Sub-Events

**VSIO21-01**

**Staging Systems, Epidemiology, and Medical Therapy**

Richard S. Finn MD (Presenter): Consultant, Bayer AG Consultant, Novartis AG Consultant, Amgen Inc

LEARNING OBJECTIVES

1) Identify state-of-the art surgical treatment, non-surgical treatment, and transplantation treatment and their impact on overall survival (OS) in patients with HCC.

**ABSTRACT**

01) Staging Systems, Epidemiology, and Medical -1) Identify state-of-the art surgical treatment, non-surgical treatment, and transplantation treatment for patients with HCC. 2) Identify the most appropriate treatment for early and advanced stage of HCC. 3) Describe and discuss indications for resection in chronic liver disease. 4) Integrate interventional radiological procedures in the treatment of HCC. 5) Describe and discuss indications for resection in chronic liver disease. 6) Integrate Interventional radiological procedures in the treatment of HCC.

**VSIO21-02**

**Identifying New Staging Markers for HCC before TACE: Which Lesion Parameter on Baseline MR Imaging Is the Ideal Prognostic Marker?**

Julius Chapiro MD (Presenter): Nothing to Disclose, Rafael Duran MD: Nothing to Disclose, MingDe Lin PhD: Employee, Koninklijke Philips NV, Ruediger Egbert Schernthaner MD: Nothing to Disclose, Carol Thompson: Nothing to Disclose, Jean-Francois H. Geschwind MD: Consultant, BTG International Ltd Consultant, Bayer AG Consultant, Guerbet SA Consultant, Nordion, Inc Grant, BTG International Ltd Grant, F. Hoffmann-La Roche Ltd Grant, Bayer AG Grant, Koninklijke Philips NV Grant, Nordion, Inc Grant, ContextVision AB Grant, CeloNova BioSciences, Inc Founder, PreScience Labs, LLC CEO, PreScience Labs, LLC

PURPOSE

The most commonly used staging systems for hepatocellular carcinoma (HCC) (e.g., BCLC, CLIP) use the largest lesion diameter as the leading imaging biomarker for tumor status. This study tested and compared the prognostic value of lesion diameter, volume and enhancement on baseline MR imaging to predict overall survival (OS) in patients with unresectable HCC treated with transcatheter chemoembolization (TACE).

METHOD AND MATERIALS

This retrospective analysis included 79 patients with unresectable HCC who were to receive their first TACE. Baseline arterial-phase contrast enhanced MRI (ceMRI) was used to measure the overall and enhancing tumor diameters. In addition, a segmentation-based 3D quantification of the overall and enhancing tumor volumes was performed in each patient (see Figure 1). Numeric cutoff values (5cm for diameters and 65cm^3 for volumes) were used to stratify the patient cohort into two groups for each method. Survival curves were compared using Cox proportional hazard ratios (HR) after univariable and multivariate analysis.

RESULTS

Median OS of the entire population was 16.4 months (95% CI, 11.4-21.5). The stratification according to overall or enhancing tumor diameters did not result in a statistically significant separation of the survival curves (HR 1.4 [95% CI, 0.7-2.5]; P=0.234 and HR 1.6 [95% CI, 0.9-2.8]; P=0.080, respectively). The stratification according to overall or enhancing tumor volume achieved statistical significance (HR, 1.8 [95% CI, 0.9-2.8]; P=0.022 and HR, 1.8 [1.1-3.1]; P=0.017, respectively). Patients with enhancing tumor volumes <65cm^3 survived significantly longer than patients with larger enhancing tumor volumes (P=0.013; 29.7 months [95% CI, 14.5-44.9] vs. 16.4 months [95% CI, 11.4-21.5]).
15.0 months [95% CI, 10.4-19.6], respectively).

CONCLUSION
As opposed to tumor diameter which currently is the most commonly used staging marker, volumetric assessment of lesion size and enhancement on baseline ceMRI is strongly associated with patient survival after TACE.

CLINICAL RELEVANCE/APPLICATION
The use of volumetry-based thresholds as staging biomarkers might lead to more accurate prognostic discriminators in future staging systems.

HCC Management in Europe
Riccardo Antonio Lencioni MD (Presenter): Nothing to Disclose

LEARNING OBJECTIVES
View learning objectives under main course title.

Hepatocellular Carcinoma Treated by Transarterial Chemoembolization: Prediction of Treatment Failure Using Tumoral Morpho-phenotypic Features on Pre-treatment Biopsy
Maxime Ronot MD (Presenter): Nothing to Disclose, Amedeo Sciarra: Nothing to Disclose, Luca Di Tommaso: Nothing to Disclose, Carlotta Raschioni: Nothing to Disclose, Pierre Bedossa: Nothing to Disclose, Massimo Roncalli: Nothing to Disclose, Valerie Vilgrain MD: Nothing to Disclose, Valerie Paradis MD: Nothing to Disclose

PURPOSE
1) To identify tumoral tissue markers as potential predictors of resistance to transarterial chemoembolization (TACE) in hepatocellular carcinoma (HCC), 2) to provide a simple scoring system to be applied on pre-TACE HCC biopsy, and 3) to validate the score.

METHOD AND MATERIALS
Inclusion criteria were patients with HCC who received TACE and who had pre-TACE biopsy of the tumor from 2005 to 2010. Two groups of patients were analyzed: 1) a study group composed of resected patients used to build the scoring system, and 2) a validation group of non-resected patients whom tumor response was evaluated at imaging. Resistance to TACE was defined as residual tumor >50% on resected specimen in the former and as non-complete tumor response according to mRECIST in the latter. In the study group, tumor size, the immunohistochemical expression of markers related to hypoxia and angiogenesis (HIF1-α, VEGF and CD34), apoptosis (CA9), stemness phenotype (Nestin), and epithelial-mesenchymal transition (Vimentin, E-Cadherin, Twist) were analyzed. Variables associated with TACE resistance were entered as candidate variables into a stepwise logistic regression model in order to build a TACE-resistance prediction score. This score was then validated on the validation group.

RESULTS
The study study was composed of 108 lesions from 41 cirrhotic patients (39 males (95%), mean age 58.5±8). Overall 45/108 (44%) HCC were classified as TACE-resistant. Of these, 33 (73%) had a diameter = 3 cm, 28 (62%) showed a high microvessel density (CD34 staining) and 40 (89%) low VEGF expression (p<0.05). The association of these three parameters (small size, ?CD34 and ?VEGF) in a weighted score was able to predict TACE-resistance with 87% accuracy, 87% sensitivity and 88% specificity. The validation set was composed of 28 HCC patients (23 males (82%), mean age 65.5±10). The score was predictive of TACE-resistance with 75% accuracy, 74% sensitivity, 80% specificity.

CONCLUSION
Combination of VEGF and CD34 staining performed on pre-TACE biopsy together with the tumor size may be useful for the prediction of TACE-resistance in HCC.

CLINICAL RELEVANCE/APPLICATION
Patients with HCC treated with TACE may benefit from a tumoral morpho-phenotypic analysis performed on pre-treatment biopsy

HCC Management in Korea
Jin Wook Chung MD (Presenter): Grant, BTG International Ltd

LEARNING OBJECTIVES
View learning objectives under main course title.

Vascular Redistribution Following Partial Hepatic Artery Embolisation for SIRT— Efficacy of Delivery of Y90 Microspheres to Embolised Liver Segments
Philip Borg MD, FRCR (Presenter): Nothing to Disclose, Jon Kingsley Bell MBChB, FRCR: Nothing to Disclose, Damian P. G. Mullan FFRRCSI, FRCR: Nothing to Disclose, Prakash Manoharan MRCP, FRCR: Nothing to Disclose, Jeremy Andrew Liston Lawrence MBChB: Nothing to Disclose, Jill Philip Tipping: Nothing to Disclose, Steve Philip Jeans: Nothing to Disclose, Amarjot Chander: Nothing to Disclose

PURPOSE
To evaluate the efficacy of delivery of microsphere delivery during Selective Internal Radiation Therapy (SIRT) when microspheres are delivered to segments of the liver which have been coil embolised.
Therapy (SIRT) using SIR-Spheres® to segments of the liver that have been coil embolised. Embolisation of the left hepatic artery and or its branches to prevent extra-hepatic distribution of Yttrium90 (Y90) microspheres is often performed in selective internal radiation therapy (SIRT). This has a potential to under treat portions of the liver.

**METHOD AND MATERIALS**

158 SIRT cases over an 8 year period were reviewed. Cases with unfavorable anatomy underwent coiling of part or all of the left or right hepatic arteries to ensure safe whole liver therapy. Using Xeleris® imaging software and SPECT-CT imaging. Regions of interest (ROI) for the right and left lobes of the liver were drawn and a geometric mean ratio of right:left (R:L) post administration of Tc99mMAA and post Y90 microspheres. ROIs were adjusted for background scatter. R:L liver lobe ratios in patients who had partial embolisation of the hepatic artery compared to R:L liver lobe with no embolisation.

**RESULTS**

- Post-Tc99mMAA Non embolised patients R:L ratio mean = 8.8
- Embolised patients R:L ratio mean = 20.3
- Post Y90 microspheres Non embolised patients R:L ratio mean = 5.6
- Embolised patients R:L ratio mean = 8.9

**CONCLUSION**

After injection of Y90 patients with partial hepatic artery embolisation had a larger R:L lobe ratio when compared to those not embolised. The same was true after injection of Tc99mMAA but to a greater extent. This difference in ratios, with better uptake in the left lobe after injection of Y90 can be explained by the development of intrahepatic collateral flow channels in the 2-3 week period between the Tc99mMAA scan immediately post coil embolisation and the Y90 scan. Laminar flow also affects the distribution of Y90. These preliminary results from analysing planar imaging of 23 patients will be correlated with SPECT CT on a larger number of patients.

**CLINICAL RELEVANCE/APPLICATION**

Although there is a significant decrease in treatment to the embolised segments, there is likely development of intracollateral flow channels to embolised segments, increasing delivery of radioisotopes after partial coiling embolisation hepatic arteries. This is an acceptable compromise to ensure safe delivery of Y90 microspheres without extrahepatic distribution.

**VSIO21-07**

**HCC Management in Hong Kong, China**

*Ronnie T.P Poon (Presenter): Nothing to Disclose*

**LEARNING OBJECTIVES**

View learning objectives under main course title.

**VSIO21-08**

**Efficacy and Safety of 70-150 μm Compared with 100-300 μm Drug Eluting Beads in Transarterial Chemoembolization for Unresectable Hepatocellular Carcinoma: Does Size Matter?**

Amy Robin Deipolyi MD, PhD (Presenter): Nothing to Disclose, Shehab A. Alansari MD: Nothing to Disclose, Rahmi Oklu MD, PhD: Nothing to Disclose, Raymond W. Liu MD: Nothing to Disclose, Andrew X. Zhu MD, PhD: Nothing to Disclose, Zubin Irani MD: Nothing to Disclose, George Rachid De Oliveira MD: Nothing to Disclose, Suvranu Ganguli MD: Research Grant, Merit Medical Systems, Inc Consultant, Boston Scientific Corporation

**PURPOSE**

Prior work suggests that 100-300 μm drug-eluting beads (DEB) for transarterial chemoembolization (TACE) compared with 300-500 μm DEB are safer and more effective for hepatocellular carcinoma (HCC). We compared safety and efficacy of 70-150 μm to 100-300 μm DEB in TACE for HCC.

**METHOD AND MATERIALS**

In 12/2012 our DEB-TACE protocol was changed from 2 vials of 100-300 μm to 1 vial of 70-150 μm and 1 vial of 100-300 μm DEB, which generated two groups of HCC patients for comparison selected under similar eligibility criteria. We reviewed laboratory and clinical data, post-TACE course, and response on 1-2 month imaging based on modified RECIST criteria. Fisher’s exact, χ2 and student’s t tests analyzed group differences.

**RESULTS**

- Of 65 cases (54 patients) performed with 70-150 μm DEB (Group 1) and 67 cases (53 patients) with 100-300 μm DEB (Group 2), treatment was lobar in 60 and selective in 11 (Group 1) and lobar in 42 and selective in 7 cases (Group 2). There was no difference in pre-procedure age, stage, or liver function tests. There was a trend for greater decrease in index lesion size in Group 1 (-8 v +2%; p=0.4). Treatment response for Group 1 and 2 was similar inrates of complete response (16 v 23%), partial response (9 v 5%), stable disease (70 v 61%) and progressive disease (5 v 11%) (p=0.4). Group 1 patients were significantly more likely to be readmitted within 1 month or have prolonged hospital stay for complications related to liver dysfunction with more patients requiring treatment for ascites, symptoms of portal hypertension, and biliary disease (12 v 3; p=0.01). Two patients in Group 1 developed cholecystitis and 2 patients died within 2 months, compared to none in Group 2. Group 1 patients tended to have increased bilirubin post-procedure (+19 v -12%; p=0.07), more complications from any cause (24 v 16; p>0.05), longer hospital stay (1.5 v 1.1 days; p=0.07), and to visit doctors more frequently within 1 month (13 v 8; p>0.05).

**CONCLUSION**

Our results suggest that despite similar efficacy by imaging, TACE with smaller 70-150 μm DEB leads to more liver-related complications, and possibly more adverse events from all causes and longer post-TACE hospitalization.

**CLINICAL RELEVANCE/APPLICATION**

Transarterial chemoembolization with 70-150 μm compared with 100-300 μm drug eluting beads for hepatocellular carcinoma may cause more complications and longer hospitalization, despite similar efficacy. Findings suggest 100-300 μm beads may be optimal.
HCC Management in Japan
Yasuaki Arai (Presenter): Nothing to Disclose

LEARNING OBJECTIVES
1) To understand how HCC patients are being managed in Japan. 2) To learn the decision making processes driving treatment selection for patients. 3) To review the data from the Japanese point of view.

Panel Discussion: HCC in the World: How Do We Put All this Information Together? New International Staging System? Are Guidelines Really Useful?

LEARNING OBJECTIVES
View learning objectives under main course title.

Intraarterial Therapies in the US: Where Are We?
Jean-Francois H. Geschwind MD (Presenter): Consultant, BTG International Ltd Consultant, Bayer AG Consultant, Guerbet SA Consultant, Nordion, Inc Grant, BTG International Ltd Grant, F. Hoffmann-La Roche Ltd Grant, Bayer AG Grant, Koninklijke Philips NV Grant, Nordion, Inc Grant, ContextVision AB Grant, Celonova BioSciences, Inc Founder, PreScience Labs, LLC CEO, PreScience Labs, LLC

LEARNING OBJECTIVES
1) Understand patient selection process. 2) Understand the patient indications and complications. 3) Understand the rationale for combining anti-angiogenic agents with loco-regional therapies. 4) Understand the results of various catheter based intra-arterial therapies for Liver Cancer.

Survival Outcomes in Patients with Advanced-stage HCC and Portal Vein Thrombosis: Comparison between Conventional and Drug-eluting Beads TACE
Boris Gorodetski (Presenter): Nothing to Disclose, Julius Chapiro MD : Nothing to Disclose, Bareng Nonyane : Nothing to Disclose, Rafael Duran MD : Nothing to Disclose, MingDe Lin : Employee, Koninklijke Philips NV, Jean-Francois H. Geschwind MD : Consultant, BTG International Ltd Consultant, Bayer AG Consultant, Guerbet SA Consultant, Nordion, Inc Grant, BTG International Ltd Grant, F. Hoffmann-La Roche Ltd Grant, Bayer AG Grant, Koninklijke Philips NV Grant, Nordion, Inc Grant, ContextVision AB Grant, Celonova BioSciences, Inc Founder, PreScience Labs, LLC CEO, PreScience Labs, LLC

PURPOSE
Our study sought to compare the overall survival (OS) in patients with hepatocellular carcinoma (HCC) and portal vein thrombosis (PVT), treated with conventional (c) or drug-eluting beads (DEB) transarterial chemoembolization (TACE).

METHOD AND MATERIALS
This retrospective analysis included a total of 133 HCC patients with PVT that were treated with cTACE (N=95) or DEB-TACE (N=38) without crossover of therapy. The extent of PVT (peripheral [p] vs. main [m] PVT) was diagnosed on contrast-enhanced MR or CT imaging. Prognostic parameters from the Barcelona Clinic Liver Cancer staging system (Child-Pugh [CP] stage, Performance Status [PS], Lesion diameter and multiplicity, PVT localization, lymph nodes, metastases) and other clinically relevant covariates (tumor type and burden, cirrhosis, sex, age) were included into the nearest-neighbor propensity score 2:1 matching, to achieve balance in treatment allocation. We then fitted a Cox proportional hazard regression model for time to death and treatment, adjusting for other covariates as potential confounders.

RESULTS
A total of 102 patients were successfully matched (31 were excluded). A total of 34 patients were treated with cTACE (N=95) or DEB-TACE (N=38) without crossover of therapy. The extent of PVT (peripheral [p] vs. main [m] PVT) was diagnosed on contrast-enhanced MR or CT imaging. Prognostic parameters from the Barcelona Clinic Liver Cancer staging system (Child-Pugh [CP] stage, Performance Status [PS], Lesion diameter and multiplicity, PVT localization, lymph nodes, metastases) and other clinically relevant covariates (tumor type and burden, cirrhosis, sex, age) were included into the nearest-neighbor propensity score 2:1 matching, to achieve balance in treatment allocation. We then fitted a Cox proportional hazard regression model for time to death and treatment, adjusting for other covariates as potential confounders.

CONCLUSION
Both cTACE and DEB-TACE achieved similar survival outcomes in patients with advanced-stage HCC and PVT. A trend towards better median OS in patients treated with cTACE was observed.

CLINICAL RELEVANCE/APPLICATION
DEB-TACE did not provide significant survival benefits in the treatment of patients with advance-stage HCC and PVT when compared to cTACE.

Assessment of Tumor Response
Riad Salem MD, MBA (Presenter): Consultant, Bayer AG Consultant, Nordion, Inc Consultant, BioSphere Medical, Inc Advisory Board, Sirtex Medical Ltd Consultant, Merit Medical Systems, Inc

LEARNING OBJECTIVES
1) Review methods of response assessment. 2) Discuss limitations of current methods. 3) Describe
future imaging concepts in development.

**VSIO21-14**

**Prospective Longitudinal Quality of Life Assessment in Patients with Unresectable Infiltrative Hepatocellular Carcinoma and Portal Vein Thrombosis after Yttrium-90 Radioembolization and Outcome Correlations**

Nima Kokabi MD (Presenter): Nothing to Disclose, Minzhi Xing MD: Nothing to Disclose, Juan Camilo Camacho: Nothing to Disclose, Hyun Sik Kim MD: Nothing to Disclose, Faramarz Edalat MD: Nothing to Disclose

**PURPOSE**

To investigate the effects of Y90 radioembolization on health-related quality of life (HRQOL) in patients with infiltrative hepatocellular carcinoma (HCC) and portal vein thrombosis (PVT) and to correlate baseline and early QOL trends to disease progression and survival.

**METHOD AND MATERIALS**

HRQOL trends using Short-Form 36 (SF-36) questionnaire in patients with infiltrative HCC and PVT treated with glass-based Y90 were investigated in a correlative study related to a prospective phase II trial. Patients underwent baseline assessment within 1 mo prior to Y90 and follow-up assessments were performed at 1, 3 and 6 mo post-therapy. Tumor progression was determined by 3 monthly MRI's. Overall survival (OS) and time to progression (TTP) were measured using Kaplan-Meier estimation from the day of first Y90. Baseline and follow-up SF-36 scores were compared using paired t-test. Log-rank test was used to determine the effects of favorable scores at baseline and early follow-ups on TTP and OS.

**RESULTS**

Thirty patients (n=30) were treated and followed for a median of 19 mo. Decreased pre-treatment baseline scores within all domains of SF-36 were observed in patients vs. age-adjusted US controls. The physical component scores were more significantly decreased than mental components. Overall, at 1, 3 and 6 mo, scores for individual SF-36 domains, physical and mental component summaries (PCS and MCS) remained unchanged. While there was no difference in baseline SF-36 scores for patients with prolonged TTP (=4 mo) and OS (=6 mo), corresponding physical component scores at 1 mo were significantly higher than those with TTP < 4mo and OS < 6mo. Specifically at 1 mo, patients with normalized Physical Function, Role Physical and PCS within 2 standard deviation (SD) of US normalized score, had a significantly prolonged median OS (15.7 mo vs. 3.7 mo; p<0.001) and TTP (12.4 mo vs. 1.8 mo; p<0.001) compared those with physical component scores > 2SD below normalized US population values.

**CONCLUSION**

HRQOL in patients treated with infiltrative HCC and PVT treated with Y90 does not significantly change within 6 months post therapy. Early (1month) favorable trends in the physical components of SF-36 may be a predictor of prolonged OS and TTP.

**CLINICAL RELEVANCE/APPLICATION**

The effect of Y90 radioembolization on HRQOL in patients with infiltrative HCC and PVT and the utility of SF-36 assessment tool as a predictor of clinical outcome are currently unknown.

**VSIO21-15**

**Tumor Board**

**LEARNING OBJECTIVES**

1) The algorithm by which patients with HCC are worked up and their appropriateness for transplant or resection will be discussed.