make a proper classification of each anomaly with an appropriate terminology.

### VIE169

**Operator Radiation Dose Reduction during Fluoroscopic Interventional Procedures in an Academic Setting**

**Education Exhibits**

**Location:** VI Community, Learning Center

**Participants**

- Arun C. Nachiappan MD: Nothing to Disclose
- Gary Lloyd Horn MD (Presenter): Nothing to Disclose
- Ray C. Mayo MD: Nothing to Disclose
- David Matthew Wynne MD: Nothing to Disclose
- Benjamin R. Archer PhD: Nothing to Disclose
- John Austin Hancock MD: Nothing to Disclose
- Cliff J. Whigham DO: Nothing to Disclose

**TEACHING POINTS**

1) Review various sources of operator radiation dose during fluoroscopy. 2) Describe methods to decrease operator dose, which include appropriate shielding use, optimal positioning of operator and patient, collimation, lower fluoroscopic frame rate, and judicious use of digital subtraction angiography. 3) Discuss how one can institute a radiation safety educational program at one's own institution.

**TABLE OF CONTENTS/OUTLINE**

1) Overview of sources of radiation to which the fluoroscopy operator is exposed. 2) Review of operator and patient dose monitoring methods 3) Review of department-wide strategies to lower operator radiation dose, including lowering fluoroscopy time, setting reference levels, encouraging vendor interaction, and hands-on orientation for new resident operators. 4) Discussion of steps to monitor and reevaluate educational program and ideas to incentivize decreased operator dose.

### VIE170

**Patient Anxiety before and Interventional Radiologic Procedures: Guiding the Radiologists Towards a More Patient-centered Role**

**Education Exhibits**

**Location:** VI Community, Learning Center

**Certificate of Merit**

**Participants**

- Khalid Walid Shaqdan MD (Presenter): Nothing to Disclose
- Shima Aran MD: Nothing to Disclose
- Elmira Hassanzadeh MD: Nothing to Disclose
- Hani H. AbuJudeh MD, MBA: Research Grant, Bracco Group Consultant, RCG HealthCare Consulting Author, Oxford University Press

**TEACHING POINTS**

• Minimally invasive procedures increasingly replace open surgery and reduce the need for general anesthesia. • Although interventional radiology treatments offer less risk, pain and recovery time when compared to open surgery, patients nonetheless may be anxious about them and their outcomes. • The aim of this exhibit is to explain physician etiquettes, assessment...
methods, environmental factors, communication techniques, and recent research findings to reduce patient anxiety and improve overall experience in the interventional practice.

TABLE OF CONTENTS/OUTLINE

- Background/Literature review:
  - Harmful effects of patient anxiety
  - Role of radiologists in improving patient experience
  - ACR Imaging 3.0 campaign
  - "Program to enhance relational communicational skills-Radiology"
  - How other specialties deal with patient anxiety
  - How to maintain a low anxiety environment:
    - Quick patient assessment
    - Spielberger and colleagues "State–Trait Anxiety Inventory (STAI)"
  - Standardized guidelines
    - Physician etiquettes
    - Bedside manners
    - Environmental factors
    - Discussion techniques
    - Appropriate ways to deliver unexpected news to the patient
  - Recent research
    - Video goggles worn by patient during IR procedure showing soothing non-violent videos

VIE171

Percutaneous Abscess and Fluid-Collection Drainage: A Primer for Every Interventional Radiology Resident/Fellow

Education Exhibits
Location: VI Community, Learning Center

Participants

Masashi Tamura (Presenter): Nothing to Disclose
Seishi Nakatsuka MD: Nothing to Disclose
Yosuke Suyama: Nothing to Disclose
Jitsuro Tsukada: Nothing to Disclose
Nobutake Ito MD: Nothing to Disclose
Sota Oguro: Nothing to Disclose
Hideki Yashiro MD: Nothing to Disclose
Masanori Inoue MD: Nothing to Disclose
Masahiro Jinzaki MD: Nothing to Disclose

TEACHING POINTS

Percutaneous drainage is an effective and safe method for treating abscess and fluid-collection. We describe and illustrate the principle and various techniques of percutaneous abscess and fluid-collection drainage. By viewing this exhibit, the readers will understand when you should perform percutaneous drainage or not. 2. Be able to choose appropriate device and imaging guidance. 2. Learn how to safely perform percutaneous drainage using basic technique and to manage the catheter. 4. Get further technique for drainage of the apparently inaccessible, challenging lesion.

TABLE OF CONTENTS/OUTLINE


VIE172

Percutaneous Spinal Cement Augmentation: Status Quo and Future Directions

Education Exhibits
Location: VI Community, Learning Center

Cum Laude

Participants

Uei Pua MBBS, FRCR (Presenter): Nothing to Disclose

TEACHING POINTS

1) understand the indications and contraindications for cement augmentation, namely; vertebroplasty, kyphoplasty and stentoplasty (vertebral body stenting)
2) understand current techniques and advances in the area of cement augmentation

TABLE OF CONTENTS/OUTLINE

By the end of the exhibit, the reader will be familiar with the following: Pre-procedural assessment for cement augmentation (case selection): 1) Imaging assessment: Conventional radiography AND MRI 2) Morphological assessment for suitability: i) AO classification of vertebral fractures ii) Tomita classification of vertebral involvement in metastatic disease 3) Clinical assessment: Visual analog scale, Oswestry Disability Index, response to conventional treatment Conventional technique and complications of cement augmentation techniques: 1) Principles fluoroscopic planes and needle trajectory 2) Tools and differences of the various techniques 3) Principles of cement filling and complications Advances and future directions in cement augmentation 1) Advances in techniques: Unipedicular approaches 2) Advances in imaging: Cone beam CT 3) Use of non-cement fillers: e.g. allogenic bone graft
VIE173

Peri-Procedural Anticoagulant Management

Education Exhibits

Location: VI Community, Learning Center

Participants

Brendan Patrick McMenomy MD (Presenter): Nothing to Disclose
Anil Nicholas Kurup MD: Nothing to Disclose
Patrick Wade Eiken MD: Nothing to Disclose
Jonathan Michael Morris MD: Nothing to Disclose
Robert McBane MD: Nothing to Disclose
Thomas Duncan Atwell MD: Nothing to Disclose

TEACHING POINTS


TABLE OF CONTENTS/OUTLINE

- Anti-Platelet Agents
  - Medication List
  - Medication Information
  - Suggested Periprocedural Guidelines for Antiplatelet Agents

- Vitamin K Antagonists
  - Medication List
  - Medication Information
  - Suggested Periprocedural Guidelines for Vitamin K Antagonists

- Heparins
  - Medication List
  - Medication Information
  - Suggested Periprocedural Guidelines for Heparin Agents

- Direct Thrombin Inhibitors
  - Medication List
  - Medication Information
  - Suggested Periprocedural Guidelines for Direct Thrombin Inhibitors

- Direct Factor Xa Inhibitors
  - Medication List
  - Medication Information
  - Suggested Periprocedural Guidelines for Direct Factor Xa Inhibitors

- Glycoprotein IIb/IIIa Antagonists
  - Medication List
  - Medication Information
  - Suggested Periprocedural Guidelines for Glycoprotein IIb/IIIa Antagonists

Suggested Periprocedural Laboratory Screening Guidelines
Correction of Coagulation Abnormalities

VIE177

Vascular and Lymphatic Imaging for Plastic and Reconstructive Surgery: A Primer for the Radiologist

Education Exhibits

Location: VI Community, Learning Center

Certificate of Merit

Participants

Shigeyoshi Soga MD (Presenter): Nothing to Disclose
Hiroshi Shinmoto MD: Nothing to Disclose
Teppei Okamura MD: Nothing to Disclose
Nobuyuki Yoshihara: Nothing to Disclose
Tsuyoshi Soya: Nothing to Disclose
Tatsumi Kaji MD: Nothing to Disclose
Fumio Ohnishi: Nothing to Disclose
Toshiharu Minabe: Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to detail: 1. Surgical anatomy and principles of microvascular flap reconstruction and lymphatic reconstructive surgery. 2. Role of vascular and lymphatic imaging. 3. Comparison of imaging protocols and modalities, including CT, MR, US, lymphoscintigraphy, and fluorescence imaging. 4. Image post-processing for submillimeter vessels and lymphatics.

TABLE OF CONTENTS/OUTLINE

1. Surgical procedures
   - Microsurgical flap procedures
   - Lymphatic-venous anastomosis for the treatment of lymphedema
2. Supermicrosurgery
3. Microsurgical anatomy
4. Imaging protocols and clinical impact for plastic and reconstructive surgery
5. Vascular imaging: CT/MR angiography for reconstructive surgery, ranging from breast and head/neck reconstruction to facial transplantation
6. Lymphatic imaging of extremities for diagnosis and surgical planning: high-resolution isotropic 3D MR lymphangiography and lymphoscintigraphy
7. Imaging and surgical findings
8. Comparison of imaging modalities (CT, MR, US, lymphoscintigraphy, and near-infrared fluorescence imaging), as well as review of existing literatures
9. Future directions and summary

VIE178

Who Needs Glue: Exploring New Percutaneous Biological Sealants in Interventional Radiology

Education Exhibits

Location: VI Community, Learning Center

Certificate of Merit

Participants

Vibhor Wadhwa MBBS (Presenter): Nothing to Disclose
Clifford Raabe Weiss MD: Research collaboration, Siemens AG
Brian Philip Holly MD: Nothing to Disclose
Todd Schlachter MD: Nothing to Disclose
Anobel Tamrazi MD, PhD: Nothing to Disclose

TEACHING POINTS

1. Review the biological sealants used in various surgical specialties and with potential use in IR procedures especially for bowel leaks and fistulae. 2. Explain with relevant case examples the utility of different biological sealants in IR.
TABLE OF CONTENTS/OUTLINE

1. List the new generation biological sealants used in various surgical specialties, with potential use in IR.
2. Present relevant cases showing the utility of these sealants.
3. Illustrate sealant preparation and deployment technique.

VIE179

Case Based Review of Renal Interventions: From Indications to Completion. Primer for Radiology Residents and Fellows

Education Exhibits
Location: VI Community, Learning Center

Selected for RadioGraphics

Participants
Jay Patel MD (Presenter): Nothing to Disclose
Nishith Patel MD: Nothing to Disclose
Sean Keith Calhoun DO: Nothing to Disclose
Thaddeus M. Yablonsky MD: Nothing to Disclose

TEACHING POINTS

1. Review the indications, patient preparation and equipment for various renal interventions
2. Learn multimodality features of a variety of renal pathology
3. Discuss interventional treatment options, technical considerations and common complications of these interventions

TABLE OF CONTENTS/OUTLINE

The indications, patient preparation and equipment for each case will be reviewed, followed by a discussion of multimodality imaging features. Interventional treatment options, technical considerations and common complications will also be reviewed. Topics presented include:

Embolization:
- Renal arteriovenous fistula
- Renal arteriovenous malformation
- Renal angiomyolipoma
- Renal cell carcinoma
- Renal Trauma

Drainage:
- Renal and perinephric abscesses
- Percutaneous nephrostomy
- Ureteral stenting

Other:
- Percutaneous transluminal angioplasty - fibromuscular dysplasia
- Radiofrequency ablation - oncocytoma
- Stenting - renal artery stenosis
- Percutaneous nephrolithotomy

VIE180

Clinical Outcome of Percutaneous Transhepatic Obliteration for Anorectal Varices

Education Exhibits
Location: VI Community, Learning Center

Participants
Tetsuya Minami MD (Presenter): Nothing to Disclose
Satoshi Kobayashi MD: Nothing to Disclose
Toshifumi Gabata MD: Nothing to Disclose
Osamu Matsui MD: Research Consultant, Kowa Company, Ltd Research Consultant, Otsuka Holdings Co, Ltd Research Consultant, Eisai Co, Ltd Speakers Bureau, Bayer AG Speakers Bureau, Eisai Co, Ltd

PURPOSE

From anorectal varices is quite rare, but they can lead to a life-threatening hemorrhage because of their high flow rate and volume. Treatment of anorectal varices has not yet been established. We are able to control six cases of the varices by percutaneous transhepatic obliteration (PTO).

METHOD AND MATERIALS

From 2004 to 2013, six patients (67-80 years old) who suffered anorectal varices induced by portal hypertension were enrolled this study. All six women were treated with balloon-occluded antegrade transvenous sclerotherapy by 5% ethanolamine oleate iopamidole (EOI) via percutaneous transhepatic approach.

RESULTS

Four patients were successfully treated after one procedure, and one patient required twice treatment. In the case of rest one patient, the varices could be controlled by twice PTO and partial splenic embolization.
CONCLUSION

This study suggests that PTO by using EOI may be good treatment for anorectal varices.

CLINICAL RELEVANCE/APPLICATION

Varices develop at any site of GI tract in patient with portal hypertension. Recently, the frequency of anorectal varices is reported higher than before, bleeding from anorectal varices can lead to a life-threatening hemorrhage. No therapeutic strategy has yet been established. Our method using ethanolamine is effective treatment for anorectalvarices.

VIE181

Cryoablation of Exophytic Neoplasms: Novel Minimally Invasive Approach to Treat Unresectable Tumors

Education Exhibits
Location: VI Community, Learning Center

Participants
Luke Gorges DO (Presenter): Nothing to Disclose
Maryam Gul : Nothing to Disclose
Ammar Ahmed Chaudhry MD : Nothing to Disclose
Jung Hwoon Edward Yoon MD : Nothing to Disclose
David Schulsinger : Nothing to Disclose
John Alexander Ferretti MD : Nothing to Disclose

TEACHING POINTS

1- Review indications, interventional methods, contraindications, complications, pearls and pitfalls of percutaneous cryoablation.
2- Cryoablation was previously not recommended for perivascular and pericolonic neoplasms due to heat sink effects and potential damage to adjacent organs. We will discuss novel approach to treat these previously 'do NOT cryoablate' lesions and how to minimize potential risks while obtaining an appropriate size ablation zone. 3- Algorithm to help determine the best treatment modality in managing renal masses.

TABLE OF CONTENTS/OUTLINE

A. Anatomy- Effect of cryoablation on vessels, small and large intestines, abdominal wall, etc. B. Clinical Findings secondary to mass effect, obstruction, vessel invasion, etc. C. Highlight imaging findings (e.g. significance of fat planes) that serve as key to patient inclusion and exclusion criteria. D. Pathophysiology: Cryobiology: Intra- and extracellular mechanisms that promote tumor cell death E. Procedure Technique: discuss key do's and don'ts e.g. not crossing peritoneal reflections, not ablating needle tract, etc. F. Follow-up: Immediate post-procedure management and follow-up guidelines G. Outcomes: a. Complications: Immediate (hemorrhage, recurrence, bowel perforation, etc), Delayed (recurrence, fistulas, etc) b. Survival

VIE182

How Critical is C-arm Computed Tomography(C-arm CT) for Overcoming Challenges in Patients Undergoing Trans-arterial Chemoembolization for Hepatocellular Carcinoma?

Education Exhibits
Location: VI Community, Learning Center

Participants
Chinmay Bhimaji Kulkarni MBBS, MD (Presenter): Nothing to Disclose
Srikanth Moorthy MD : Nothing to Disclose
Sreekumar K P MBBS, MD : Nothing to Disclose
Rajesh Ramaih Kannan MD : Nothing to Disclose
Nirmalkumar Prabhu : Nothing to Disclose

TEACHING POINTS

Basics of C-arm Computed Tomography (C-arm CT). How is C-arm CT performed ? Application in patients undergoing Trans-arterial chemoembolization (TACE) for Hepatocellular carcinoma (HCC).

TABLE OF CONTENTS/OUTLINE


VIE183

Managing Complicated Acute Pancreatitis: Interventional Radiology to the Rescue

Education Exhibits
Location: VI Community, Learning Center

Participants
Rory O'Donohoe MBBCh (Presenter): Nothing to Disclose
Sinead Helena McEvoy MBCh, FFR(RCSI) : Nothing to Disclose
Lisa P. Lavelle MBCh, FFR(RCSI) : Nothing to Disclose
David Paul Brophy MBCh : Research Consultant, Marvao Medical Limited Shareholder, Marvao Medical Limited
Colin Patrick Cantwell MD : Nothing to Disclose
Jeffrey William McCann MBCh, MSC : Nothing to Disclose
Edmund Ronan Ryan MBCh : Nothing to Disclose
**TEACHING POINTS**

The purpose of this exhibit is: 1. To review the complications of acute pancreatitis including the various types of vascular and non-vascular complications. 2. To discuss the indications for image guided intervention with an emphasis on clinical evaluation. 3. To review the role of MRI in the assessment of fistulae and of phlegmonous peri-pancreatic collections. 4. To illustrate the IR techniques for treatment of both vascular and non-vascular complications.

**TABLE OF CONTENTS/OUTLINE**

1. Overview of the complications of acute pancreatitis. 2. The types of collections associated with acute pancreatitis (using the revised Atlanta classification of pancreatitis: acute peripancreatic fluid collections, acute necrotic collections, pseudocysts, walled off necrosis), and indications for their drainage. 3. Drainage approaches and techniques, including retroperitoneal, transhepatic and transgastic drainage. 4. Fistulae and their management, including pancreaticopleural fistulae. 5. The diagnosis and treatment of arterial and venous complications, with an emphasis on endovascular therapy for pseudoaneurysms of the gastroduodenal artery, inferior pancreaticoduodenal artery and splenic artery. 6. Summary.

**VIE184**

**Non-Surgical Management for Hepatocellular Carcinoma with Vascular Tumor Thrombus**

*Education Exhibits*

*Location: VI Community, Learning Center*

**Participants**

- Masakatsu Tsurusaki MD, PhD (Presenter): Nothing to Disclose
- Takamichi Murakami MD, PhD : Nothing to Disclose
- Nobuyuki Asato MD : Nothing to Disclose
- Yukinobu Yagyu MD : Nothing to Disclose
- Seishi Kumano MD : Nothing to Disclose
- Mitsuru Matsuki : Nothing to Disclose

**TEACHING POINTS**

1. To discuss the various forms of non-surgical management for unresectable hepatocellular carcinoma (HCC) with vascular tumor thrombus (VTT).
2. To present HCC with VTT cases demonstrating various treatment techniques, complications, responses and survival.

**TABLE OF CONTENTS/OUTLINE**

A. Epidemiology of HCC with VTT B. Various non-surgical treatments for HCC with VTT, including transcatheter arterial chemoembolization (TACE), transcatheter arterial embolization (TAE), hepatic arterial infusion (HAI), and systemic chemotherapy. C. Interventional management of complications caused by VTT, such as portal obstruction and portal hypertension. E. Cases. SUMMARY Our results of both HAI and radiotherapy combined with TACE for HCC with VTT suggest that are tolerable and increase tumor response rate. This exhibit reviews a. The methods of non-surgical treatments of HCC with VTT. b. The outcomes of non-surgical treatments of HCC with VTT. c. The methods of management and outcomes by interventional procedure for complications caused by VTT.

**VIE185**

**Role of Interventional Radiology in the Management of Renal Artery Aneurysm: A Pictorial Review**

*Education Exhibits*

*Location: VI Community, Learning Center*

**Participants**

- Christelle Chedrawy MD (Presenter): Nothing to Disclose
- Pedram Rezai MD : Nothing to Disclose
- Daniel Joseph Kay MD : Stockholder, General Electric Company
- Anupam Basu MD : Nothing to Disclose
- Daniel Anthony Falco DO : Nothing to Disclose

**TEACHING POINTS**

Visceral arterial aneurysms are rare entities with a described incidence of 0.2%. Renal artery aneurysms account for 15-22% of the visceral arterial aneurysms and are generally discovered incidentally. Most of the aneurysms are less than 2 cm and are asymptomatic. Symptoms may result from rupture and thromboembolic events. A size greater than 2 cm warrants intervention. Multiple approaches have been described in the management of visceral arterial aneurysms. The primary intent of covered stent placement is to exclude the aneurysmal sac while maintaining distal perfusion. The described approach offers an alternative to treat high risk patients, as well as patients with aneurysms whose size or location would make a surgical approach problematic.

**TABLE OF CONTENTS/OUTLINE**


**VIE186**

**The Role of Hypersplenism in Complicated Portal Hypertension**

*Education Exhibits*

*Location: VI Community, Learning Center*

**Participants**

- Joseph Wilson Owen MD (Presenter): Nothing to Disclose

**Certificate of Merit**
TEACHING POINTS

Increased splenic flow may be a compensatory mechanism to maintain portal flow in the face of increasing hepatic resistance/portal hypertension. Hypersplenism can be due to marrow disorders, resulting in increased splenic capacity and blood flow. These high flow states can exacerbate the complications of portal hypertension.

Treatment of hypersplenism may reduce overflow phenomenon in patients at risk for variceal bleeding.

TABLE OF CONTENTS/OUTLINE

- Associations Myelo/Lymphoproliferative Disorders Portal Hypertension (PHTN)
- Pathophysiology Hypertrophy Arterial Recruitment Splenic Outflow Sequelae Leuko/Thrombocytopenia Hemorrhage - Splenic/portal flow ratio may correlate with varical bleeding
- Post Transplant PHTN - Increased splenic flow persists, so PHTN persists despite normal hepatic resistance
- Treatments Partial/Complete Splenic Embolization Splenectomy TIPS/BRTO Case 1 17 y/o h/o liver transplant with post transplant PHTN Esophageal varices Biopsy - Noncirrhotic PHTN Elevated splenic flow Splenectomy vs splenic embolization Case 2 34 y/o with noncirrhotic PHTN and splenomegally Variceal hemorrhage PHTN treated with TIPS Recurrent variceal bleeding Splenectomy with resolution of PHTN

VIE187

Comparison between Cross-sectional and Angiographic Imaging features in Locoregional Management of Hepatocellular Carcinoma: A Pictorial Review

Education Exhibits
Location: VI Community, Learning Center

Participants
- Nirmal Kakani MD : Nothing to Disclose
- Hamid Reza Sadeghi Neshat MSc (Presenter): Nothing to Disclose
- Derek William Cool MD, PhD : Patent agreement, Eigen
- Aaron Fenster PhD : License agreement, Eigen

TEACHING POINTS

1. Angiographic appearance of tumors pre- and post-treatment
2. Comparison of angiographic and CT findings pre and post treatment
3. Comparison of angiographic and 3D/contrast US pre and post treatment
4. Pit falls to avoid during interpretation.

TABLE OF CONTENTS/OUTLINE

- As incidence of HCC continues to increase, multi-modality imaging protocols have allowed us to understand their vital role in its detection, treatment and follow up. The unique vascular properties of primary liver cancer allows the treatment of these tumors with trans-arterial chemo- and radio-embolization (TACE/TARE), as well as percutaneous ablation. Accurate and reliable understanding of the angiographic appearance with concurrent interpretation of the follow up scans is paramount for the success of loco-regional therapy. This educational exhibit aims to compare the angiographic findings of the lesions with the CT, 2D/3D ultrasound, and contrast ultrasound changes pre- and post treatment. This will help the reader to understand the relation between location, vascularity and the response of the tumor to treatment across modalities. Images are selected from 50 patients recruited in an IRB approved study who underwent (DEB)TACE/TARE or microwave/radiofrequency ablation between 2011-2014 to study role of multi-modality imaging in interventional management of focal liver tumors.

VIE188

CT-guided Radiofrequency Ablation of Lung Tumors: How to Do It

Education Exhibits
Location: VI Community, Learning Center

Participants
- Tomohisa Okuma MD, PhD (Presenter): Nothing to Disclose
- Toshiyuki Matsuoka MD : Nothing to Disclose
- Shinichi Hamamoto MD, PhD : Nothing to Disclose
- Yukio Miki MD, PhD : Nothing to Disclose

TEACHING POINTS

To review the indications, contraindications, imaging for treatment response, clinical outcome and potential complications of percutaneous CT-guided radiofrequency ablation.

TABLE OF CONTENTS/OUTLINE

A. Review of Indications, Contraindications B. Technique C. Evaluation of therapeutic effects (CT, FDG-PET, and MR imaging) D. Outcomes E. Contributing factors to local progression F. Complications (including management)

VIE189

How We Do It: MRI Analysis of Tissue Imaging Outcomes Following Percutaneous Ablation of Hepatic Tumors

Education Exhibits
Location: VI Community, Learning Center

Participants
- Gregory John Woodhead MD, PhD (Presenter): Nothing to Disclose
- Ragni Jindal BA : Nothing to Disclose
- Bobby Thomas Kalb MD : Nothing to Disclose
- Charles T. Hennemeyer MD : Nothing to Disclose
TEACHING POINTS
The purposes of this exhibit are: 1. To review irreversible electroporation (IRE), an evolving technique for the percutaneous ablation of malignant hepatic tumors. 2. To gain an awareness of how recent advances in abdominal MRI facilitate analysis of tissue imaging outcomes following percutaneous ablation. 3. To outline the systematic methodology employed at our institution for the characterization of post-IRE tissue outcomes.

TABLE OF CONTENTS/OUTLINE
I. Overview of percutaneous ablation of hepatic tumors: IRE, RFA, microwave ablation, and cryoablation. II. IRE: Applications, advantages, and technique. III. Abdominal MRI: A superior imaging modality for the characterization of hepatic tumors and evaluation of post-ablation tissue imaging outcomes: HCC and hepatic metastases. IV. "How we do it": A systematic methodology for MRI evaluation and characterization of post-ablation outcomes. V. Through case examples, interpreting physicians will be introduced to broad categories of MR imaging outcomes following IRE: (1) Devascularization, and (2) Residual enhancement. IV. Summary: Recent advances in Body MRI facilitate analysis of post-ablation tissue characteristics. This educational exhibit will outline a methodology for the systematic evaluation of MRI outcomes following IRE of malignant hepatic tumors.

VIE190
Magnetic Resonance Imaging for Guidance of Hepatic Radiofrequency Ablation

Education Exhibits
Location: VI Community, Learning Center

Participants
Stephan Clasen MD (Presenter): Nothing to Disclose
Hans-Jorg Rempp: Nothing to Disclose
Rudiger Hoffmann: Nothing to Disclose
Philippe Lucien Pereira MD: Support, Terumo Corporation Support, Bayer AG Advisory Board, Siemens AG Support, Bracco Group
BioSciences, Inc Consultant, Celonova BioSciences, Inc Speaker, Biocompatibles International plc Research Grant, Biocompatibles International plc Consultant, Microsulis Medical Ltd Consultant, Microsulis Medical Ltd
Claus Detlef Claussen MD: Nothing to Disclose
Konstantin Nikolaou MD: Speakers Bureau, Siemens AG Speakers Bureau, Bracco Group Speakers Bureau, Bayer AG

TEACHING POINTS
Capabilities of magnetic resonance (MR) imaging for guidance of different steps during hepatic radiofrequency (RF) ablation: pre- (planning), peri- (targeting, monitoring, and controlling), and post-interventional (assessment of treatment response) imaging. Beside general advantages of MR imaging like excellent soft-tissue contrast in hepatic imaging special techniques are in particular supportive for targeting and monitoring of thermal ablation. MR-fluoroscopy offers a near real-time feedback in different planes while the RF applicator is advanced into the target tissue. In relation to thermal ablation therapy, the main advantage of MR imaging is the sensitivity to thermal effects. Strategies for monitoring thermal ablation therapy are a direct temperature mapping, e.g. the proton resonance frequency shift method, or a visualization of irreversible tissue damage caused by thermally induced coagulation. Advantages and disadvantages of MR-guided RF ablation will be discussed.

TABLE OF CONTENTS/OUTLINE

VIE191
Pulmonary Ablation: An Update on Currently Available Ablation Technologies and Their Use in the Lungs

Education Exhibits
Location: VI Community, Learning Center

Participants
Ankaj Khosla MD (Presenter): Nothing to Disclose
Stephen Phillips Reis MD: Nothing to Disclose
Ali Pirasteh MD: Nothing to Disclose
Thomas Alfred Pacicco: Nothing to Disclose
Clayton K. Trimmer DO: Nothing to Disclose
Sanjeeva P. Kalva MD: Consultant, Celonova BioSciences, Inc

TEACHING POINTS
In a subset of patients, ablation of pulmonary nodules serves as an alternative to surgical resection of both primary and metastatic lesions in the lung. Following the results of the National Lung Cancer Screening Trial (NLCSST), the number of both primary and secondary lung tumors is likely to increase after the implementation of low dose screening CT. In this exhibit we aim to describe the currently available pulmonary ablation technologies. There will be a review of the current literature on lung cancer, staging, pulmonary ablation techniques and a discussion on the indications for ablation. We will go over procedure details with demonstration from our institution and review the variety of probes used in pulmonary radiofrequency ablations. Finally, we will discuss upcoming techniques and their potential.

TABLE OF CONTENTS/OUTLINE

VIE192
Rare Complications after Lung Percutaneous Radio Frequency Ablation: Incidence, Risk Factors, Prevention, and Management

Education Exhibits
CERTIFICATE OF MERIT

Selected for RadioGraphics

Participants

Nicolas Alberti MD (Presenter): Nothing to Disclose
Xavier Buy MD : Proctor, Galil Medical Ltd
Nora Frullo : Nothing to Disclose
Michel Montaudon MD : Nothing to Disclose
Mathieu Canella : Nothing to Disclose
Afshin Gangi MD, PhD : Proctor, Galil Medical Ltd
Jean Palussiere MD : Travel support, Bracco Group

TEACHING POINTS

Tumor destruction by percutaneous radiofrequency ablation (PRFA) is a minimally invasive treatment proposed in the management of lung tumors, primary or secondary, especially in inoperable patients. This technique is very well tolerated in the lung, and most of the complications, which occur in up to 50% of cases, are minor. Little is known about potential rare complications after PRFA. The aim of this educational exhibit was to a) describe b) prevent c) manage rare complications after PRFA of the lung based on our experience in a large tertiary referral centre (more than 1000 patients during 11 years).

TABLE OF CONTENTS/OUTLINE

1) Pulmonary complications: *Bronchopleural or bronchial fistula *Pulmonary artery pseudo aneurysm *Gas embolism *Aspergilloma or delayed abscess inside post RFA cavitation 2) Thoracic wall complications: *Intercostal neurona *Intercostal artery injury *Rib necrosis 3) Mediastinal and apical complications: *Neural damage (brachial plexus, recurrent and phrenic nerves) 4) Diaphragmatic injury (hermia)

VIE194

How and When Do the Checks with Doppler Ultrasound to Patients Who Have Been Transplanted Pancreas—Kidney

Education Exhibits

Location: VI Community, Learning Center

Participants

Roberto Correa Soto (Presenter): Nothing to Disclose
Teresa Gonzalez De La Huebra Labrador : Nothing to Disclose
Aurymar Fraino : Nothing to Disclose
Percy Alexander Chaparro Garcia : Nothing to Disclose
Diego Sebastian Palominos Pose MD : Nothing to Disclose
Karín Daniela Muller MD : Nothing to Disclose
Cecilia Santos Monton : Nothing to Disclose
Heidy Saenz Acuna MD : Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:

- To explain the possible locations, orientations and physiology of the new transplanted organ (kidney, pancreas).
- To review the methodology and temporal protocol of doppler ultrasound of patients transplanted pancreas-kidney.
- To review the radiological findings indicating good and / or poor outcome.

TABLE OF CONTENTS/OUTLINE

- Introduction
- Transplanted organs (pancreas-kidney) location, orientation, relationships, physiology.
- Imaging techniques and findings.
  1. Doppler ultrasound technique: protocol review, methodology, temporal protocol.
  2. Radiological findings of good prognosis.
  3. Imaging findings of complications and poor prognosis
- Common diagnostic pitfalls.
- A useful radiological report.
- Cases to illustrate the radiologic features.

VIE195

How to Hit the Bulls Eye: Tips and Tricks for a Successful Ultrasound Guided Lymph Node Biopsy

Education Exhibits

Location: VI Community, Learning Center

Participants

Daniel Claudio Mysler MD : Nothing to Disclose
Andres Kohan MD (Presenter): Fellowship funded, Koninklijke Philips NV
Tiare Africa Pineiro MD : Nothing to Disclose
Monica Poclava MD : Nothing to Disclose
Adrian Nervo MD : Nothing to Disclose
Ricardo D. Garcia-Monaco MD, PhD : Research Consultant, Siemens AG Research Consultant, BTG International Ltd
TEACHING POINTS
To review clinical indications for lymph node biopsy
To identify the different image guided biopsy techniques for lymph nodes
To review ultrasound guided lymph node biopsy technique
To review the different tips and tricks for a successful procedure and tissue sampling

TABLE OF CONTENTS/OUTLINE
- Anatomy: location of the lymph nodes, best acoustic windows to image them and best point of access for tissue sampling
- Pathophysiology: metastatic pathways and where to go look for the most probably involved lymph nodes
- Clinical Findings: tips from physical examination to help locate pathological lymph nodes
- Ultrasound guided biopsy technique: a review step by step of the appropriate biopsy procedure
- Indications and contraindications
- Tips and tricks for successful tissue sampling: experience based tips and tricks to maximize tissue sampling and obtain a representative biopsy
- Possible complications and their treatment

VIE196
Imaging the Swollen Arm with Dialysis Access: It’s Not Just DVT
Education Exhibits
Location: VI Community, Learning Center
Magna Cum Laude

Participants
Shilpa Nagarur Reddy MD (Presenter): Nothing to Disclose
Meghan Boros MD: Nothing to Disclose
Mindy Meislich Horrow MD: Spouse, Director, Merck & Co, Inc

TEACHING POINTS
1. Venous US is frequently the initial study requested to evaluate acute arm swelling in patients with dialysis access. While important to exclude DVT, in the setting of swelling in an arm with chronic dialysis access, radiologists must consider a wide variety of other vascular and non-vascular causes for swelling, many of which can be appreciated or suggested using US. This exhibit will review anatomy of AV grafts and fistulas and how to evaluate them with US, demonstrate examples of alternative vascular and non-vascular diagnoses, and discuss when other modalities and interventions are necessary.

TABLE OF CONTENTS/OUTLINE
1. Systematic approach using US for initial evaluation of swollen arm with chronic dialysis access
   a. History and physical examination of arm
   b. Type of access
   c. Relevant vascular anatomy with Doppler analysis
   d. Soft tissues
2. Venous related diagnoses
   a. Deep and superficial venous thrombosis
   b. Central venous stenosis or occlusion
   c. Large draining veins from fistula
3. Abnormalities intrinsic to chronic dialysis access
   a. Thrombosis of fistula or graft
   b. Steal syndrome
   c. PSA
4. Non-vascular diagnoses
   a. Soft tissue collections
   b. Other arm masses

VIE197
It Doesn't Look Right but I'm Not Sure Why: Dissection of a Doppler Waveform
Education Exhibits
Location: VI Community, Learning Center
Certificate of Merit

Participants
Amy Davis Haberman MD (Presenter): Nothing to Disclose
Erin Horsley DO: Nothing to Disclose
Steven David Herman MD: Nothing to Disclose

TEACHING POINTS
1. Learn the specific components of spectral waveforms and their meaning with respect to physiology.
2. Learn to maximize the ultrasound unit settings to guarantee accuracy of diagnosis.
3. Be able to recognize normal and abnormal waveforms specific to each organ and pathology.

TABLE OF CONTENTS/OUTLINE
1. Basic physiology of hemodynamics
2. Basic Doppler techniques
3. Dissection of a spectral waveform
4. Optimizing your Doppler settings
5. Organ specific Doppler evaluation
6. Pathologic Doppler waveforms
7. It doesn't look right but I'm not sure why. What do I do? 8. Post quiz

VIE198
The Doppler Imaging Criteria for Diagnosing Stenoses in Arteries: A Comprehensive Review
Education Exhibits
Location: VI Community, Learning Center

Participants
Ganesh Moreshwar Joshi MBBS (Presenter): Nothing to Disclose
Flavius F. Guglielmo MD: Nothing to Disclose
TEACHING POINTS

The purpose of this exhibit is: 1. Review all arteries outside of the brain that can be evaluated with Doppler ultrasound. 2. Learn imaging criteria for diagnosing significant stenosis in each artery. 3. Learn primary and secondary signs of arterial stenosis.

TABLE OF CONTENTS/OUTLINE

General principles 1. Waveform appearance within and adjacent to a significant stenosis 2. Optimizing color and spectral Doppler Head and neck arteries 1. Internal carotid- non-operated, post CEA, and post stenting 2. Common and external carotid 3. Subclavian- with TOS evaluation 4. Vertebral 5. Innominate Abdomen arteries 1. Abdominal aorta 2. Celiac- with MALC evaluation 3. SMA, IMA 4. Renal- native and transplant renal artery evaluation 5. Iliac Upper extremity arteries 1. Axillary, brachial, ulnar 2. Radial- with evaluation for radial artery dependence Lower extremity arteries 1. CFA, SFA, DFA, popliteal 2. PTA, ATA, peroneal 3. Bypass grafts, stents The major teaching points of this exhibit are: 1. There are general principles to know when evaluating arteries for stenosis within and proximal and distal to the stenosis. Adhering to them improves diagnostic accuracy. 2. Several arteries have unique imaging criteria when diagnosing stenosis. 3. In some arteries maneuvers can be performed to diagnose a stenosis.

VIE199

The Role of Ultrasonography to Evaluate Complications after Endovascular Aneurysm Repair at Different Sites

Education Exhibits
Location: VI Community, Learning Center

Participants
Joao Rafael Terneira Vicentini MD (Presenter): Nothing to Disclose
Felipe Ribeiro Ferreira: Nothing to Disclose
Danilo Giorgio Oliveira Azevedo Medrado MD: Nothing to Disclose
Leina Ceravolo De Melo Zerey: Nothing to Disclose
Carlos A P Ventura PhD: Nothing to Disclose
Maria Cristina Chammas MD: Nothing to Disclose

TEACHING POINTS

- Recognize the importance of ultrasound as a diagnostic method in the evaluation of complications after endovascular aneurysm repair, particularly endoleak
- Key findings in ultrasound / Doppler examination of stents/grafs in peripheral arteries
- Discuss ways to improve Doppler ultrasound technique for better results in these patients
- Main advantages of ultrasound in the initial follow-up after aneurysm surgery over other imaging methods

TABLE OF CONTENTS/OUTLINE

- Sample of cases evaluated and monitored with Doppler ultrasound
- Special aspects of different arteries examination, such as the carotid and popliteal arteries
- Security and applicability of ultrasound following endovascular correction of aneurysms
- Correlation of sonographic findings and CT angiography (CTA)
- Literature review on use of ultrasound and CT scan for follow-up after endovascular aneurysm repair

VIE200

Ultrasound-Guided Intervention: Beyond the Guidance Tool

Education Exhibits
Location: VI Community, Learning Center

Participants
Alexander Zachary Copelan MD (Presenter): Nothing to Disclose
Anindya K. Roy MD: Nothing to Disclose
Hanh Vu Nghiem MD: Nothing to Disclose

TEACHING POINTS

Advantages of ultrasound in cross-sectional intervention have been previously described. Utilizing case-based illustrations, we will not only substantiate these traditional advantages, but will also demonstrate additional advantages, including the use of ultrasound as a diagnostic, intra-procedural problem solving tool to prevent unnecessary procedures and potential complications.

TABLE OF CONTENTS/OUTLINE

Illustrate and Depict:
Traditional advantages of US as an image guidance tool: real-time nature, vessel visualization, portability, decreased procedure time and cost, and lack of ionizing radiation and use of iodinated contrast material

Expanded advantages:
i. Biopsy of small lesions, lesions not readily accessible by CT guidance, trans-rectal, trans-vaginal, and trans-perineal approaches, and pediatric intervention
ii. Use of US-guided direct compression to displace bowel loops to facilitate biopsy of deep lesions, to treat pseudo-aneurysm with or without thrombin injection, and to help minimize potential post-procedural bleeding complications
iii. Use of US imaging as an intra-procedural problem solving tool to help prevent unnecessary procedures and potential complications, and to urge the interventionist to recognize such instances and take the appropriate steps to ensure the safety and efficacy of image-guided intervention
Ultrasound-Guided Thoracic Interventions: Practical Guide With Tips and Tricks

Education Exhibits
Location: VI Community, Learning Center

Participants
Jose Carmelo Albillos Merino MD (Presenter): Nothing to Disclose
Susana Hernandez Muniz MD : Nothing to Disclose
Javier Azpeitia Arman MD : Nothing to Disclose
Rosa M. Lorente-Ramos MD, PhD : Nothing to Disclose
Alvaro Paniagua MD : Nothing to Disclose

TEACHING POINTS
To describe the main thoracic interventions that can be achieved by ultrasound guidance. To propose a tailored approach with tips and tricks.

TABLE OF CONTENTS/OUTLINE
US-guided interventional procedures main advantages are that can be performed at the patient bed-side, permit a safe real-time control of the interventions without the use of ionizing radiation and are cost and time-effective. US has been considered to have a secondary role in interventions on the thorax. Nevertheless, most thoracic structures are adequately imaged by US and, as a result, interventional procedures can be safely performed with US-guidance. The main procedures that can be performed are biopsies (fine-needle and core biopsy) and drainage of fluid collections. The organs that can be reached by US are located in the chest wall, mediastinum, pericardium, pleura, pleural cavity and in the subpleural pulmonary parenchimae. We propose a guide to the interventions based on a tailored approach with real cases. Several steps must be followed: To depict the lesion with available imaging techniques. To decide the best approach to the lesion. To verify correct visualization of the lesion with US. To perform the procedure with adequate technique and material. To assess absence of complications.

VIE202
Utility of Ultrasound in Selected Cases in Interventional Radiology

Education Exhibits
Location: VI Community, Learning Center

Participants
Ayman Sawas MD (Presenter): Nothing to Disclose
Devang Butani MD : Nothing to Disclose

TEACHING POINTS
Learn indications, benefits, interventional methods, and potential complications of utilizing ultrasound in interventional radiology procedures through case based presentation. This will include cases of performing direct intrahepatic protocaval shunt (DIPS) with intravascular ultrasound guidance, treating stenosis and thrombosis of dialysis fistulas without fluoroscopy, and percutaneous transhepatic cholangiogram (PTC).

TABLE OF CONTENTS/OUTLINE
A. Clinical scenario.
B. Indication
C. Benefits of ultrasound pertaining to the case
D. Anatomy
E. Interventional methods
F. Outcomes including complications

VIE203
CT Spectral Imaging in CT Portal Venography: Which Phase is Better, Late Arterial Phase or Portal Venous Phase

Education Exhibits
Location: VI Community, Learning Center

Participants
He Qing Wang MSc (Presenter): Nothing to Disclose
Ailian Liu MD : Nothing to Disclose
Yijun Liu : Nothing to Disclose
Haruhiko Machida MD : Nothing to Disclose
Eiko Ueno MD : Nothing to Disclose

TEACHING POINTS
To review current CT in CT portal venography (CTPV) and its limitations The standard contrast medium injection of the multiphase contrast-enhanced in liver can be used for CTPV with spectral CT. To demonstrate the improved image quality using late arterial phase as compared with that obtained using portal venous phase by presenting clinical images.

TABLE OF CONTENTS/OUTLINE
1) Standard CT in CTPV and its limitations
2) Normal multiphase contrast enhancement in liver can
Optimal energy level of CTPV images in late arterial phase by presenting clinical images 3) CTPV images using late arterial phase is better than that obtained using portal venous phase high contrast between the portal vein and liver parenchyma in late arterial phase no hepatic veins overlapped the portal veins

VIE204
"Management of Displaced Intravascular Foreign Bodies—An Overview"

Education Exhibits
Location: VI Community, Learning Center

Participants
James Burn MBBS, BSc (Presenter): Nothing to Disclose
Antoni Aleksander Sergot MBBS, FR CR: Nothing to Disclose
Yaron J. Berkowitz MBChir, MRCS: Nothing to Disclose
Wasim Hakim MBBS: Nothing to Disclose
Steven S.M. Moser: Nothing to Disclose

TEACHING POINTS
1) Knowledge of the typical types, sites and risk factors of displaced intravascular foreign bodies.
2) An understanding of the associated morbidity and mortality.
3) Understanding of the various retrieval methods and equipment available - including advantages and disadvantages of each.
4) Tips/guidelines for improving outcome in intravascular retrieval/repositioning.

TABLE OF CONTENTS/OUTLINE
Summary of typical displaced foreign bodies and sites of migration eg. pulmonary arteries/cardiac atria - using case examples.
Risk factors for fracture/migration eg. emergency insertion / poor guide catheter or guide wire support / tortuous and calcified vessels etc.
Overview of the clinical sequelae and associated mortality and morbidity of displaced/fractured intravascular foreign bodies.
Summary of various retrieval equipment (eg snares, baskets or forceps) and techniques (proximal vs distal grab etc) using case examples.

VIE205
The Road to Success for Adrenal Venous Sampling; Can It Be Useful to Detect Adrenal Veins on Unenhanced CT with 3D Thin Slice Data Acquisition?

Education Exhibits
Location: VI Community, Learning Center

Participants
KIMEI AZAMA (Presenter): Nothing to Disclose
Masahiro Okada MD: Nothing to Disclose
Yuko Iraha: Nothing to Disclose
Joichi Heianna: Nothing to Disclose
Tomomi Koga: Nothing to Disclose
Sadayuki Murayama MD, PhD: Nothing to Disclose

TEACHING POINTS
The teaching points of this exhibit are: 1. To explain about adrenal venous anatomy on CT and MRI and basics of adrenal signal intensities on in-phase or opposed phase of dual-phase T1 weighted image. 2. To describe the clinical impact of adrenal venous sampling for primary aldosteronism. 3. To show the technique of adrenal venous sampling and present the utility to understand the location of adrenal veins on unenhanced CT, including 3D data acquisition. 4. Pitfalls of adrenal venous sampling are also addressed.

TABLE OF CONTENTS/OUTLINE
1) Anatomy of adrenal veins a. The shape of left/right adrenal vein b. Variations 2) Concept of primary aldosteronism -Definition, Frequency, Classification 3) Significance of adrenal venous sampling -For definite diagnosis -To determine surgical indication 4) Identification of left/right adrenal vein on unenhanced CT -How to recognize the location of adrenal veins on unenhanced CT 5) Optimal CT parameters of 3D data acquisition 6) What shape is better to insert the catheter to adrenal veins? -Strategies for left/right adrenal venous sampling -Technical difficulties 7) Pitfalls of adrenal venous sampling

VIE207
The Transjugular Route to Biopsies: A Practical Guide

Education Exhibits
Location: VI Community, Learning Center

Participants
Harshad Wankhedkar DMRD (Presenter): Nothing to Disclose
Diptiman Roy MD: Nothing to Disclose
Tejas Prakash Dharia MBBS: Nothing to Disclose
Charul Goyal MBBS: Nothing to Disclose

TEACHING POINTS
The Transjugular route has been used to perform biopsies of liver, kidney, intracardiac masses, pancreas and other organs A
The principle indication of using a transjugular route is the presence of an uncorrected bleeding disorder, when a percutaneous approach is contraindicated. Transjugular route for biopsy is an established technique in high-risk patients. Indications for transjugular renal biopsy, apart from bleeding disorders, include conditions that preclude the prone position, like voluminous ascites, morbid obesity, and mechanical ventilation. Transjugular route for intracardiac masses has the advantage of avoiding cardiac wall injury.

**TABLE OF CONTENTS/OUTLINE**

**Benefits of using a transjugular approach for visceral biopsies**

**Patient Selection**

**Organ-specific Procedure technique**

- Pre-procedural workup
- Procedure
- Post-procedural imaging

**Procedure-specific complications**

- Major complications
- Minor complications
- Organ-specific complications

**VIE208**

Where We Have Been, Where We Are, and Where We Are Going: History and State of the Art Treatment and Management of Chronic Lower Extremity Venous Insufficiency

*Education Exhibits*

Location: VI Community, Learning Center

**Participants**

- Mustafa Syed DO (Presenter): Nothing to Disclose
- Eli Halpert MD: Nothing to Disclose
- Ronald Mark Dreifuss MD: Nothing to Disclose
- Christopher John Moran MD: Nothing to Disclose

**TEACHING POINTS**

Describe chronic lower extremity venous insufficiency (CVI). Demonstrate a basic pathophysiologic and epidemiologic understanding. Quantifying CVI: Understanding deep/superficial/perforator venous anatomy and its importance in treatment success. Overview of older, current, and novel techniques--their appropriate use in treatment and management of CVI.

**TABLE OF CONTENTS/OUTLINE**

Introduction: Description of venous insufficiency and our role in management as interventional radiologists. Epidemiology: Who is most prone to CVI? Pathophysiology and Anatomy: What are factors that lead to venous insufficiency? What is the pathophysiology? Pertinent discussion of anatomy (with diagrams) Approach to Evaluation and Treatment: CEAP Classification Sonography Discussion of older techniques such as surgical stripping and sclerotherapy. Discussion of newer techniques such as mechanical, chemical, and thermal ablation--effectiveness, and appropriate subset of patients. Post-treatment follow-up: Discussion of post-treatment follow-up. Evaluating success of a therapy. Patient’s options in the event of post-treatment failure. Conclusion: Discussion emphasizing the importance of understanding CVI, anatomy, its morbidity, and great benefit to the patient in the setting of appropriate treatment.

**MSE-SUA**

Multisystem/Special Interest Sunday Poster Discussions

*Education Exhibits*

**MSE157**

Strategies for Reduction of Radiation Dose in Body CT with Iterative Reconstruction Technique (Station #1)

- Wirana Angthong MD (Presenter): Nothing to Disclose
- Panitpong Maroongroge: Nothing to Disclose
- Vithya Varavithya: Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: To review the general concepts of radiation exposure To describe body CT dose parameters and report pertinent to radiation dose To explain the appropriate selection of scan parameters to minimize radiation exposure while maintaining image quality. To discuss a practical approach to optimizing specific CT protocols with iterative reconstruction technique in current clinical practice

**TABLE OF CONTENTS/OUTLINE**

General concepts of radiation exposures Absorbed dose Effective dose Nomenclature of CT parameters and issues pertinent to radiation dose Tube current (mA): fixed tube current or automatic exposure control Tube peak kilovoltage (kVp) Beam pitch, beam collimation Reconstruction algorithms: filter back projection versus iterative reconstruction CT dose report CT dose index volume Dose length product Optimization of CT parameter for dose reduction Feasibility of iterative reconstruction technique in modified low dose body CT Low tube voltage and contrast agent dose reduction in CT chest/abdomen/pelvis and CT angiography Screening noncontrast CT lung nodule protocol Renal stone protocol Acute abdomen protocol for acute appendicitis
OBE-SUA
Obstetrics/Gynecology Sunday Poster Discussions

Education Exhibits

AMA PRA Category 1 Credits ™: .50
Sun, Nov 30 12:30 PM - 1:00 PM Location: OB Community, Learning Center

Sub-Events

OBE115
The Revised FIGO Staging System for Cancer of the Ovary, Fallopian Tube, and Peritoneum: Important Implications for Radiologists (Station #1)

Tsukasa Saida MD (Presenter): Nothing to Disclose, Yumiko Oishi Tanaka MD: Nothing to Disclose, Koji Matsumoto MD: Nothing to Disclose, Toyomi Satoh MD: Nothing to Disclose, Hiroyuki Yoshikawa MD, PhD: Nothing to Disclose, Manabu Minami MD, PhD: Nothing to Disclose

TEACHING POINTS
The International Federation of Gynecology and Obstetrics (FIGO) recently underwent significant revision for cancer of the ovary. The revision is based upon the concept that high-grade serous tubal intraepithelial carcinoma (STIC) may be the origin of some high-grade serous carcinomas (HGSC) of the ovary and peritoneum. Therefore, the staging criteria of the ovary, fallopian tube and peritoneum have just unified. The teaching points of this exhibit are: 1. To clarify the concept of STIC and apparent multicentric origin of HGSC of müllerian-derived tissues. 2. To show the examples of diseases along with the new staging criteria with MRI and CT.

TABLE OF CONTENTS/OUTLINE
A. A brief interpretation of "STIC" theory. B. Imaging examples of HGSC of the ovary, fallopian tube, and peritoneum C. CT and MRI examples of the each stage of the diseases with emphasizing the changes of the revised FIGO staging system including: 1. Due to the difficulty in decision of the primary site, stage II was simplified. 2. Exclusive lymph node metastasis is no longer stage IIIc as patients with retroperitoneal lymph node involvement without peritoneal involvement have better prognosis. 3. Stage IV was divided into stage IVa with malignant pleural effusion and stage IVb with distant metastasis.

OBE145
Premedicating Pregnant Patients with A Contrast Allergy Before CT: Is There a Role — Alternatives, Risks, and Benefits (Station #2)

Jaspreet Kaur Bisla MD (Presenter): Nothing to Disclose, Jeanne Miriam Horowitz MD: Nothing to Disclose, Cecil Gordon Wood MD: Nothing to Disclose, Frederick Lawrence Hoff MD: Nothing to Disclose, Vahid Yaghmai MD: Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To review the risks and benefits of premedication in pregnant patients 2. To review indications for contrast enhanced CT in pregnancy 3. To discuss alternative imaging tests for a pregnant patient

TABLE OF CONTENTS/OUTLINE
I. Risks and benefits of premedication in pregnant patients A. Benadryl-Class B B. Prednisone-Class C C. Break-through reactions D. Informed written consent II. Are there indications for a contrast enhanced CT in pregnancy? A. Body imaging B. Neuro imaging C. Low radiation dose CT technique III. Imaging alternatives A. Ultrasound a. Appendix b. Pelvic B. MRI- noncontrast a. Acute abdominal pain- appendicitis, SBO, biliary, pancreatitis IV. Conclusion - While pregnant patients can be premedicated, alternative imaging such as ultrasound and/or MRI is preferable to premedicating pregnant patients for a CT due to the risk of a breakthrough reaction and lack of radiation.

MSE-SUB
Multisystem/Special Interest Sunday Poster Discussions

Education Exhibits

AMA PRA Category 1 Credits ™: .50
Sun, Nov 30 1:00 PM - 1:30 PM Location: MS Community, Learning Center

Sub-Events

MSE149
Overcoming MR Image Quality Problems. A Practical Approach (Station #1)


TEACHING POINTS
1. MR image quality is mainly determined by three main factors: signal to noise ratio (SNR), resolution and scan speed.

2. Most MR image quality problems mainly affect one of these three categories, and recognition of the main problem area is the first step in image optimization.

3. Diagnostic quality images may be obtained if compromises to the other two areas may be tolerated.

4. Scanning at 3T allows significant gains in SNR, which then may be reinvested to improve resolution and scan speed.

**TABLE OF CONTENTS/OUTLINE**

1. Determinants of MR image quality and examples
   a. Signal to noise ratio (SNR)
   b. Resolution
   c. Scan speed
2. How to recognize the main culprit that is causing poor image quality.
3. Determining where compromises can be made and making appropriate changes.
4. Reinvesting signal gains from 3T imaging to improve resolution and scan speed.

**OBE-SUB**

**Obstetrics/Gynecology Sunday Poster Discussions**

*Education Exhibits*

**OB**

AMA PRA Category 1 Credits ™: .50

Sun, Nov 30 1:00 PM - 1:30 PM  Location: OB Community, Learning Center

**Sub-Events**

**OBE175**

MRI Evaluation of the Female Pelvic Floor: Dynamic Imaging of Normal Function and Dysfunction (Station #1)

Melinda Jean Yeh MD (Presenter): Nothing to Disclose, Vignesh Amal Arasu MD: Nothing to Disclose, Ginger Merry MD, MPH: Nothing to Disclose, Thomas A. Hope MD: Speaker, Guerbet SA Research Grant, General Electric Company, Stefanie Weinstein MD: Nothing to Disclose, Rizwan Aslam MBBCh: Research support, Bayer AG

**TEACHING POINTS**

1. Understand normal anatomy and function of the "pelvic floor." 2. Identify types of pelvic floor dysfunction on MRI.

**TABLE OF CONTENTS/OUTLINE**

A. Background • Epidemiology and risk factors • Anatomy of the pelvic floor Surgical compartments Anatomic Layers B. Technique • MRI protocols • Dynamic imaging C. Imaging • Pelvic Floor Support Structures • Pelvic Floor Relaxation Pubococcygeal line (PCL) Descent: M-line calculation Widening: H-line calculation • Pelvic Organ Prolapse • Bladder Vagina • Rectum • Rectal evacuation D. Discussion • Treatment • Outcomes

**MSE-MOA**

**Multisystem/Special Interest Monday Poster Discussions**

*Education Exhibits*

**OT**

AMA PRA Category 1 Credits ™: .50

Mon, Dec 1 12:15 PM - 12:45 PM  Location: MS Community, Learning Center

**Sub-Events**

**MSE013-b**

105 Years of Conventional Dacryocistography Nowadays Technique and Advances (hardcopy backboard)

Felipe Aluja MD (Presenter): Nothing to Disclose, Rodolfo Alberto Mantilla Espinosa MD: Nothing to Disclose, Jorge O. Suarez MD: Nothing to Disclose

**TEACHING POINTS**

Review the technique of dacryocystography that was originally described by Ewing in 1909 using bismuth subnitrate as contrast media. It was the first method used to evaluate the lacrimal drainage system. Describe the lacrimal drainage system anatomy in dacryocystography including essential structures as Rosenmüller valve, Krause valve and Hasner valve. Recognize nasolacrimal drainage system pathologies, specially causes of obstruction as infectious, inflammatory, congenital, tumoral and traumatic. Discusses and illustrate other imaging methods including ultrasound, computed tomography, magnetic resonance imaging and nuclear medicine.

**TABLE OF CONTENTS/OUTLINE**
**MSE102**

**Fungus Among Us: Spectrum of Imaging Findings in Coccidiomycosis (Station #1)**

Asha Goud MD (Presenter): Nothing to Disclose, Neil Patel MD: Nothing to Disclose

**TEACHING POINTS**

Coccidioidomycosis, commonly known as Valley Fever, is caused by a fungus found in the soil of dry areas and is endemic to the southwestern United States. At least 30-60% of people who live in an endemic area are infected at some point in their lives. The infection is spread through inhalation of particles and travelers passing through endemic areas may also contract the disease. Clinical manifestations range from minor respiratory illness that clears on its own to severe multi-organ system disseminated disease. The goals of this exhibit are to become familiar with the clinical manifestations be able to identify the spectrum of multi organ system imaging findings.

**TABLE OF CONTENTS/OUTLINE**

1. Background
2. Clinical manifestations and laboratory/imaging findings of Valley Fever.
3. An emphasis is placed on wide range of imaging findings and dissemination patterns to various organ systems on multiple modalities (CT, US, NM, and MR) including: pulmonary musculoskeletal ocular gastrointestinal and lymphatic systems.
4. Conclusion: Each year there are over 150,000 cases of Valley Fever, however, there is little public awareness of this disease. Knowledge of the wide spectrum of imaging findings are essential in the diagnosis and management.
Anatomical considerations of the female peritoneum
Imaging patterns of main lesions of each compartment
Sample cases and mimics
General overview on the clinical consequences and the patient management
Summary and diagnostic algorithm

**MR Defecography: A Comprehensive Review of the Pelvic Floor Anatomy — How To Do It and What to Look For! (Station #2)**

Carolina Augusta Modena Heming MD (Presenter): Nothing to Disclose, Antonio Eiras-Araujo MD: Nothing to Disclose, Jaime Araujo Oliveira Neto MD: Nothing to Disclose, Rosana Souza Rodrigues MD, PhD: Nothing to Disclose, Daniella Braz Parente MD: Nothing to Disclose

**TEACHING POINTS**

1. Review pelvic floor normal anatomy and landmarks. 2. Describe how to perform, what to look for, and how to interpret MR defecography. 3. Illustrate the different pathologies of the pelvic floor (pictures and videos) and their grading system. 4. Discuss the common pitfalls and limitations, and the proper reporting method.

**TABLE OF CONTENTS/OUTLINE**

1. MRI Protocols: Anatomic Study (small FOV, 3mm slice thickness, adequate angulation) and Dynamic Study (Rest, Sphincter contraction, Valsalva maneuver, Evacuation) 2. Normal anatomy of the pelvic floor: bladder, urethra, uterus, vagina, anorectal junction, puborectal, pubococcigeal, and ileococcigeal muscles, external and internal anal sphincters, ligaments, fasciae, perineal body. 3. Important landmarks: pubococcygeal line, H line, M line, anorectal angle. 4. Examples of different pathologies: urethral hypermobility, cystocele, uterine prolapse, anterior rectocele, rectal prolapse, rectal and anal invagination, enterocoele, peritonocele, spastic pelvic floor syndrome, anal incontinence.

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**MSE-MOB**

**Multisystem/Special Interest Monday Poster Discussions**

_Education Exhibits_

**OT**

AMA PRA Category 1 Credits ™: .50

Mon, Dec 1 12:45 PM - 1:15 PM Location: MS Community, Learning Center

**Sub-Events**

**MSE103**

_IgG4-related Disease from Head to Toe (Station #1)_

Anxo Martinez De Alegria MD (Presenter): Nothing to Disclose, Sandra Baleato Gonzalez MD: Nothing to Disclose, Ihab Abdulkader-Nallib: Nothing to Disclose, Jose-Antonio Diaz-Peromingo: Nothing to Disclose, Carmen Villalba-Martin MD: Nothing to Disclose

**TEACHING POINTS**

IgG4-related disease is a newly recognized systemic disorder that can involve almost any organ. The imaging findings consist of diffuse and focal organ infiltration by fibroinflammatory tissue, mimicking a neoplastic process. It is important to recognize the multorgan involvent of this disease and be familiar with its imaging features, in order to avoid unnecessary surgical procedures. The purposes of this exhibit are: - To provide a practical review of the spectrum of imaging findings in patient with IgG4-related disease. - To emphasize its systemic nature and the continuously growing list of extrapancreatic manifestations. - To address the differential diagnosis with other inflammatory or neoplastic processes

**TABLE OF CONTENTS/OUTLINE**

Index Physiopathological and clinical features of IgG4-related disease Radiological manifestations of IgG4-related disease: - Head and neck involvement - Pulmonary and mediastinal disease - Autoimmune pancreatitis and hepatobiliary tract involvement - Retroperitoneal fibrosis and renal involvement Take home points

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**OBE-MOB**

**Obstetrics/Gynecology Monday Poster Discussions**

_Education Exhibits_

**OB**

AMA PRA Category 1 Credits ™: .50

Mon, Dec 1 12:45 PM - 1:15 PM Location: OB Community, Learning Center

**Sub-Events**

**OBE135**

_High Yield Tutorial: Ultrasound Diagnosis of Placenta Accreta (Station #1)_

Alison Matich BA (Presenter): Nothing to Disclose, Dolores Helen Pretorius MD: Software support,
TEACHING POINTS

The purpose of this exhibit is: 1. To review classification, pathophysiology, and epidemiology of placenta accreta. 2. To illustrate five sonographic signs of placenta accreta, with attention to associated pitfalls and criteria for adequate ultrasound images.

TABLE OF CONTENTS/OVERSE


MSE-TUA

Multisystem/Special Interest Tuesday Poster Discussions

Education Exhibits

AMA PRA Category 1 Credits ™: .50

Tue, Dec 2 12:15 PM - 12:45 PM  Location: MS Community, Learning Center

Sub-Events

MSE139

Hydatid Disease: Spectrum of Unusual Locations and Complications (Station #1)

Badreedine Alami MD (Presenter): Nothing to Disclose, Omar Addou MD, MSc : Nothing to Disclose, Youssef Alaoui Lamrani MD : Nothing to Disclose, Imane Kamaoui MD, PhD : Nothing to Disclose, Shiam Tizniti : Nothing to Disclose, Mustapha Maaroufi : Nothing to Disclose, Meryem Boubou : Nothing to Disclose

TEACHING POINTS

- Describe the imaging features of hydatid disease in various unusual locations. - Recognize the appropriate imaging methods for each location, its advantages and limitations. - Show the various complications of this infectious process.

TABLE OF CONTENTS/OVERSE

CONTENT ORGANIZATION 1) Introduction 2) Epidemiology and etiopathogeny 3) Imaging tools: Plain radiography, ultrasonography, computed tomography (CT) and MR imaging 4) Specific radiologic appearance in unusual sites including: Spleen - Kidney - Pancreas- Adrenal gland - Peritoneum and retroperitoneum - Interventricular septum - Pleura- Diaphragmatic crus - pulmonary artery - Brain - Spinal cord - Soft tissue- Testis and Ovary. 5) Complications of hydatid disease including: - Rupture and biliary communication, - Bacterial superinfection of hydatic cyst , - Exophytic growth, - Perforation into hollow viscera, - Peritoneal seeding, - Portal vein involvement, - Abdominal wall invasion. SUMMARY The hydatid disease should be included in the differential diagnosis of a cystic lesion, found anywhere in the body, especially when they occur in endemic regions. Good knowledge of unusual locations and its imaging findings is essential to make a prompt and accurate diagnosis and avoid serious complications of this infectious process.

MSE121

The Post-Visceral Transplant Neoplasias: A Review (Station #2)


TEACHING POINTS

PURPOSE/AIM
1. Review epidemiology and prognosis of post-transplant malignancy
2. Review risk factors and potential predictors of malignancy
3. Review imaging findings of post-transplant malignancies

TABLE OF CONTENTS/OVERSE

CONTENT ORGANIZATION 1. Epidemiology, characteristics and prognosis of post-transplant malignancy a. Epidemiology and common tumors b. Survival comparison to non-transplant patients 2. Risk factors and predictors of malignancy a. Risk factors for solid organ malignancies b. Risk factors for non-melanoma skin cancers c. Role of immunosuppressive therapy and viral infections 3. Cross-sectional imaging of post-transplant tumors a. Donor organ and recipient preexisting malignancies b. De novo malignancies i. Kaposi's sarcoma ii. Post transplant lymphoproliferative disorder iii. Skin tumors iv. Others 4. Conclusion SUMMARY As mortality from infectious and cardiovascular diseases decline, malignancy has become one of the more common causes of morbidity and mortality in transplant patients. Malignancies in these patients carry worse prognosis. Long term immunosuppression and viral illness are the most important of risk factors and predictors. The purpose of this exhibit is to illustrate the pathophysiology, risk factors, and role of imaging in screening and diagnosing post-transplant malignancies.
**OB-E-TUA**

**Obstetrics/Gynecology Tuesday Poster Discussions**

_Education Exhibits_

**OB**

AMA PRA Category 1 Credits™: .50

Tue, Dec 2 12:15 PM - 12:45 PM   Location: OB Community, Learning Center

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**Sub-Events**

**OBE101**

New Classification of Mullerian Anomalies, Clinical Implications, and Treatment Frontiers (Station #1)

Mariam Moshiri MD (Presenter): Consultant, Reed Elsevier Author, Reed Elsevier, Suresh Maximin MD: Nothing to Disclose, Sherif Osman MD: Nothing to Disclose, Christine O. Menias MD: Nothing to Disclose, Puneet Bhargava MD: Editor, Reed Elsevier, Sabrina Mahboob MBBS: Nothing to Disclose, Douglas S. Katz MD: Nothing to Disclose

**TEACHING POINTS**

The most commonly used classification system for mullerian anomalies is that created by American Fertility Society (AFS). Occasionally anomalies are identified on imaging which do not closely match any of the described classes. Very recently the EUROPEAN SOCIETY OF HUMAN REPRODUCTION AND EMBRYOLOGY and EUROPEAN SOCIETY FOR GYNECOLOGICAL ENDOSCOPY formed a working group CONUTA to arrive at a more accurate and objective classification. The working group has developed a new system based on scientific research and recommendations of experts. The purpose of the exhibit is therefore to review the new classification system, explain how this system builds on and clarifies the AFS system, and to demonstrate how to use the system with imaging case examples

**TABLE OF CONTENTS/OUTLINE**

Review the newly proposed classification of mullerian anomalies, which includes: U (uterus), C (cervix), V (vagina) categorization for each given anomaly, compare the new system with the currently used AFS classification system Review representative cases with multiple imaging modalities: US, 3D US, MR, hysterosalpingography and in selected cases CT Review clinical implication for fertility and patient management Review clinical treatment methods based on new classification system Review new treatment frontiers for treatment of female infertility, including uterus transplantation

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**OBE100**

"Fetal Malformations of the External Ears: More Than What It Sounds" (Station #2)

Maria A. Calvo-Garcia MD (Presenter): Nothing to Disclose, Rupa Radhakrishnan MD: Nothing to Disclose, Arnold Carlson Merrow MD: Author, Amirsys, Inc Editor, Amirsys, Inc Employee, Amirsys, Inc, Beth M. Kline-Fath MD: Nothing to Disclose

**TEACHING POINTS**

The ear (also known as pinna or auricle) is not frequently targeted during the routine fetal anatomic assessment. However, it could provide important clues in the presence of other facial or systemic anomalies. We will review basic embryologic steps in the formation of the face that will help understand the pattern of specific ear malformations. Subsequently we will present the imaging evaluation of a group of clinical conditions with their postnatal correlations. With this exhibit we expect the reviewers to become familiar with characteristic scenarios and potential search patterns during US and fetal MRI evaluations.

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**OBE-TUB**

**Obstetrics/Gynecology Tuesday Poster Discussions**

_Education Exhibits_

**OB**

AMA PRA Category 1 Credits™: .50

Tue, Dec 2 12:45 PM - 1:15 PM   Location: OB Community, Learning Center

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**MSE-WEA**

**Multisystem/Special Interest Wednesday Poster Discussions**

_Education Exhibits_

**OT**
Sub-Events

**MSE151**

**Perfusion CT: Methodology, Acquisition Protocols, Post Processing Techniques, and Practical Clinical Considerations (Station #1)**

Adriana Danielle Faulkner MD (Presenter): Nothing to Disclose, Kohsuke Kudo MD: Nothing to Disclose, Qing Yang PhD: Employee, Apollo Medical Imaging Technology Pty Ltd, Ameera Fouad Fareed Ismail MD: Nothing to Disclose, Vicky Joo-Lin Goh MBCh: Research Grant, Siemens AG, Farhood Saremi MD: Nothing to Disclose

**TEACHING POINTS**

To learn general principle of CT perfusion imaging and common acquisition protocols To understand how to interpret perfusion parameters To review post processing techniques used in current practice and learn common artifacts to avoid misinterpretation

**TABLE OF CONTENTS/OUTLINE**

Scanner requirements: volume scanner, dual source (Helical Shuttle), dual energy Influencing parameters: spatial resolution, noise, temporal resolution, pitch, slice thickness Data acquisition protocols: scan duration, frequency of sampling, reconstruction interval, anatomic coverage Contrast related issues: dose, iodine concentration, injection rates , dual phase Arterial input and venous output functions Mathematical modeling techniques: Compartmetal model, deconvolution analysis Perfusion parameters: volume, flow, mean transit time, pemeeability Anatomical differences: single versus dual supply tissue perfusion Clinical applications: stroke, myocardial ischemia, body (lung, liver, kidney) imaging, oncological application, Radiation dose issues Artifacts; patient related, beam hardening, cone-beam, misregistration, post processing

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**OBE-WEA**

**Obstetrics/Gynecology Wednesday Poster Discussions**

**Education Exhibits**

**OBE140**

**More than Neural Tube Defects: Spectrum of Pathology to Consider with Elevated Maternal Serum AFP (Station #1)**

Lorene Elaine Romine MD (Presenter): Nothing to Disclose, Tracy Anton BS: Nothing to Disclose, Gladys Ramos MD: Nothing to Disclose, Dolores Helen Pretorius MD: Software support, Koninklijke Philips NV Software support, General Electric Company

**TEACHING POINTS**

1. Review the spectrum of abnormalities that may be present when a pregnant woman presents with an elevated serum AFP at aneuploidy screening. 2. Identify key imaging features that will aid in appropriate diagnosis.

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**OBE169**

**Maternal Gastrointestinal Disorders During Pregnancy: Diagnosis Utilizing MRI and Management Stratification (Station #2)**

Sherelle Lea Laifer-Narin MD : Nothing to Disclose, Edgar St Amour MD (Presenter): Nothing to Disclose

**TEACHING POINTS**

This exhibit reviews gastrointestinal disorders that may present during pregnancy and their imaging characteristics. Rationale for decisions to pursue medical treatment versus surgical management are presented.

**TABLE OF CONTENTS/OUTLINE**

Background: Gastrointestinal disorders may present during pregnancy; up to 1% of pregnant women require non-obstetrical general surgery. Many anatomic and physiologic changes occur during pregnancy, and various signs and normal symptoms of pregnancy may be confused with symptoms of acute gastrointestinal disorders. Accurate diagnosis and treatment of the pregnant patient is of the highest priority, and proper treatment will
benefit both the mother and the fetus. Imaging parameters: Noncontrast MRI was performed. Mutiplanar T2 weighted images of the maternal abdomen were obtained. Differential Diagnosis: Acute appendicitis, cholecystitis, pancreatitis, inflammatory bowel disease, colitis, bowel obstruction, hepatic lesions, and colorectal malignancy. Summary: Accurate diagnosis of acute abdominal pain is paramount; therapeutic decisions may be medical, surgical, or expectant. Maternal condition takes priority, however, added fetal risks are involved. Multidisciplinary consultation is crucial, additional precautions must be taken, and nonemergent surgery may be delayed until after delivery.

**MSE-WEB**

**Multisystem/Special Interest Wednesday Poster Discussions**

*Education Exhibits*

**OT**

AMA PRA Category 1 Credits ™: .50

Wed, Dec 3 12:45 PM - 1:15 PM Location: MS Community, Learning Center

**Sub-Events**

**MSE123**

**Abdominal Manifestations of Systemic Autoimmune Diseases and Vasculitis (Station #1)**

Kiyoyuki Minamiguchi (Presenter): Nothing to Disclose, Aki Takahashi MD: Nothing to Disclose, Nagaaki Marugami: Nothing to Disclose, Ryosuke Taiji: Nothing to Disclose, Junko Takahama MD: Nothing to Disclose, Kimihiko Kichikawa MD: Nothing to Disclose

**TEACHING POINTS**

1. To present an overview of systemic autoimmune diseases and vasculitis that can involve abdomen. 2. To describe imaging findings and clinical presentation those are helpful in diagnosing with illustrations.

**TABLE OF CONTENTS/OUTLINE**

1. The pathophysiology of abdominal involvement by autoimmune diseases and vasculitis will be discussed. 2. The imaging spectrum of the abdominal manifestations of systemic autoimmune diseases and vasculitis such as systemic lupus erythematosis, scleroderma, polymyositis/dermatomyositis, Behcet’s disease, IgA vasculitis and polyarteritis nodosa will be reviewed with the clinical findings and a discussion of the differential diagnosis. 3. The imaging findings of treatment complications (drug toxicity, opportunistic Infection) will be reviewed.

**OBE-WEB**

**Obstetrics/Gynecology Wednesday Poster Discussions**

*Education Exhibits*

**OB**

AMA PRA Category 1 Credits ™: .50

Wed, Dec 3 12:45 PM - 1:15 PM Location: OB Community, Learning Center

**Sub-Events**

**OBE141**

**MRI of Placenta Accreta, Increta and Percreta: What the Radiologist Needs to Know (Station #1)**

Anuradha Samir Shenoy-Bhangle MD (Presenter): Nothing to Disclose, Debra Ann Gervais MD: Research Grant, Covidien AG, Susanna I. Lee MD, PhD: Nothing to Disclose

**TEACHING POINTS**

1. MRI is indicated in patients with equivocal or suspected ultrasound diagnosis of abnormal placentation for confirmation and surgical planning 2. Exam should be performed between 23 to 30 weeks of gestation, without intravenous contrast and with a radiologist monitoring image acquisition 3. Diagnostic features are rounded placental margins, intraplacental T2 hypointense bands and uterine bulging (accreta/increta) and disruption of myometrial wall (percreta) 4. Report should include diagnosis (percreta vs. accreta/increta vs. negative), identification of the adjacent involved organs, placental location and a description of the previa.

**TABLE OF CONTENTS/OUTLINE**

Introduction Definition of abnormal placentation variants Demographics Management issues Indications for MRI Exam performance Timing relative to gestation Image acquisition protocol Image interpretation - 16 pathologically confirmed cases with diagnostic features Normal - 30 weeks Suspicious on ultrasound but negative on MRI Accreta/Increta - obvious and subtle Percreta - invasion into bowel, bladder, abdominal wall muscle Reporting Diagnosis - test sensitivity and specificity Features relevant to treatment planning Other possible incidental findings relevant to obstetrical management

**MSE-THA**

**Multisystem/Special Interest Thursday Poster Discussions**
Sub-Events

Oncologic Imaging: Typical Pitfalls in Tumor Response Evaluation (Station #1)

Maka N. Kekelidze MD, PhD (Presenter): Nothing to Disclose, Joachim Hohmann MD, DIPLPHYS: Research funded, Bayer AG Research funded, Siemens AG, Pietro Lodise: Nothing to Disclose, Matthias Rasmus MD: Nothing to Disclose, Georg M. Bongartz MD: Research Grant, Bayer AG Research Grant, Siemens AG

TEACHING POINTS

1. To illustrate 10 pitfalls that confound the interpretation of radiologic tumor response monitoring. 2. To learn about the negative consequences caused by these pitfalls. 3. To provide practical tips how to avoid them in clinical practice.

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Main pitfalls in tumor response interpretation: 1. Assignment of non-qualifying target lesions (number, size, pseudolesions); 2. Measurement of non-reproducible targets: irregularly shaped, merging/splitting lesions; 3. Misinterpretation of bone metastases; 4. Choice of inadequate response criteria (e.g. RECIST, Choi, Cheson, mRECIST, PERCIST); 5. Consideration of reappearing lesions as progressive disease; 6. Wrong definition of Baseline/Nadir as reference; 7. Inconsistencies of lesion definition/measurements in follow-up; 8. Miscalculation of time-point response (mixed response); 9. Inconsistency of clinical data or further imaging results; 10. Comparison of inconsistent modalities and/or protocols Conclusion: Radiologists should be aware of pitfalls in tumor response evaluation which dramatically influences oncologic treatment decision. Proper application of available response criteria with thorough knowledge of their limitations can lower the negative implications for patient care and increase the efficiency of imaging based tumor response evaluation.

Sub-Events

MRI of the Fetal Cerebellum and Posterior Fossa — Spectrum of Abnormalities (Station #1)

Sherelle Lea Laifer-Narin MD: Nothing to Disclose, Frank Hao MD (Presenter): Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to review normal cerebellar development and anatomy. Knowledge of normal anatomy and landmarks will assist in identifying cerebellar abnormalities and pathology. The reader should be familiarized with pathology indicative of both good and poor prognoses.

TABLE OF CONTENTS/OUTLINE

Background: Fetal MRI has greatly improved analysis and diagnosis of fetal cerebral and cerebellar anatomy and pathology. Cerebellar abnormalities can be divided into disorders of development, presenting with either a large posterior fossa, or with a normal or small posterior fossa, and destructive disorders. The spectrum of cerebellar abnormalities will be reviewed. Differential diagnosis: Disorders presenting with a large posterior fossa include the Dandy-Walker malformation, mega cistern magna, posterior fossa arachnoid cyst, and Blake's pouch cyst. Disorders presenting with a normal or small posterior fossa include the Dandy-Walker variant, cerebellar hypoplasia/agenesis, and rhombencephalosynapsis. Destructive disorders include cerebellar hemorrhage and infant. Summary: Many diverse cerebellar abnormalities can occur. Precise evaluation and delineation of cerebellar abnormalities can be accomplished with the use of MRI, confirming or negating ultrasound diagnoses. This allows for more accurate prognostication and genetic counseling.
Sub-Events

MSE122

3-D Printing in Radiology—How to Get Started (Station #1)
Alex Marro BSc (Presenter): Nothing to Disclose, Mark Daniel Cicero: Nothing to Disclose, Walter H. Mak MD: Nothing to Disclose, Timothy Richard Dowdell MD: Nothing to Disclose, Taha Bandukwala MD: Nothing to Disclose

TEACHING POINTS
1) 3-D printers are now affordable and will continue to decrease in cost. They are poised to be a part of imaging departments in the future. 2) Outline the steps in creating a 3-D model from CT images: 1) image acquisition 2) segmentation using a bone window 3) crop the mask and make edits 4) perform 3-D reconstruction 5) apply post-processing to smooth out artifacts 6) import to printer software 7) set printer parameters and print 3) Review of literature in current and anticipated use of 3D printed models in healthcare. 4) Given their expertise in imaging, radiologist should be involved in the processing and post processing of data files, and review the printed 3-D model for accuracy and quality assurance.

TABLE OF CONTENTS/OUTLINE
1) A brief history of 3-D printing 2) The process of creating 3-D parts from CT images 3) Current and future applications of 3-D printing in healthcare 4) Role of the radiologist in 3-D model reconstruction

Obstetrics/Gynecology Thursday Poster Discussions

OBE-THB

Obstetrics/Gynecology Thursday Poster Discussions

Education Exhibits

OB

AMA PRA Category 1 Credits ™: .50
Thu, Dec 4 12:45 PM - 1:15 PM  Location: OB Community, Learning Center

Review of Safety of MRI in Pregnancy (Station #1)
Kristina Elizabeth Hoque MD, PhD (Presenter): Nothing to Disclose, Daphne Kim Walker MD: Nothing to Disclose

TEACHING POINTS
This exhibit explores the basic principles of MRI safety for both pregnant healthcare workers and pregnant patients. A review of past and present literature pertaining to effects of MRI on the developing fetus will be explored. Past and present guidelines for MRI and gadolinium contrast agents will be detailed.

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