Scientific Tracks & Abstracts
May 25, 2018

LIVER 2018

World Liver Conference 2018

May 25-26, 2018 | New York, USA

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Fibrolamellar-type hepatocellular carcinoma: A histologically unique tumor with a distinctive molecular alteration

Yue Xue
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Fibrolamellar hepatocellular carcinoma is generally a fairly rare event in routine pathology practice. It is a unique type of hepatocellular carcinoma with a distinctive predilection for young patients without underlying liver disease unlike most hepatocellular carcinomas which arise in the background of liver injury such as hepatitis or cirrhosis. It has a characteristic cell type composed of large polygonal hepatocytes with eosinophilic and granular cytoplasm surrounded by abundant, thick fibrous tissue arranged in lamellar bands of collagen fibers, co-expression of cytokeratin 7 and CD68 and activation of protein kinase A (most often by formation of DNAJB1-PRKACA). In this talk, the distinctive clinic-pathologic features of Fibrolamellar hepatocellular carcinoma and the diagnostic pathologic criteria will be reviewed in detail. Further, updated molecular genetics and associated signaling transduction pathway involved with this specific tumor will be particularly highlighted as a primer for anatomic pathologists.

Speaker Biography

Yue Xue has completed her MD/PhD training, followed by Anatomic and Clinical Pathology residency at Dartmouth-Hitchcock Medical Center. She later did two fellowships, one in Oncologic Surgical Pathology at Memorial Sloan-Kettering Cancer Center, and the other on Gastrointestinal/Liver Pathology at Emory University. She is an Assistant Professor at Emory University, where the liver transplant program was ranked second nationally in 2017. As a Junior Faculty, she has published almost 20 original observations and written three book chapters, and been actively involving in pancreatobiliary/liver research.

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Transplantation of bioengineered functional liver surrogates

Fanwei Meng
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The shortage of eligible liver donors results in deaths of patients waiting for liver transplantation. It is imperative to identify alternative treatments to bridge the gap. Decellularized liver scaffold based liver regeneration is a promising approach to develop functional liver surrogates. In the current study, decellularized rat liver scaffolds were recellularized with human liver carcinoma cells (HepG2) and re-endothelialized with rat sinusoidal endothelial cells. Decellularized liver scaffolds that were only recellularized with HepG2 were served as the control group. *In vitro*, the liver scaffolds, that were repopulated with both HepG2 and endothelial cells, were found to upregulate hepatic cell specific genes and perform superior hepatic functions when compared to the counterparts that were only repopulated with HepG2. Recellularized liver scaffolds were under perfusion culture for seven days and then transplanted to recipient rats heterotopically. The vasculatures of the bioengineered liver grafts remained patent for at least 14 days post-transplantation as demonstrated by the ultrasound imaging. Moreover, Doppler ultrasound observed blood flow patterns similar in characteristics of the arterial and venous flows, respectively, in the bioengineered liver grafts. Functionally, the hepatic P450 metabolic activities and the human albumin production were both detected in the bioengineered liver grafts 14 days post-transplantation. Our results strengthened the feasibility of engineering functional liver surrogates utilizing decellularized liver scaffolds.

Speaker Biography

Fanwei Meng has completed his PhD in 2012 from the Department of Biomedical Engineering at the University of Utah. He later on conducted his Post-doctoral trainings at the McGowan Institute of Regenerative Medicine, University of Pittsburgh Medical Center as well as the University of Texas Medical Center. His research focuses on cell-derived biomaterials as well as biologic scaffold based regenerative approach. He has published more than 10 papers in reputed journals. He is currently an Associate Scientist at the Organ Transplantation Center of the King Faisal Specialist Hospital and Research Center at Saudi Arabia.

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TM4SF5 drives aggravation from nonalcoholic fatty to fibrotic and cancerous liver

Jung Weon Lee
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Chronic liver injury can lead to inflammation, fibrosis, cirrhosis, and tumorigenesis. Since TM4SF5, a tetraspan (in) with four transmembrane domains is shown to be involved in liver fibrosis, it is reasonable to consider that TM4SF5 can play roles in important roles development of liver diseases. In CCl_4-administrated animal livers, the pattern of TM4SF5 expression along the fibrotic septa was in parallel to those of TGFβ1, α-SMA, and collagen I deposition. TM4SF5 is induced by signaling activities of TGFβ1- and EGFR-mediated signaling pathways. Therefore, in this current study, we further explored how TM4SF5 is involved in development of liver fibrosis and HCC, using *in vitro* cell and *in vivo* animal systems in addition to human tissues. Primary hepatocytes isolated from mice treated with CCl4 for four or 16 weeks, to mimic fibrotic and cirrhotic livers, respectively, showed enhanced TM4SF5, α-SMA, collagen I, and laminins expression, in addition to increased c-Src and STAT3 activities. Suppression or inhibition of TM4SF5, c-Src, or STAT3 could result in blocking of collagen I and laminin expression. Furthermore, when CCl_4 administration was performed together with IP or intratumoral treatment of anti-TM4SF5 antibody, the mice showed reduced development of CCl_4-mediated fibrosis phenotypes in livers and tumor formation by xenografts, in addition to reduced STAT3 signaling activity and ECM deposition. These observations suggest that TM4SF5 may be involved in the development of fibrosis and tumorigenesis, via its roles in ECM induction through c-Src and STAT signaling pathways.

Speaker Biography

Jung Weon Lee has completed his PhD from University of North Carolina at Chapel Hill, NC, USA and Post-doctoral studies from MSKCC at NY. These days, his research group mostly focuses on the roles of a tetraspanin, TM4SF5, in NASH, fibrosis, tumorigenesis and metastasis, and on the anti-TM4SF5 reagents to block TM4SF5-mediated liver diseases, in either 2D or extracellular matrix-surrounded 3D culture conditions via biochemical, cell biological and molecular biological approaches in addition to animal models, and clinical samples for the fibrotic and tumor models or patients (Lab homepage: http://www.snupharm.ac.kr/jwl/). He has published more than 100 papers in reputed journals.

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Intraductal ultrasonography as a local assessment before magnetic compression anastomosis for obstructed Choledocho-jejunostomy

Hideaki Kawabata, Naonori Inoue, Yukino Kawakatsu, Yuji Okazaki, Misuzu Hitomi, Masatoshi Miyata, Yoshikazu Tanaka and **Yoshihiro Shimizu**
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Magnetic compression anastomosis (MCA) has been developed as a non-surgical alternative treatment for biliary obstruction; however, the precise assessment of the local condition is still difficult. Intraductal ultrasonography (IDUS) provides real-time, high-quality, cross-sectional images of the bile duct and periductal structures. A 70-year-old woman who had undergone pancreaticoduodenectomy for pancreatic head cancer suffered from obstructed choledocho-jejunostomy with no recurrent findings. Cholangiography using the percutaneous transhepatic cholangiographic drainage (PTCD) and fluoroscopy revealed complete obstruction of the upper common bile duct, and the distance of the obstruction was 7 mm. IDUS showed fibrous heterogenous hyperechoic appearance without fluid collection, vessels or foreign bodies at the site of the obstruction. We performed choledocho-jejunostomy using the MCA technique. One magnet was inserted into the obstruction of the hepatic side through the PTCD fistula. Another was delivered endoscopically to the obstruction of the jejunal side. The two magnets were immediately attracted towards each other transmurally, and reanastomosis was confirmed seven days after starting the compression. The magnets were easily retrieved endoscopically. A 16-Fr indwelling drainage tube was placed in the duodenum through the PTCD. The internal tube removed 12 months after reanastomosis, and no MCA-related complications have been observed. In conclusion, MCA is a safe, effective, low-invasive treatment for biliary obstruction, and IDUS is useful for the pretreatment assessment of feasibility and safety.

Speaker Biography

Hideaki Kawabata is a Clinical Gastroenterologist to the core and now Director of the Department of Kyoto Okamoto Memorial Hospital, Head of the Gastroenterological Center and Chief of the Palliative Care Team at our hospital, as well as a Specialist and Councilor in the Japanese Society of Gastroenterology and the Japan Gastroenterological Endoscopy Society and a Specialist in the Japanese Society of Internal Medicine and the Japanese Society of Gastrointestinal Cancer Screening.

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Totally laparoscopic caudate hepatectomy for cancer

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Background & Aim: In the past 15 years, we have completed more than 560 cases of laparoscopic hepatectomy; there are two cases of caudate lobe. Caudate hepatectomy remains a surgical challenge in spite of recent advances in laparoscopic technique. Hepatic tumor in the caudate lobe is usually deeply located in the center of the liver and close to the vena cava and hepatic hilum. Thus, lesion in this region was considered as a contraindication of laparoscopic hepatectomy. The aim of this study is to explore the safety and feasibility of laparoscopic hepatectomy for lesions in the caudate lobe.

Methods: Two patients with caudate hepatic tumor received laparoscopic caudate hepatectomy in our hospital from November 2016 to July 2017.

Results: All procedure for two patients with caudate hepatic tumours (sizes 2.5, 4.5 cm) was completed with totally laparoscopic technique. The average operative time was 268 min. and estimated blood loss was 180 ml, and average length of postoperative hospital stay was 7.5 days. There was no perioperative complications and patient mortality.

Conclusions: Our experience demonstrated that laparoscopic hepatectomy is a safe and feasible procedure for caudate hepatic tumours in selected patients.

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Mesenchymal stem cell derived hepatocytes (iMHeps): Invaluable tools for predictive hepatotoxicity and immune-compatible surrogates for liver function support

S Jyothi Prasanna
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Scarcity of liver donors and difficulties in obtaining functional primary human hepatocytes in clinically relevant numbers poses immense challenge for liver transplantation. This extrapolates to non-availability of primary hepatocyte culture alternatives for drug induced hepatotoxicity screening and studying hepatotropic infections. Though iPSC-derived hepatocyte cells emerged as alternatives, maturity of the differentiated state, prominence of fetal metabolism, promiscuous differentiation to related endoderm lineages and immune rejection poses a roadblock for preclinical/clinical applications. Owing to ease of expansion and established immune-evasiveness of Mesenchymal stem cells (MSCs), an attempt is made to trans-differentiate human adipose tissue derived MSCs to hepatocytes using a combination of developmentally relevant transcriptional factors and hepatogenic cues. IMHeps so derived manifested robust expression of liver enriched transcription factors, metabolic signatures comparable to human hepatocytes, drug inducible Cytochrome P450 enzyme activities mirroring adult hepatocytes and robust xenobiotic clearance. IMHeps are permissive to hepatotropic viruses certifying junctional maturity, a facet required for viral entry. In-depth analysis of background Mesenchymal memory in iMHeps indicated erasure of connective tissue differentiation potential indicating stability of the hepatic state even upon withdrawal of the initial hepatogenic cues used for trans-differentiation. Though iMHeps have forgone Mesenchymal differentiation abilities an unanticipated conservation of immune-modulatory abilities, a hallmark of native MSCs, was exhibited by iMHeps upon co-culture with activated immune cells. IMHeps could thus emerge as immune-compatible alternatives to primary human hepatocytes and transformed hepatoma lines for studies on drug induced hepatotoxicity, modelling liver infections and as transplantable surrogates for liver failure.

Speaker Biography

S Jyothi Prasanna had completed her Doctoral studies from the prestigious Indian Institute of Science, India. Her Doctoral Research involved studies on IFNγ signaling in hepatocellular carcinomas and the relevance of downstream pathways in antiviral immunity. As a Lead Scientist in Stem Cell Research Center, Manipal Hospital, she was instrumental in developing preclinical models to test the efficacy of allogeneic mesenchymal stem cells and has a patent on clinical scale expansion of human MSCs. Currently, she is heading the Injury, Repair and Regeneration team as a Professor at School of Regenerative Medicine, Manipal Academy of Higher Education..

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Successful cascade of care and cure HCV in more than 2000 drugs users: How increase HCV treatment rate in drug users by nurse outreach care, since screening to treatment

Andre-Jean Remy, Hakim Bouchkira, Jeremy Hervet, Arnaud Happiette Laetitia Salabert, Stephane Montabone and **Hugues Wenger**
Perpignan Hospital, France

Introduction: Although highest European screening rate in France, 33% of patients didn't take care of hepatitis C because there were no diagnosed. Drug injection was main contamination route of hepatitis C virus (HCV) in France and western Europe since 1990. French guidelines were to treat all inmates and drug users, even fibrosis level. Access of HCV screening, care and treatment in drugs users, prisoners and homeless was low in France. They were considered as difficult to treat populations. All these patients need support especially psycho-educative interventions. Hepatitis Mobile Team (HMT) was created in July 2013 to increase screening care and treatment of hepatitis B and C patients. HMT was composed of 1 hepatologist, 3 nurses, 1 secretary, 2 social workers, 1 health care worker, for a cross-disciplinary approach.

Objective: Increase outreach screening care treatment access and cure of our target population. Patients and methods Target population was drugs users, prisoners, homeless, precarious people, migrants and psychiatric patients. We proposed part or all of our services to our medical and social partners. There were 15 services for 42 medical and social units in half million people area. There were 4 steps: for early detection and primary prevention. 1) Screening by point of care testing PDBS (dried blood test) for HIV HBV HCV. 2) Green thread: outside POCT/DBS and FIBROSCAN** in specific converted van. 3) Outreach open center 4) Drug users information and prevention 5) Free blood tests in primary care for patients without social insurance 6) Staff training. For linkage to care and fibrosis assessment: 7) Social screening and diagnosis (EPICES score) 8) Mobile liver stiffness Fibroscan* (indirect measurement of liver fibrosis) in site 9) Advanced on-site specialist consultation. For access to treatment: 10) Easy access to pre-treatment commission with hepatologists, nurses, pharmacist, social worker, GP, psychiatric and/or addictologist. 11) Low cost mobile phones for patients. For follow up during and after treatment. 12) Individual psycho-educative intervention sessions 13) Collective educative workshops 14) Peer to peer educational program 15) Specific one day hospitalizations. All services were free for patients and for partners.

Results: From 2013 July to 2017 December, we did 4021 DBS for 3291 people (2053 HCV DBS) and 1165 Fibroscan*. HCV new positive rate was 19.8%. Our HCV active file was 504 patients included these 19.8% new patients screened by DBS; 96% realized HCV genotype, HCV viral load and FIBROSCAN. DAA treatment was proposed to 94%; 78% started treatment, 12% were lost follow up and 4% refused treatment. After treatment, there was 5 relapse and 3 reinfections by drug injection. Our cured rate was 76%. Sociological evaluation of our program showed that 4 program qualities for patients were free access, closeness (outside hospital), speed (of the results) and availability (of nurse and social workers).

Conclusions: Specific nurse follow-up of drugs users and other HCV high-risk patients including screening, early detection, diagnosis and treatment increase rate of treated and cured patients, with low rate of relapse and reinfections.

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Role of oxidative stress and homocysteine in non-alcoholic fatty liver disease

Nikhil D Patel
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Nonalcoholic fatty liver disease (NAFLD), hepatic manifestation of metabolic syndrome is now the commonest chronic liver disease due to rising obesity and diabetes. NAFLD progresses from simple steatosis (NAFL) to steatohepatitis (NASH) and cirrhosis. In presence of suitable genetic and environmental factors (diet/physical activity/gut dysbiosis), insulin resistance (IR) and obesity results in adipose dysfunction, which triggers proinflammatory response, decreased lipolysis, increased de-novo lipogenesis and further increased IR. These events increase free fatty acid (FFA) flux to liver, which leads to triglyceride accumulation (NAFL). Toxic levels of FFA in liver trigger increased β-oxidation and mitochondrial dysfunction (MD). Obesity, homocysteine and environmental factors trigger endoplasmic reticulum stress (ERS). MD and ERS result in reactive oxygen species (ROS) production. ROS activates antioxidant mechanisms (consisting of enzymes like Superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase, glutathione transferase; and non-enzymes like vitamin A, C, E, β-carotene and glutathione) which scavenges them, but over production of ROS results in depletion of antioxidants. Homocysteine adds to ROS production and suppresses antioxidants. Oxidative stress results in proinflammatory cytokine production, lipid peroxidation (measured by Malonildialdehyde) and protein adducts production leading to cell injury, inflammation and cell death leading to NASH. In addition, it triggers hepatic stellate cell activation leading to fibrosis and subsequently cirrhosis. Oxidative stress also produces DNA damage leading to future hepatocellular carcinoma. So, oxidative stress remains central to development of NASH and cirrhosis. In clinical practice, differentiating NAFL and NASH requires liver biopsy because non-invasive scoring systems are not sensitive. Measuring homocysteine and enzymes (like glutathione transferase, glutathione peroxidase, catalase, etc.) may prove helpful to define progress to NASH. Also targeting these molecules by newer therapeutic strategies may halt progression of NAFLD.

Speaker Biography

Nikhil D Patel (MD, DNB [Gastroenterology]) is practicing as a Consultant Gastroenterologist since 12 years. He has around 50 publications in various journals. He has presented more than 80 scientific papers in reputed conferences.

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New perspectives in cystic fibrosis associated liver diseases in children

Wikrom Karnsakul
Johns Hopkins School of Medicine, USA

Cystic fibrosis (CF) is a multisystem genetic disorder caused by a defect in the cystic fibrosis transmembrane conductance regulator (CFTR) gene, encoding the transporter protein responsible for chloride flux across the apical membrane of the epithelial cell. Significant liver disease is an unusual presentation in CF population with the incidence of 4-7%; however an emerging cause of mortality as a result of advanced care in pulmonary, nutritional and lung transplantation care. The cause of CFLD is unknown. The presentation of CFLD varies widely in the CF population with most liver disease occurring at or before puberty. Although dual-pass liver biopsy increases diagnostic yield with the presence of fibrosis, the distribution of fibrotic liver lesions in CFLD is focal and yet the procedure is rather invasive. Currently there are no known risk factors predicting the development of CFLD. The development of non-invasive fibrosis markers has progressed rapidly. Such markers include hyaluronic acid, metalloproteinases, tissue Inhibitors of matrix metalloproteinases (TIMPS), transforming growth factor (TGF-β1), etc. These are not routine laboratory investigations and tend to be expensive. In addition, they may be elevated secondary to fibrosis in extrahepatic organs such as the lungs. Many simple and inexpensive methods such as APR, FIB-4, liver ultrasound have been used as a non-invasive biochemical marker. Furthermore, in CF the role of these tests to reflect CFLD is unclear but may help for early detection of a child with CFLD. Novel therapies exist in CF children. It is still unknown if any therapy can prevent the development and progression of liver disease in CF children.

Speaker Biography

Wikrom Karnsakul is an Assistant Professor of Pediatrics at the Johns Hopkins University School of Medicine. His clinical interests are in the care of pediatric liver diseases, and general gastrointestinal diseases. He received his Medical degree in 1992 from Mahidol University School of Medicine in Bangkok, Thailand. He completed his Residency in Pediatrics at Advocate Hope Children's Hospital, University of Illinois at Chicago in 1998 and did a fellowship in Pediatric Gastroenterology, Hepatology and Nutrition at Texas Children's Hospital, Baylor College of Medicine in Houston, Texas. He completed his Post-doctoral research training at USDA/ARS Children's Nutrition Research Center, Baylor College of Medicine. He joined the faculty at Johns Hopkins University School of Medicine in 2008. His research interests center on the understanding and treatment of chronic liver disease, ascites, cholestasis, viral hepatitis, metabolic liver diseases and living related liver transplantation. He has a particular focus on hepatitis E infection. He is also involved in NIH-funded multicenter research studies including the Cholestatic Liver Disease Consortium and Cystic Fibrosis Related Liver Disease Project.

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Video Presentation

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The management of functional constipation

Antonio Iannetti
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Functional constipation management: Functional constipation is a very common disease among the healthy population and is a cause of serious social discomfort in young and working-age patients. In older people and in defeated patients, it can be cause and contributory cause of aggravation of existing pathologies. For these reasons, this pathology is an important source of expenditure for the National Health Service and also for the nation and the economy, given the absences of work. The problem, often limited to situations that can be handled in outpatient care, sometimes takes on important dimensions, requiring hospitalization and, in particularly severe cases, the need for surgical intervention. In my presentation, I try to highlight the importance of targeted diagnostics before proceeding with a therapeutic intervention. I focus attention on the differential diagnosis between functional constipation and irritable bowel syndrome with prevalent constipation, because this can change the pathology management. I also point out the importance of dividing the disease into subclasses, because this also radically affects the therapeutic approach.

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Two incisions laparoscopic cholecystectomy: A simple way to reduce scar

Rafael Antoniazzi Abaid and **Bruno Zilberstein**
University of Santa Cruz do Sul, Brazil

About 20% of the population has cholelithiasis and this is the main abdominal cause of hospitalization in developed countries. Considering that only in the United States about 700,000 cholecystectomies are done each year, it is possible to estimate the importance of the problem for public health. For a century, since Carl Langenbuch removed the first gallbladder, cholecystectomy was only performed through laparotomies. In the 1980s, laparoscopic cholecystectomy (LC) appeared. The technique was improved and spread rapidly in the 1990s. It is one of the most frequently performed procedures today and is still considered gold standard technique in the treatment of symptomatic cholelithiasis. Although large and traumatic incisions have been replaced by four small 5 mm and 10 mm incisions, many surgeons continue to search for even less invasive techniques. The reduction of surgical trauma has potential benefit of causing less postoperative pain, reducing convalescence time and generating better aesthetic results. Several techniques have been described with these objectives. As LC is a relatively inexpensive and easy-to-perform technique, the greatest challenges are to maintain safety without increasing technical difficulty or cost. In accordance with safety standards and with the intention of reducing scars, it was proposed to perform two incisions simplified laparoscopic cholecystectomy using a hybrid technique with an incision inside the umbilicus and another in the epigastrium to operate similarly to standard LC.

Speaker Biography

Rafael Antoniazzi Abaid has completed his PhD at Digestive Surgery Division, Department of Gastroenterology, University of Sao Paulo School of Medicine, USP, Brazil and also is a Professor in Medicine School, University of Santa Cruz do Sul, UNISC, Brazil.

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Therapeutic potential of resolvin D1 in the treatment of liver sterile inflammatory diseases

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A novel genus of specialized pro-resolving mediators (SPMs) has been discovered to be involved in the active clearance and regulation of inflammatory exudates to restore tissue homeostasis. One of the lipid mediators, resolvins (Rvs), are formed via specific transcellular biosynthetic pathways at strict temporal intervals during the inflammatory response. While accumulating evidences suggest RvD1 counteracts proinflammatory signaling and promotes resolution, the specific cellular targets and modes of action for RvD1 remains largely unknown. Ischemia/reperfusion (IR) injury is an unavoidable sequela of major liver surgery and is characterized by a sterile inflammatory response jeopardizing the organ. We have recently reported that RvD1 facilitates M2 macrophage polarization of Kupffer cells and efferocytosis via ALX/FPR2 signaling in the animal model of liver IR. Moreover, our most recent *in vivo* and *in vitro* findings have implied that a crosstalk between mitochondrial oxidative stress and RvD1 is pivotal in the protection of IR-induced hepatocellular damage (*unpublished data*), which give us a clue for solving the conundrum of cellular and molecular mechanisms of liver IR injury. Our study justifies that RvD1 might be a useful pharmacological maneuver for attenuating liver sterile inflammation such as IR injury.

Speaker Biography

Jung-Woo Kang has completed his Ph.D in 2015 from School of Pharmacy, Sungkyunkwan University. Dr. Kang has currently been a postdoctoral associate in Department of Internal Medicine, Section of Digestive Diseases, Yale University. Dr. Kang have performed a number of studies investigating signaling pathways in clinically-relevant hepatotoxicity models and applying novel pharmacological strategies. Dr. Kang has published more than 20 papers in the journals of pharmacology and biochemistry.

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Liver stiffness predicts relapse after direct acting antiviral therapy against chronic hepatitis C virus infection

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Background: Assessment of fibrosis in chronic hepatitis has always been considered of utmost relevance for patient care in clinical hepatology. Over the last decade, several non-invasive methods were proposed for diagnosis of liver fibrosis, including the elastometric measurement of hepatic stiffness, group of clinical and biochemical parameters, and combinations of both methods. It has been suggested that elastography and serum markers are useful techniques for diagnosing severe fibrosis and cirrhosis and for excluding significant fibrosis in hepatitis C virus patients. In addition, hepatic stiffness may also help to prognosticate treatment response to antiviral therapy.

Aim: To evaluate changes of Transient elastography values as well as serum fibronectin and AST to platelet ratio index in patients (APRI) treated with sofosbuvir- based treatment regimen.

Methods: This is a follow-up study including 100 chronic HCV Egyptian patients treated with Sofosbuvir-based treatment regimen. Transient elastography values were recorded as well as serum fibronectin and APRI were calculated at baseline and SVR12.

Results: There was a significant improvement of platelets counts, ALT and AST levels, which in turn cause significant improvement in APRI scores at SVR12. Liver stiffness measurements were significantly lower at SVR12 (15.40±8.96 vs 8.82±4.74 kPa, P =0.000). There was significant decline in serum fibronectin from baseline to SVR 12 (524.14±237.61 vs 287.48±137.67, P=0.000).

Key words: Hepatitis C Virus (HCV), Liver stiffness (LS), Transient Elastography (TE) and Fibronectin (FN).

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