New technology has ultrasound poised for Renaissance

New quantitative methods are augmenting ultrasound’s traditional role as a safe, fast and easy-to-perform modality and giving it new life and increased relevance in medical imaging, according to one of the leading experts in the field.

By Richard S. Dargan

The presenter of the RSNA 2014 New Horizons Lecture, Jonathan M. Rubin, M.D., Ph.D., described how quantitative ultrasound techniques like volume flow estimation and elasticity imaging provide insight into the function of some of the body’s major organs.

Though still in its infancy, elasticity imaging—a measure of the mechanical properties of tissue—has many applications that will develop over time, Dr. Rubin said. “Elasticography has grown beyond strain and shear wave speed imaging to include shear viscosity imaging, non-linear strain and non-linear shear wave imaging,” he said. “The applications are expanding rapidly, and the impact will almost certainly be major.”

One of the newest and most exciting potential applications is in lung imaging, where researchers have developed a new technique to monitor respiratory motion by measuring lung strain. The technique takes advantage of the fact that the lung’s surface expands like a balloon when filled with air. A transducer is placed on the skin and used to track speckle on the lung surface. The lung strain is positive when the patient inhales, and negative when the patient exhales.

“People with lung disease have no strain because there’s no aeration,” Dr. Rubin said. “This technique enables us to measure local lung ventilation, which is almost impossible with current methods.”

Though still in its early stages, the technique has been successfully accomplished in mice with pulmonary fibrosis. Potential applications include assessing and monitoring patients with pulmonary fibrosis and other lung conditions.

“Mick Jagger” Position Helps Improve Visualization of Biceps Tendon on Ultrasound

I considered the anatomy with the tendon moving as the shoulder is put in different positions, and the Mick Jagger position is the one where it is the best visible.

Patrick Omoumi, M.D.

“I considered the anatomy with the tendon moving as the shoulder is put in different positions, and the Mick Jagger position is the one where it is the best visible,” said Dr. Omoumi, associate physician at Service de Radiologie Diagnostique et Interventionnelle in Lausanne, Switzerland.

Study Suggests Role of MR Imaging after DBT Should be Reassessed

It is necessary to perform MR imaging after digital breast tomosynthesis (DBT) to detect additional disease in patients diagnosed with breast cancer? A study presented Monday suggests that preoperative use of MR imaging in breast cancer patients be reevaluated as DBT replaces 2D digital mammography.

Routine use of MR imaging to screen newly diagnosed breast cancer is already controversial and varies greatly from institution to institution, said presenter Amy Chudgar, M.D., of the Hospital of the University of Pennsylvania (HUP), who was awarded a Trainee Research Prize—Resident, for her research, “Digital Breast Tomosynthesis versus Contrast induced nephropathy and renal failure 13A.”

Digital mammography detected cancers: Assessment of Disease Extent on MRI.”

“Some surgeons do MRIs on every patient preoperatively, while others will do the exam at the patient’s request,” Dr. Chudgar said.

While some previous studies have shown that preoperative MR imaging detects more disease and is useful for planning surgeries, other studies have discovered a high rate of false positive results that can lead to unnecessary surgery. Some recent studies also show that DBT is superior to 2D digital mammography at discovering cancers, suggesting the DBT alone may be enough to detect the full extent of disease.
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Tuesday At a Glance

7:15–8:15
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RSNA Diagnosis Live™
Body, Cardiac, MSK, Neuro, ENT
Potpourri
3:00–6:00
Series Course
Pediatric
3:30–5:00
 Associated Sciences Refresher Course
Essentials of Breast Imaging
4:30–6:00
 Refresher/Informatics Courses
4:45–6:00
 BOOST: Bolstering Oncoradiologic and Oncoradiotherapeutic Skills for
Tomorrow: Case-based Review—Head and Neck, Gynecology

12:15–1:15
Poster Discussions
12:30–2:00
Informatics Courses
1:30–2:45
Tuesday Plenary Session
(Arie Crown Theater)
Presentation of Gold Medals
(See Page 14A)
Annual Oration in Diagnostic Radiology
Transcending from Volume-Based to
Value-Based Practice:
A Meaningful Goal for All Radiologists or
a Meaningless Platitude?
David C. Levin, M.D.
1:30–3:00
 Associated Sciences Refresher Course
Essentials of Chest Imaging
Quality Improvement Symposium: Staff
and Patient Safety
1:30–6:00
 Interventional Oncology Series:
Liver Metastases
2:30–4:00
Informatics Courses
3:00–4:00
Scientific Paper Sessions
3:00–4:15
 BOOST: Bolstering Oncoradiologic and Oncoradiotherapeutic Skills for
Tomorrow: Case-based Review—
Head and Neck, Gynecology

Need a fresh new headshot for your CV or
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studio, located in the RSNA Services area
in the Lakeside Center, Level 3 Ballroom, is
open today through Thursday from 10 a.m.
until 5 p.m.
Radiologists Across the World Need to Lead the Way in Radiation Safety

As the gatekeepers of imaging, radiologists worldwide need to take a leading role in educating patients, referring physicians and the public about the issues surrounding radiation safety, according to a panel of experts from across the globe gathered for RSNA’s International Trends meeting.

By Elizabeth Gardner

Held Monday, this year’s meeting focusing on “Radiation Safety Regulations and Impact on Patient Care,” drew more than 30 attendees representing major radiology organizations across the globe. They gathered to assess the current state of radiation safety regulations and discuss how radiologists can impact the issue. Each year the International Trends meeting is held on a topic of global concern to the profession to help radiology organizations work together toward solutions.

“We can all remember coming to this meeting when ultrasound was the hot topic, and then CT and then MRI, but right now there are no new technologies and quality and safety are the hottest topic,” said James Borgstede, M.D., president of the International Society of Radiology and RSNA Board Liaison for International Affairs who co-modерated the meeting with International Advisory Committee Chair Byung Ihn Choi, M.D. “If we don’t take the lead here, someone else will.”

Radiation Education, Awareness Lacking

A survey conducted among the attendees before the meeting showed that while most thought their countries do a reasonably good job of regulating radiation exposure, a majority think that neither their country’s referring physicians nor their patients are well-educated on the issue. Respondents also said their governments were the most influential factor in determining how radiation exposure is regulated while educational institutions are perceived to have the least influence.

Radiation exposure from all sources has increased 65 percent in the past decade—partly due to greatly expanded use of CT scans—said presenter Marilyn Goske, M.D., Corning Benton Endowed Chair for Radiation Education, Professor of Radiology and Pediatrics at the University of Cincinnati College of Medicine and staff radiologist at Cincinnati Children’s Hospital Medical Center who founded and chairs the international Image Gently® campaign focusing on using kid-sized imaging for children in the U.S.

“There has been an alphabet soup of international agencies working toward radiation protection for years, but now the conversation has really moved into the medical field, where there’s greater awareness of the need for optimizing dose,” Dr. Goske said.

While awareness of radiation exposure has grown, it’s by no means universal even among medical personnel said Omnolola Atalabi, M.B.B.S., of Nigeria, where there are fewer than 500 radiologists serving a country of 170 million people. Dr. Atalabi said that most radiological exams in Nigeria are carried out by thousands of radiology assistants with no formal training. In the U.S., Dr. Goske said the Image Gently campaign recently expanded its outreach to include the nation’s 143,000 dental hygienists who collectively take no formal position on radiation exposure, despite being responsible for millions of dental X-rays annually.

Without a clear understanding of the risks of radiation exposure weighed against the advantages of imaging studies, non-radiologists can make a host of unequipped decisions, said Ulrich Bick, M.D., professor of radiology and vice-chair in the Department of Radiology at the CHARITE Berlin, Germany, who discussed the issue of appropriate use. In Germany, the law gives radiologists the ultimate say in whether a study is appropriate by giving them the authority to overrule a referring physician. All the same, “appropriate use looks easier than it is,” Dr. Bick said. Practice guidelines disagree and sometimes payers may refuse to cover an exam if they think it’s too expensive. For new modalities or types of exams, payers demand the highest level of evidence, a randomized controlled trial, before they’ll cover the cost, Dr. Bick said. “It’s ridiculous, because those trials are usually not available and it delays access to new tests.”

Residents May Face Knowledge Gap

Perhaps the most concerning knowledge gap (though the one that might be easiest to fill) is among radiology residents. While they are required to record dose information as part of their reports, many don’t understand its significance, said Teresita Angtuaco, M.D., a professor of radiology and director of the Division of Imaging at the University of Arizona for Medical Sciences and chair of RSNA’s Committee on International Radiology Education.

“Residents have to learn it for the board exams, but that’s the only interest they have in radiation dose issues,” Dr. Angtuaco said. “We have to engage the residents in thinking that this is part of their job and to educate the public about radiation safety, because they’re the gatekeepers of imaging,” Dr. Angtuaco added. “Who else is going to tell people if radiologists don’t?”

There’s been an alphabet soup of international agencies working toward radiation protection for years, but now the conversation has really moved into the medical field, where there’s greater awareness of the need for optimizing dose.

Marilyn Goske, M.D.

New Technology Has Ultrasound Poised for Renaissance

Elastography has grown beyond strain and shear wave speed imaging ... the applications are expanding rapidly, and the impact will almost certainly be major.

Jonathan M. Rubin, M.D., Ph.D., professor, a field in which he was a pioneer. A combination of 3D and 4D ultrasound with an angle-independent technique has made flow estimation viable, with multiple physiological and pathological implications, Dr. Rubin said.

Volume flow estimation has proven to be very accurate in animal studies and has been used clinically to measure umbilical cord blood flow. In one patient, the technique even predicted preeclampsia, a potentially dangerous pregnancy complication. Other potential volume flow applications include transplant evaluations, cardiac output measurements and cerebral perfusion.

“We are at the cusp of a renaissance in ultrasound,” said Dr. Rubin. “There are many things going on in the field that will have a major impact on medical care.”
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Hypercarbic Challenge May Show Abnormal Brain Physiology in Concussed Athletes

Increased cerebrovascular reactivity (CVR) in college athletes following a sports-related concussion may be related to recurring headache symptoms and could be an indicator of acute injury, according to presenter Adam R. Militana, M.D., Monday at RSNA 2014.

By Paul LaTour

I don’t want to overstate any of our findings, but they do hint at an underlying physiology there,” said Dr. Militana, a third-year resident at Vanderbilt University School of Medicine.

Researchers studied seven college athletes (four men, three women, from ages 18-22) in three to six days following sports-related concussions, which were diagnosed by a sports medicine physician. They had no history of prior concussion and only one noted a prior migraine condition.

Using functional MRI with a hypercarbic challenge, the researchers found CVR increased approximately 33 percent across all regions of interest (ROI) in subjects compared with the control patients. The increase is associated with more recent injury, and in one region it is also associated with increased headache symptoms.

“Some regions were more elevated than others, but they increased much more than the controls,” Dr. Militana said. “This is unusual in CVR work.”

He added that imaging has played a limited role in assessment and treatment of concussions. The findings of the pilot study indicate that increased CVR may be an objective measure that could lead to an increased role for imaging in the future in assessing concussions, especially when it relates to return-to-play symptoms for concussed athletes.

“We hope this measure will help inform clinical decision-making in the future, in particular, return-to-play decisions,” Dr. Militana said.

No Correlation Between Innings Pitched and Degenerative Changes for Pitchers

In a separate study of Major League Baseball (MLB) pitchers, researchers found no statistical significant correlation between the number of innings pitched and any one characteristic MRI finding encountered in the throwing elbow, according to a study presented Monday.

“The professional pitcher’s elbow is subjected to a rather uniform and repetitive valgus torque that can lead to a characteristic spectrum of adaptive and degenerative changes that are readily identified on MRI,” said lead author Nicholas M. Gutierrez, M.D., a resident at the University of Miami Jackson Memorial Hospital. “However, these findings do not necessarily correlate with current or future development of elbow pain or dysfunction.”

Dr. Gutierrez and colleagues examined 26 asymptomatic MLB pitchers (asymptomatic being defined as no related stays on the disabled list in the two seasons prior to the MRI and no elbow complaints at the time of the MRI).

Annual Oration in Diagnostic Radiology Presented Today

Shift in Focus Will Make Radiology a High-value Specialty

Radiology faces many threats, ranging from commoditization and declining reimbursements to the perception that much imaging is unnecessary. Countering the threats means moving from the current volume-based practice model to a value-oriented one, says David C. Levin, M.D., who will present today’s Annual Oration in Diagnostic Radiology, “Transitioning from Volume-Based to Value-Based Practice: A Meaningful Goal for All Radiologists or a Meaningless Platitud?”

Dr. Levin, a preeminent expert in health policy and practice, calls on radiologists to become true consulting physicians who actively assess the appropriateness of imaging requests, more closely supervise performance of the studies and do better at communicating results to patients. With these changes, says Dr. Levin, within five years radiology could be considered a high-value specialty more helpful to patients and referring physicians than it is at present.

Dr. Levin is professor and chairman emeritus of the Department of Radiology at Jefferson Medical College and Thomas Jefferson University Hospital in Philadelphia. His recent research has focused on the utilization and costs of imaging procedures, the effects of self-referral and practice patterns in imaging. Dr. Levin established the Jefferson Center for Research on Utilization of Imaging Services. In 2008, an endowed chair was established in his honor at Thomas Jefferson University, renaming the chair of the Department of Radiology as The David C. Levin Professor and Chair of Radiology.

Goske Surprised with Butterfly Award

Marilyn J. Goske, M.D. (left), was surprised Monday with the 2014 Butterfly Award of the Alliance for Radiation Safety in Pediatric Imaging, recognizing outstanding dedication to the cause of radiologic protection for pediatric patients around the world. Dr. Goske, founding chair of the alliance, announced during a meeting Monday that she was stepping down in July 2015. In his first remarks as incoming chair, Donald P. Frush, M.D., detailed Dr. Goske’s achievements, including safety campaigns in CT, fluoroscopy, interventional radiology, CR/DR and safety in pediatric dentistry. Dr. Frush then surprised Dr. Goske with the Butterfly Award—she had thought she was to present it to someone else. Children of the world are safer because of Dr. Goske’s work, Dr. Frush said.
Introducing Touch Ultrasound

From a world leader in imaging comes a revolution in ultrasound: The CARESTREAM Touch Ultrasound System. With a configurable All-Touch control panel like nothing the industry has ever seen, Touch Ultrasound offers a new level of intuitive operation, innovative productivity tools and a powerful processor that provides both efficiency and advanced image quality.

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Artwork created from analog X-rays are among the one-of-a-kind events RSNA 2014 attendees can explore in the technical exhibit halls commemorating RSNA’s Centennial celebration. The artwork, which Arie van’t Riet, Ph.D., calls an “amazing kind of black and white photography,” is on display in Booth 3965 in the South Building.

“This is one of the most interesting things I’ve seen in the technical exhibits,” said Ella A. Kazerooni, M.D., M.S., a professor of radiology in the University of Michigan Health System and a recipient of RSNA’s 2014 Honored Educator Award. Dr. Kazerooni stopped by to browse the exhibit, noting that she was a fan of X-ray art and even has some of her colleagues’ pieces on display in her home. “This really takes it to a whole new level, really makes you stop and take a look,” she said.

As a physicist, Dr. van’t Riet specialized in radiation physics, with special interest in very low energy X-rays. “Some years ago I started to use these experiences in X-ray photography,” he says on his website www.x-rays.nl. “I prefer X-ray objects of ordinary scenes like a butterfly near a river, a fish in the ocean, a mouse in the field, a heron along the riverside, a bird in a tree and so on.”

Dr. van’t Riet’s art features ethereal figures of plants and animals that the artist arranges in natural scenes and captures with an analog X-ray camera at various intensities. The animals have died from natural causes or traffic accidents, so no living animals are harmed by radiation. Dr. van’t Riet adds color accents with Photoshop. The results are reminiscent of Hasegawa watercolors, with articulations of feathers, stamens and bones.

“I am truly fascinated,” said Dr. Kazerooni. “It shows how beautiful radiography can be.”

Roentgen Takes People Back to Where it All Began

In the opposite hall in the North Building, attendees can pose with a model of Wilhelm Roentgen in front of a backdrop simulating the laboratory where he made his cornerstone discovery. The exhibit, located at Booth 7950 in Hall B, also features historic artifacts that underscore Roentgen’s process as he duplicated his experiments and realized his findings.

“It is so interesting to know the history of radiology,” said Vanessa Gonzalez, M.D., of Querétaro, Mexico. “Sometimes we don’t know the old equipment; we are used to modern technology.

“First of all we come to the meeting to have new knowledge,” Dr. Gonzalez added. “Then of course we meet radiologists from all over the world, to share our experiences and improve our jobs.”

“I was excited to see this exhibit, because our students had just learned about fluoroscopy,” said Sandra Shawgo, M.S., an instructor and clinical coordinator at Wilbur Wright College’s radiography program in Chicago. “Seeing the goggles made the lesson more real for them.”

Shawgo brings her students to the RSNA annual meeting each year to broaden their experiences with careers in radiography. Standing outside the Wilhelm Roentgen’s Laboratory exhibit, second-year student Natalia Jamroz said, “It’s exciting because it’s Roentgen—it’s what we learned about from day one.”

“I think the geek in me wanted to see the older tubes,” added second-year student Joel Aguilar.

Geeks, art lovers and conventionalists alike can see these featured exhibits and hundreds more during Technical Exhibits hours, today and Wednesday, 10:00 a.m. – 5:00 p.m. and Thursday 10:00 a.m. – 2:00 p.m.

Scientific Presentations Are Meeting’s Cutting Edge

By Mike Bassett

From the moment Wilhelm Roentgen made his historic discovery, radiologic science has been evolving—and the RSNA annual meeting has been the place where radiologists have kept pace.

“In the Scientific Sessions we are trying to have all that is new in roentgenology, as well as papers which will bring the old material up to date,” noted 1927 RSNA President Edward W. Rowe, M.D., in a Radiology editorial urging people to attend the 13th RSNA annual meeting in New Orleans.

Some 60-plus years later, 1990 President E. Robert Heitzman, M.D., encouraged his colleagues to come to Chicago for the 76th annual meeting. “As we enter the decade of the 1990s, the scope and complexity of our discipline are enormous,” Dr. Heitzman wrote in Radiology. “Preservation and expansion of our skills require our most diligent effort . . . An outstanding educational program is being organized; it will emphasize developments for both the general radiologist and the specialist that are at the cutting edge of our specialty.”

Year by year the number of scientific presentations has grown—there were around 100 in Dr. Rowe’s day and just over 1,000 in Dr. Heitzman’s. In 2014, there are 2,703 scientific presentations (1,754 papers and 949 posters).

Need for Science and Education Emphasized

RSNA leaders recognized early the need to expose annual meeting attendees to the latest in the specialty while also offering sessions on existing science. Thus, they began scheduling paper presentations, called scientific sessions, as well scientific exhibits (now known as education exhibits), at annual meetings as well as mid-year exhibitions held from 1916 to 1925.

Early programs were limited in scope compared to what modern-day attendees experience. For example, the program for the 10th annual meeting in Kansas City in December 1924 was divided into seven “clinical conferences” with topics ranging from “Carcinoma of the Breast” to “Teeth as Foci of Infection.” At the onset of the Great Depression, meeting attendance began to decline, but at RSNA 1932 in St. Louis, organizers were still able to fill up five days of scientific sessions.

The format echoed the meeting’s early days—in 1924, presenters were encouraged to give synopses rather than read papers verbatim. “Let us make it snappy this year by having the usual number of papers but more time for discussions,” Radiology Editor Maximilian J. Hubery, M.D., exhorted in an editorial before the mid-year meeting in Chicago’s Sherman Hotel.

Even with the new format, however, the ability of the scientific program to continue growing was curtailed by the limited exhibition space available in the meeting venue of choice, Chicago’s Palmer House. This all changed with the move to McCormick Place in 1975, which would have a tremendous impact on attendance numbers at the annual meeting and the number scientific papers presented. By 1969, the number had increased to over 1,400, compared to 272 in 1974, the last year at the Palmer House.

CONTINUED ON PAGE 12A
By Mike Bassett

With more than 2,100 education exhibits available for viewing at RSNA 2014, it’s clear they play a significant role in the RSNA annual meeting. Turns out the necessity of these exhibits—called “scientific exhibits” in the last century—has a history nearly as long as that of the Society itself.

Reports from the 9th annual meeting held in Rochester, Minn., in December 1923 suggest that the early education exhibits placed an emphasis on displaying films. For example, C.G. Sutherland, M.D., of the Mayo Clinic, exhibited 137 films of soft tissue tumors and calcified shadows in the soft tissues. According to an article in the January 1924 issue of Radiology, view boxes were constructed by Mayo Clinic staff, with architects’ tracing cloth being used to diffuse the light so that “practically every film [showed] to the very best advantage.”

1938: First Exhibit Award Presented

Fifteen years later, following the 1938 annual meeting in Pittsburgh, special mention was made of the high quality and education value of the 39 exhibits displayed in several different rooms in the hotel. The first award was given to Sherwood Moore, M.D., of St. Louis, for his exhibit on “Body Section Radiography with the Laminograph.” In 1950, the 46 scientific exhibits on display at the annual meeting at Chicago’s Palmer House were highlighted by the introduction of new “fluorescent-lighted” viewing boxes.

Leonard E. Swischuk, M.D., a former chair of the RSNA Education Exhibits Committee, was first introduced to the education exhibit program as a radiology resident in the early 1960s. “I realized at that time that the exhibits were a great way to get your information across,” said Dr. Swischuk, director of pediatric radiology at the University of Texas Medical Branch at Galveston. “They required a lot of work because you had to cut different size holes in the 14 x 17 inch cardboard mounts. The radiographs had to be photographed and then transparencies of various sizes created. Adding the text was perhaps the easiest part of the preparation.”

While the number of exhibits didn’t necessarily increase during the annual meeting’s tenure at the Palmer House, attendance surely did, forcing a number of changes affecting the exhibit program. In 1968 the exhibits were moved from an open exhibit hall to small rooms up on the hotel’s seventh floor. The size of the rooms and the fact that smoking indoors was still quite common meant that viewing the exhibits could be a cramped, smoke-filled experience.

By 1974—the last year in which the meeting was held at the Palmer House—total attendance had increased to more than 11,000 with 80 exhibits spread out among 50 small rooms.

As was the case with the Technical Exhibits and Scientific Presentations, RSNA’s move to McCormick Place allowed for a dramatic increase in the number of exhibits. By 1989, for example, the number of exhibits had increased to 400 in 60,000 square feet of space—a far cry from the Palmer House days.

Science, Education More Clearly Defined

At the turn of the century, a number of significant changes had a tremendous impact on the education exhibits. Starting with RSNA 2000, presenters were given the choice of two ways to proffer their ideas and their work—either through the presentation of scientific papers or posters, or the use of education exhibits (previously referred to as scientific exhibits).

CONTINUED ON PAGE 12A

RSNA 2014 Attendees Look into Radiology’s History

The Centennial Showcase is a must-see at RSNA 2014. Open during RSNA Services hours in Hall D, the Showcase features a welcome by a virtual Wilhelm Roentgen, historic timelines, displays of historic medical imaging equipment, and the highly popular Cases of the Century, which challenge attendees to make diagnoses from vintage films.
Gold Medal Has Honored Many

In 1919, RSNA bestowed its first Gold Medal. Since then RSNA has awarded the medal to 189 individuals, including those who will receive it as part of the Tuesday Plenary Session in the Arie Crown Theater at 1:30 p.m. today—Gary J. Becker, M.D., Allen S. Lichter, M.D., and Etta Pisano, M.D. Other recipients through the years have included:

- John D. Camp, M.D., 1949
- Arthur C. Singleton, M.D., 1962
- H. Dabney Kerr, M.D., 1964
- Marvin M.D. Williams, Ph.D., 1965
- Benjamin Felson, M.D., 1979
- Alice Ettinger, M.D., 1982
- Anne G. Osborn, M.D., 2006
- Herbert Y. Kressel, M.D., 2011

See menus and event details: RSNA.org/Sip-and-Savor

Wednesday, December 3, 5:00 pm – 7:00 pm
Skyline Ballroom, McCormick Place, West Building
- Professional Registration, Lakeside Center-Level 3, Hall D
- Exhibitor Registration, Grand Concourse-Level 3
- Sip & Savor Social Desk, Grand Concourse-Level 2.5

Raise a glass to toast RSNA!
Celebrate our 100th annual meeting with:
- Beer, wine, and cocktails
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Clariication
An announcement in Monday’s Daily Bulletin about the Technical Exhibits Grand Opening inadvertently omitted some names. The companies recognized were Agfa Healthcare, Bayer Healthcare, Bard Biopsy, Bracco, Canon, Carestream, FujiFilm, GE Healthcare, Hitachi, Hologic, Mallinckrodt Pharmaceuticals, McKesson, Nuance, Philips, Samsung, Shimadzu, Siemens and Toshiba.

Photo Opportunities Help Attendees Capture Centennial Experiences
RSNA 2014 attendees posed for photos at the “big RSNA 100” 3D logo in RSNA Services and spoke about the significance of being at this once-in-a-lifetime event.

“It’s really important, to see the evolution over 100 years,” said Marcos Hjelt, M.D., of Hurlingham, Argentina (not pictured). “It’s amazing that we started from x-rays and have evolved to the advanced technology we have now. Everyone here is excited, because radiology is going to keep on advancing.” Attendees are encouraged to visit all of RSNA’s must-see attractions this week, including the 3D Centennial logo, the Centennial Showcase in Hall D, X-ray Art by Arie van’t Riet in the South Hall and the Wilhelm Roentgen Laboratory in the North Hall.
Residents/Fellows Humbled, Honored to be Part of RSNA’s Centennial Celebration

The Daily Bulletin hit the Residents and Fellows Lounge on Monday where doctors were enthusiastic to be involved in RSNA’s 100th annual meeting. Asked the question, “How does it feel to be part of RSNA’s 100th anniversary celebration?” doctors from around the world shared a common reaction: They were thrilled to be attending such a special event.

Scientific Presentations Are Meeting’s Cutting Edge

Continued from page 9A

Posters Offer Even More Science

In 2000 the Scientific Program saw another significant change with the introduction of scientific posters. Hard-copy, backboard exhibits were followed a few years later by the launch of a digital presentation system for both scientific posters and education exhibits.

Scientific posters, explained RSNA volunteers organizing the meeting, were a better tool for demonstrating dense data sets and analyses than a short verbal presentation. In addition, volunteers noted, the posters gave investigators more opportunities to interact with researchers in their own fields.

Adding posters to the meeting repertoire also helped solve another challenge, said Theresa C. McLoud, M.D., associate radiologist-in-chief at Massachusetts General Hospital and then-chair of the Scientific Program Committee. More and more radiologists wanted to present at the RSNA meeting, she said, and volunteers were concerned that too many abstract submissions were being rejected.

“We had a concern about the increase in the number of submissions and wanted to accommodate more people,” recalled Dr. McLoud, who served as RSNA president in 2008. She attributed the submission increase to more young radiologists recognizing the value of presenting their work at the annual meeting, as well as more interest from radiologists outside North America.

The overall quality of the abstracts was also improving, Dr. McLoud added. “The RSNA annual meeting was recognized as the premier radiological meeting in the world,” she said. “It had achieved international stature that paralleled the increased international attendance.”

2004 RSNA President Brian Lentle, M.D., was RSNA Liaison for Education when posters were introduced. With more presenters coming from outside North America, he said, “there was a feeling that posters could help some presenters who were having difficulties with language issues.”

“I also think posters have provided a broader base to the whole meeting,” Dr. Lentle continued. “I think they have created a new dimension of interest in the exhibit area, which has enormously increased over the years. Whenever you got into the exhibit area, it’s one of the busiest areas of the meeting.”

Education Exhibits Have Risen in Prominence, Capitalized on Technology

Continued from page 10A

According to Brian Lentle, M.D., professor emeritus of radiology at the University of British Columbia who served on the RSNA Board of Directors as Liaison for Education during this period, one of the problems with scientific exhibits at that time was that in reality, most of them were intended to be educational. That distinction between scientific and education exhibits had been “blurred in the past,” said Dr. Lentle, who served as 2004 RSNA President. “One of the things the Board wanted to do was to make that distinction a lot clearer.”

Electronic Medium Offers New Opportunities

Another big change occurred in 2004 with the introduction of electronic education exhibits through a digital presentation system in place of the traditional backboard panel exhibits.

Nearly a decade later in 2013, almost 9 out of 10 education exhibits were prepared using RSNA’s online presentation system. Richard Baron, M.D., professor of radiology at the University of Chicago Medical Center, served as chair of the Education Exhibits Committee from 2006 to 2009 and said that one of the most “stimulating” discussions he had during his tenure had to do with the issue of electronic versus backboard panel exhibits.

“The issue ‘highlights how different people learn, think and like to hear about different options through different types of media’,” said Dr. Baron, currently chairman of the RSNA Board of Directors. Regardless of the medium in which they’re presented, it’s clear that education exhibits can leave quite an impression.”

“I remember Tony Proto’s (Anthony Proto, M.D., who served for a decade as editor of Radiology among other RSNA-related roles) exhibit on lateral chest X-ray,” Dr. Baron recalled. “It was just exquisite. You had computer graphics available to you—incredible materials that were visually attractive and were presented in a way that you could easily grasp key concepts. It was the Beethoven and Brahms era of educational exhibits.”
Meta-analysis Shows No Relationship Between CIN and Permanent Renal Failure

While there are safety guidelines in place protecting patients from experiencing contrast induced nephropathy (CIN) as a result of undergoing intravenous contrast enhanced CT (CECT), Shira Moos, M.D., and colleagues were interested in finding out how serious a problem CIN actually is in these cases.

For purposes of the study, Dr. Moos and her colleagues defined CIN as either a 25% increase in serum creatinine from a baseline measure or 0.5 mg/dL (44 µmol/L) increase in absolute value, within two to five days of intravenous contrast administration.

Of the patients in the study population who developed CIN, the incidence of permanent renal failure, renal replacement therapy, and death was 13.28 percent, 0.5 percent, and 13.46 percent, respectively. Dr. Moos and her colleagues calculated that the risk difference for permanent renal failure was 0.07 between CIN patients and patients without CIN, 0.05 for renal replacement therapy, and 0.15 for death.

Consequently, Dr. Moos said, the researchers found no relationship between CIN and permanent renal failure. “Which means that most patients who developed CIN had their kidney function normalize within a week,” she said. “And patients didn’t see any increase in kidney disease if they already had it, and if they had normal kidney function their kidney values returned to normal.”

In addition, the researchers found no relationship between CIN and the need for renal replacement therapy. “Based on our research, it is safe to say that patients who develop CIN don’t really have a higher risk of developing permanent renal failure or needing renal replacement therapy,” she said. However, Dr. Moos said the results suggested that individuals who developed CIN had a higher risk of death. “Which was surprising, because the factors that we expected to increase the risk of death were permanent renal failure and the need for renal replacement therapy,” she said. “But the incidence in the population of those two things were lower than the risk of death. So we see there is some kind of relationship there, but we really couldn’t figure it out from the data.”

Dr. Moos said that despite the apparent association between CIN and death, it is possible that death is less a consequence of CIN and more the result of a pre-existing co-morbidity.

Dr. Moos said a randomized control trial is needed to further study what the long-term outcomes are in patients after the administration of iodinated contrast.

Pettigrew Receives Inaugural ARR Gold Medal

The Academy of Radiology Research (ARR) presented its first-ever Gold Medal Award to Roderic I. Pettigrew, Ph.D., M.D., for his extraordinary service on behalf of imaging research as Director of the National Institute of Biomedical Imaging and Bioengineering (NIBIB) at the National Institutes of Health (NIH). The award was presented Monday at the opening of the Academy Distinguished Investigator Ceremony at RSNA 2014. ARR is an alliance of 28 professional imaging societies, including RSNA. At right is ARR President Jonathan S. Lewin, M.D.
Gold Medals Presented Today

RSNA’s highest honor—the Gold Medal—will be awarded to three individuals during today’s plenary session.

Study Suggests Role of MR Imaging after DBT Should be Reassessed

CONTINUED FROM PAGE 14

HUP began using DBT for all screenings in 2011. While the hospital’s current protocols call for doing both DBT and 2D digital mammography on each patient, Dr. Chudgar says that the dual exam will be phased out as more data is accumulated on the effectiveness of DBT.

The retrospective study reviewed more than 24,000 DBT-screened patients and almost 11,000 DM-screened patients. Of the DBT patients, 235 had a subsequent MR imaging exam, and 83 of those were for staging newly diagnosed breast cancer. Of the DM patients, 83 patients had a subsequent MR imaging exam and 26 of those were for cancer staging. In the DBT cohort, MR imaging detected additional disease in non-dense breasts.

Chudgar said, “We know there are limitations to the study, and it should be researched further because the population size is low and we don’t have information for long-term follow-up. We’d also like to do further analysis on breast density.”

MRI detects additional cancer in both groups, but for patients whose cancer was detected with DBT, the MRI results had fewer true positives.

Amy Chudgar, M.D.

Study shows that MR imaging detected additional disease in non-dense breasts had more true positives with DM than with DBT, and also had a higher rate of “no additional findings” with DBT, suggesting that DBT is an especially effective technique for detecting additional disease in non-dense breasts.

“DBT, suggesting that DBT is an especially effective technique for detecting additional disease in non-dense breasts.”

Chudgar said, “We know there are limitations to the study, and it should be researched further because the population size is low and we don’t have information for long-term follow-up. We’d also like to do further analysis on breast density.”

RSNA 2014 Sessions Focus on Breast MR Imaging Research

Dr. Chudgar is part of other research teams presenting related research this week:


- “Utilization of MRI as a Problem Solving Tool Prior to and Following the Implementation of Screening DBT,” Scientific Paper (SSK01-05), 11:10-11:20 a.m., Wednesday, Dec. 3

A Rousing Resident’s Reception

Continuing the RSNA Centennial celebration, 2014 RSNA President N. Reed Dunnick, M.D., (top) welcomed more than 700 attendees to the RSNA/American College of Radiology Residents Reception held Monday at the Hyatt McCormick where residents and fellows mingled with colleagues and radiology leaders in a relaxing, informal setting. The annual event featured an iPad giveaway.

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DTI Shows Post-concussion Damage to Brain’s White Matter

By Richard S. Dargan

People who suffer concussions may have damage to the white matter (WM) of their brains that corresponds with specific post-injury symptoms like depression and neck pain, according to results from two studies presented Monday.

Previous research has shown that mild traumatic brain injury (mTBI) — more commonly referred to as a concussion — can cause lasting damage to the brain’s signal-carrying WM. The development of the MRI technique diffusion tensor imaging (DTI) has enabled researchers to look for damage all the way down to individual WM tracts.

“Often, conventional MRI results are normal in these patients,” said Joseph Delic, M.D., from the University of Pittsburgh Medical Center. “DTI is more sensitive to the brain’s signal-carrying WM. The development of the MRI technique diffusion tensor imaging (DTI) has enabled researchers to look for damage all the way down to individual WM tracts.”

In the first study, Dr. Delic and colleagues looked at associations between WM injury patterns and neuropsychiatric symptoms like depression and anxiety in subjects with mTBI. The 74 subjects with post-concussion symptoms were compared with 36 mTBI patients who were free from symptoms like depression and anxiety in WM injury patterns and neuropsychiatric regions corresponding to injuries that present as a specific symptom.

We saw central white matter injury in people with post-traumatic depression as well as anxiety, and the regions that were damaged corresponded to regions we already know are associated with non-traumatic depression.

Dr. Delic also presented results from a study of the association between WM injury and peripheral symptoms like cervicalgia and parathesias. Researchers reviewed DTI results from 19 mTBI patients with cervicalgia and nine with cervicalgia and parathesias. Researchers reviewed DTI results from 19 mTBI patients with peripheral pain and compared them with 55 mTBI patients without cervicalgia and 65 mTBI patients without paresthesias. Patients with post-traumatic neck pain had decreased FA values in a white matter tract known as the right superior longitudinal fasciculus, suggesting that their pain may be at least partly related to intracranial, or within the skull, injuries.

The intracranial aspect may cause problems with spatial orientation, said Dr. Delic. “This suggests that post-traumatic neck pain may result not from direct injury to the cervical region, but from attempts at compensation for spatial orientation insufficiencies after mTBI.”

Dr. Delic said. “The ultimate goal is to develop techniques to identify injuries in patients, determine if those injuries are predictive of specific symptoms and tailor treatments for each patient,” he said.

Margulis Award Presented to MRI Study of Plaque

The RSNA Alexander R. Margulis Award for Scientific Excellence was presented Monday to Anna E. H. Zavodni, M.D., and colleagues, for the article, “Carotid Artery Plaque Morphology and Composition in Relation to Incident Cardiovascular Events: The Multi-Ethnic Study of Atherosclerosis (MESA),” published in Radiology in May 2014.

Named for Alexander R. Margulis, M.D., a distinguished investigator in the science of radiology, the award recognizes the best original scientific article published in a particular year in Radiology. The Margulis Award Nominating Committee and the Margulis Award Selection Committee review published manuscripts based on their novelty, quality, importance, and potential scientific and clinical impacts.

The study investigated the predictive value of a number of MRI features in determining the risk of subsequent cardiovascular events in an asymptomatic population. A total of 946 participants in the Multi-Ethnic Study of Atherosclerosis (MESA) were evaluated with MRI. Patients were followed for an average of 5.5 years to determine the subsequent occurrence of major cardiovascular disease, including fatal and non-fatal myocardial infarction and cerebrovascular disease.

The paper was the first population-based, prospective study to determine if vulnerable plaque features shown on MR images add to the risk of a cardiovascular event beyond the traditional risk factors and adds to the growing body of information on biomarkers that may be used to determine the risk of major cardiovascular disease in asymptomatic individuals.

Cardiovascular events occurred in 59 of the patients in the study. Abnormal thickening of the carotid artery wall and the presence of a lipid core and calcium in the internal carotid artery on MRI were significant predictors of subsequent events. A lipid core was present in almost half of the patients who had an event, compared with only 17.8 percent of those who did not have an event.

Copies of the award-winning article are available in the Journals, News & RadiologyInfo area in RSNA Services.
Abbreviated MR May Serve as Added Breast Cancer Screening Tool

Critics of breast MR imaging have focused on its high cost, lengthy duration, high false-positive rates and the tendency of the exam to detect indolent breast cancers. But what if breast MR imaging could be performed faster and cheaper, yet still be able to detect biologically significant breast cancers?

By Mike Basset

In a study presented Monday at RSNA 2014, Laura Heacock, M.D., Linda Moy, M.D., and colleagues at New York University Langone Medical Center, determined that abbreviated breast MR imaging can significantly reduce acquisition times while detecting biologically significant cancers.

“MRI has the highest sensitivity for the detection of invasive breast carcinoma and ductal carcinoma in situ [DCIS],” said Dr. Heacock in her presentation, “Critics of this exam have argued that it leads to the overdiagnosis and overtreatment of more indolent tumors. However, the functional information that a breast MRI can provide can help us detect more aggressive lesions.”

Dr. Heacock said an abbreviated MR protocol is comparable to the current mammography model in which a short screening exam can be performed and the patient recalled as necessary for a full exam. “The potential benefits of such an approach,” she said, “include wider availability due to the decreased scan time and cost of the exam, decreased radiologists interpretation time, and increased patient comfort and tolerability.”

According to Dr. Moy, the idea behind an abbreviated MR imaging protocol was introduced by Christian Kuhl, M.D., of the Department of Diagnostic and Interventional Radiology at the University of Aachen in Germany. In a study published earlier this year in the Journal of Clinical Oncology, Dr. Kuhl and her colleagues demonstrated that an abbreviated MR imaging protocol for breast cancer resulted in an exam that took just three minutes, and was more accurate than digital mammography. “I was intrigued by this because it really changes the whole paradigm of how we can detect breast cancer,” Dr. Moy said, adding that abbreviated MR imaging could address the biggest barriers to an increased use of breast MR imaging—cost and time factors.

“If we have shorter version MR imaging and can get valuable information from it, it may lead to a more widespread use of MR imaging as a supplement for women who may be high risk or have dense breast tissue,” she said. “We’re lucky that we have many new imaging modalities—like breast ultrasound and tomosynthesis—to detect breast cancer, but it’s important that MR imaging becomes more widespread because it has the highest sensitivity of these modalities.”

Abbreviated MR Imaging Yields 98 Percent Specificity

Last year at RSNA 2013, Dr. Moy and colleagues presented a study in which they reviewed 100 breast MR imaging exams with an abbreviated protocol and found that they were successful in detecting known cancers.

In this study, Drs. Moy, Heacock and their colleagues sought to determine how an abbreviated MR protocol with one post-contrast (and subtracted) sequence at 90 seconds performed at identifying cancers considered to be biologically significant.

“Our thought was that if we could detect these invasive cancers, particularly those that are going to be an intermediate grade or higher, these are the cancers that are going to metastasize,” Dr. Moy said.

Researchers retrospectively reviewed 103 women with 180 findings who underwent a breast MR imaging exam and determined that the abbreviated MR imaging “works very well,” Dr. Moy said. “All of the cancers that were high grade were detected.”

Of six cancers that were missed, two were intermediate-grade invasive cancers, she said, “and that’s where we need to improve.” Another four were lower-grade ductal carcinoma in situ, which Dr. Moy said would likely be classified as indolent tumors.

The abbreviated breast MR imaging protocol yielded 98 percent sensitivity for invasive cancers, 83 percent sensitivity for DCIS and increased specificity compared to routine breast MR exams, reported Dr. Heacock. Therefore, “the abbreviated MR exam may potentially reduce overdiagnosis by preferentially detecting biologically significant breast cancers.”

“We think an abbreviated MR can really serve as an additional screening tool, not just for women at very high risk, but maybe for women who are low to moderate risk or perhaps even women with dense breast tissue,” Dr. Moy said. “This can be a supplement to screening mammography, just like ultrasound and tomosynthesis.”

Monday’s Press Conferences

Watch for stories in the national media generated by RSNA press conferences:

High School Football Players Show Brain Changes after One Season

Researchers monitored 24 high school football players between ages 16 and 18 with Head Impact Telemetry System (HITS) helmet-mounted accelerometers. Risk-weighted cumulative exposure was computed from the HITS data, representing the risk of concussion over the course of the season. This data, along with total impacts, were used to categorize the players into heavy hitters or light hitters. All players underwent pre- and post-season evaluation with diffusion tensor imaging (DTI) of the brain. The heavy-hitter group showed statistically significant areas of decreased fractional anisotropy post-season in specific areas of the brain, including the splenium of the corpus callosum and deep white matter tracts.

Imaging Shows Brain Connection Breakdown in Early Alzheimer’s Disease

A study of the brain’s structural connectivity found that changes in brain connections visible on MRI could represent an imaging sign of Alzheimer’s disease. The researchers analyzed diffusion tensor imaging results from 102 patients enrolled in a national study called the Alzheimer’s Disease Neuroimaging Initiative (ADNI) 2 and correlated changes in the structural connectivity with results from florbetapir PET imaging. The results showed a strong association between florbetapir uptake and decreases in strength of the structural connectome in each of the five areas of the brain studied.

PET/CT Shows Pituitary Abnormalities in Veterans with PTSD

Hybrid imaging PET/CT in the pituitary region of the brain is a promising tool for differentiating military veterans with post-traumatic stress disorder (PTSD) and mild traumatic brain injury (MTBI) from those with MTBI only. Researchers used 18F-Thalooxyglucose (18F-FDG) PET/CT to study the hypothalamus and pituitary glands of veterans who had suffered blast-related MTBI. A review of 159 brain 18F-FDG PET/CT exam records showed that FDG uptake in the hypothalamus was significantly higher in the MTBI and PTSD group compared with the MTBI-only group. The finding of higher FDG uptake in the pituitary glands of PTSD suffers supports the theory that many veterans diagnosed with PTSD may actually have hypothalamic abnormalities, a condition in which the pituitary gland does not produce normal amounts of one or more of its hormones.

Researchers Use 3D Printing to Guide Human Face Transplants

CT and 3D printing technology are being combined to recreate life-size models of patients’ heads to assist in face transplantation surgery. Transplant recipients underwent preoperative CT with 3D visualization. To build each life-size skull model, the CT images of the transplant recipient’s head were segmented and processed using customized software, creating specialized data files that were input into a 3D printer. The 3D printed models provide superior preoperative data and allow complete anatomy and bony defects to be better appreciated, reducing total procedure time and improving patient outcomes.

Abbreviated MR can be a supplement to screening mammography, just like ultrasound and tomosynthesis.

Linda Moy, M.D.
Excellent Reproducibility of Total Coronary Plaque Volume By CCTA

Total coronary plaque volume by coronary CT angiography (CCTA) shows very good scan-rescan reproducibility and can be used as a patient centered index of atherosclerosis for clinical trials and therapy, according to a study presented Monday.

By Felicia Dechter

“...for radiologists this means that in clinical trials, total plaque and calcified plaque burdens can be confidently followed up in serial scans, knowing that there is little variability between readers or intra-reader,” said Puskar Pattanayak, M.D., a post-doctoral fellow in the radiology department at the National Institutes of Health Clinical Center in Bethesda, Md.

“For patients, the study shows that they can safely have repeat coronary CTs due to low radiation doses,” Dr. Pattanayak continued. “They can therefore have scans before and after treatment or have serial scans in a clinical trial.”

While both hard and soft plaque can be readily assessed with multidetector CT (MDCT) to determine the overall volume of coronary plaque, Dr. Pattanayak and colleagues sought to determine the scan-rescan reproducibility of plaque volume. Researchers analyzed 20 volunteers with a mean age of 64 at 11 segments per volunteer. Within a short period—a mean of 18 days—study subjects underwent baseline and repeat CCTA on a 320-detector scanner.

CTA images were analyzed for calcium and non-calcified plaque using Medis QAngio CT semi-automated software. A second reader interpreted the follow-up CT. Researchers measured total and plaque subtype amounts indexed by segment length and optimized plaque quantification using both standard and narrow vessel wall thickness settings using an adaptive algorithm that adjusted for coronary lumen density.

At a mean radiation dose per scan of 5.1 mSv, results showed that total plaque burden had excellent intra-observer reproducibility, inter-observer reproducibility. Calcified plaque also showed excellent intra-observer and inter-observer reproducibility. Non-calcified plaque showed excellent intraobserver reproducibility, but moderate interobserver reproducibility and scan-rescan reproducibility.

“Not only does calcified plaque burden show excellent reproducibility but it also correlates well with Agatston calcium scores,” Dr. Pattanayak said. He added that the study results can be used to inform sample size calculation for future clinical trials focused on evaluation of non-calcified plaque.

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