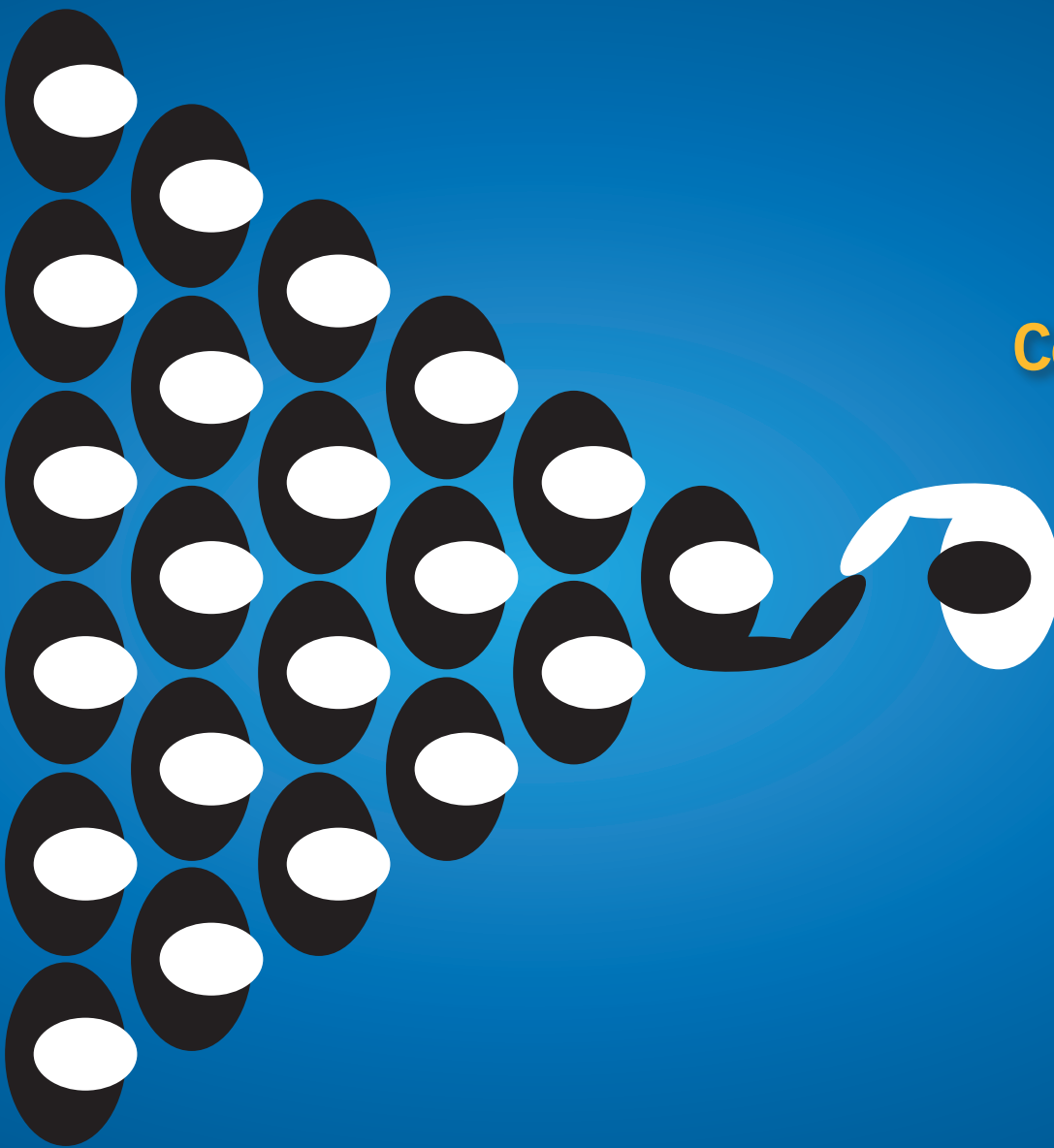


# Beyond the Scope

A REPORT OF THE UCLA DIVISION OF DIGESTIVE DISEASES

**Stronger  
Healthcare  
Through  
Collaboration**



FROM THE DIVISION CHIEFS



**Gary Gitnick, MD, FACC**

Fran and Ray Stark  
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Associate Clinical Professor  
of Medicine

## Going **Beyond** the Scope

*"Alone we can do so little; together we can do so much."*

This statement by Helen Keller on the virtues of collaboration is more relevant than ever in the current biomedical climate...and here at the UCLA Division of Digestive Diseases. Long gone is the era when it made sense for a scientist to work alone. Today, the problems in medicine are so complex and the tools so specialized that effectively tackling the major diseases of the day demands multidisciplinary teams such as the ones we assemble at UCLA. Similarly, caring for patients with complicated chronic conditions often requires integrated teams to ensure holistic, patient-centered, value-based care.

This issue of *Beyond the Scope* underscores how such teamwork is essential across the board. On page 1, we celebrate the prestigious award recently given to Dr. Emeran A. Mayer for his seminal work in outlining the connections between the brain and gut function. But Dr. Mayer would be the first to point out that his groundbreaking research is not conducted in a vacuum. At the G. Oppenheimer Center for Neurobiology of Stress and Resilience, Dr. Mayer directs an interdisciplinary, translational effort that is leading to a better understanding of the interface between stress, pain and emotions.

Beginning on page 2, we highlight an important clinical collaboration at UCLA. Approximately 5 million people are infected with the hepatitis C virus, and three-fourths of them don't know it because HCV rarely causes symptoms until it has led to severe liver damage, including cirrhosis, liver failure or liver cancer. Led by the Division of Digestive Diseases and the Division of Infectious Diseases, UCLA Health has mounted a full-scale initiative to screen all baby boomers for the virus. This complex undertaking can serve as a national model for this major public health problem.

On page 4, we profile an exemplary member of our faculty, Dr. Bennett Roth, who is retiring in October after more than four decades of practice. Dr. Roth has been a national leader (including serving as president of the American Society of Gastrointestinal Endoscopy) as well as a leader in our Division, showcasing the benefits of clinical teamwork.

Starting on page 5, we feature the fruits of another type of collaboration. The Joel and Barbara Marcus Research Seed Grants program illustrates the power of philanthropy by providing funding critical for researchers to be able to test promising ideas that, once supported with data, can lead to larger grants from the federal government and other sources. This program is integral to the ability of our GI fellows to establish their research credentials.

And finally, beginning on page 12 we review UCLA's work at Digestive Disease Week®, which was held May 21-24 in San Diego, where once again our faculty played a prominent role. But beyond sharing our latest clinical and research findings, DDW affords an unparalleled opportunity to exchange ideas with our colleagues from other institutions – another example of the importance of teamwork.

Whether we are working together within our Division, collaborating across the UCLA Health system, partnering with philanthropists or joining forces with researchers and clinicians in our community and around the world, we are determined to continue on our march toward better treatments and cures to the conditions that affect the health and quality of life of our patients. Working together, we can achieve so much.

# Dr. Emeran A. Mayer Recognized for Pioneering Work with American Psychosomatic Society Award

When Dr. Paul D. MacLean began his groundbreaking career in the late 1940s, the notion that certain disorders had psychosomatic components was met with considerable skepticism. But Dr. MacLean, a physician and neuroscientist at Yale Medical School and the National Institute of Mental Health, went on to make seminal contributions, inspired by his recognition of the importance of emotion in clinical medicine and everyday life.

In March, Emeran A. Mayer, MD, PhD, professor in the UCLA Division of Digestive Diseases and director of the G. Oppenheimer Center for Neurobiology of Stress and Resilience, was honored with a prestigious award in Dr. MacLean's name. At its annual meeting in Denver, the American Psychosomatic Society presented Dr. Mayer – renowned for work that confirmed some of Dr. MacLean's hypotheses through studies of the visceral brain and connections between the gut and the brain's limbic system – with the Paul D. MacLean Award for Outstanding Neuroscience Research in Psychosomatic Medicine.

The annual award is intended to honor Dr. MacLean and promote the line of research that he established on emotion, the brain and physical

disease. Dr. MacLean is best known for his hypothesis, first advanced in 1949, that psychosomatic disorders arose from impairment in communication between the brain's limbic system and neocortex.

"Emeran is a pioneer in psychosomatic neuroscience research – specifically, the premier innovator in brain imaging and functional GI disorders," says Richard D. Lane, MD, PhD, professor of psychiatry, psychology and neuroscience at the University of Arizona and chair of the award's selection committee. "He put this field on the map, and has continued to be very productive in using the latest methodologies to address important questions about how the brain is influencing gut function."

Dr. Lane notes that it's been known for some time that the mind influences the gut and vice versa, "but to really understand the mechanisms, we have to get the brain into it, and Emeran has done more than anyone to bring the brain into the brain/gut axis." Dr. Lane points to Dr. Mayer's imaging work showing how pain is processed in the brain in patients with irritable bowel syndrome. "It helped to show that the problems that these patients have are real," he says. "And when we do things like mindfulness-based psychotherapy or other stress-reduction techniques, we can now understand the mechanisms by which such psychological interventions are working."



"This award is particularly meaningful to me as it is linked with someone who was such a pioneer in this field," says Dr. Mayer. "These ideas are still not quite fully accepted by everyone, but partially because of our brain-imaging work, there is now much greater recognition that the central nervous system is ultimately the organ that makes this a medical problem. There are other contributing factors, including the gut and its microbiota, but ultimately it is circuits within the brain that generate the symptoms. I now believe more than ever that every syndrome we currently refer to as a functional disorder, regardless if the predominant symptoms are referred to the gut, the heart or the urinary bladder, has a shared brain mechanism. It's exciting that we have been able to extend some of the concepts that Dr. MacLean first introduced."



**Emeran A. Mayer, MD, PhD**

Director, G. Oppenheimer Center for Neurobiology of Stress and Resilience

Co-Director, CURE: Digestive Diseases Research Center

Professor of Medicine, Physiology and Psychiatry

Division of Digestive Diseases

David Geffen School of Medicine at UCLA

# Initiative Aims to Test All Baby Boomers

## Helping Link HCV-Positive Patients to Early, Effective Treatment

Under the joint leadership of the Division of Digestive Diseases and the Division of Infectious Diseases, UCLA Health has embarked on a major initiative to screen baby boomers for the hepatitis C virus (HCV). The initiative is based on the recommendation of the U.S. Preventive Services Task Force that, in addition to screening all adults at high risk for the infection – including anyone who has ever injected drugs or used intranasal cocaine, patients who have been on hemodialysis, and those who received transfusions or organ transplants before 1992 – baby boomers undergo a one-time screening. Approximately three-fourths of patients in the United States living with HCV infection were born between 1945 and 1965.

Hepatitis C infection is a leading cause of complications from chronic liver disease in the United States. It is the most common cause of cirrhosis, the biggest risk factor for liver cancer, and the most common indication for liver transplantation. Nationally, hepatitis C-related end-stage liver disease accounts for more than 30 percent of liver transplant indications among adults. At UCLA, more than half of the liver-transplant patients developed liver failure as a result of hepatitis C.

Particularly alarming is that of the estimated 5 million people in the U.S. who are HCV-positive – four times

the number believed to be infected with HIV – about three-fourths don't know it, because the infection rarely causes symptoms until the patient has developed chronic liver disease, a process that can take decades. "This is a major public health concern," says Sammy Saab, MD, MPH, a hepatologist and associate professor in the Division of Digestive Diseases. "People with hepatitis C don't wear a badge saying that they're infected. Most are completely asymptomatic, and the only way they can be diagnosed is through a routine blood test by their health care provider."

Identifying HCV-positive individuals has become all the more important over the last year with the advent of antiviral therapy that represents a major improvement over prior treatment. "Previously, people had to have weekly immune-therapy injections for up to a year, and it was very debilitating – causing headaches, fevers, and even depression," says Jeffrey D. Klausner, MD, PhD, professor in the Division of Infectious Diseases. "Now, we have oral medications that are very well tolerated and far more effective. The vast majority of patients who complete the course – typically three months, but sometimes as short as two months – are cured."

Dr. Saab adds that the medical community has undergone an evolution in the way it views HCV infection,

# for Hepatitis C

leading to broader indications for treatment. “We used to be fixated with the idea that hepatitis C causes liver disease, and now we know that it is a systemic infection that can affect not only the liver, but other parts of the body as well,” he says. “There are many conditions associated with hepatitis C that we are beginning to appreciate, and as a result, we recognize that everyone with the virus should be treated to prevent these complications, not just patients with liver disease damage.”

Baby boomers are a particularly important group to screen because many from that age group who are infected have had the virus for a long period of time, putting them at high risk for developing the complications of liver cirrhosis, liver cancer and liver failure, Dr. Saab notes. “We have this new treatment that is safe, rarely causes side effects and can cure patients,” he says. “If we wait until they become symptomatic, it’s often too late to treat hepatitis C.”

The UCLA HCV screening initiative, under the leadership of Drs. Saab and Klausner through the digestive diseases and infectious diseases divisions, is a multi-layered effort that started with educating UCLA Health’s primary care program leaders on the importance of hepatitis C screening and the national recommendations. Next, a reminder was introduced into CareConnect, UCLA’s electronic health record, so that when primary care physicians see individuals born between 1945 and 1965 who haven’t yet been screened,

they are alerted that the patient should be tested for the virus.

Patients who test negative do not need to be tested again, assuming they don’t meet any of the other high-risk criteria. When a patient tests positive, the ordering physician receives a notification, along with recommendations for additional tests to confirm the infection and assess the degree of liver damage. A dedicated hepatitis C treatment coordinator monitors the laboratory results and provides assistance to link the providers with hepatologists and infectious disease specialists in the Division of Digestive Diseases and Division of Infectious Diseases so that patients can receive timely and appropriate care.

*People with hepatitis C don’t wear a badge saying that they’re infected. Most are completely asymptomatic, and the only way they can be diagnosed is through a routine blood test by their health care provider.*

To further expedite the process, the new initiative has instituted automated viral-load testing and genotyping for anyone testing positive, so that patients don’t have to return for a second blood draw. The results of those tests help to guide treatment decisions.

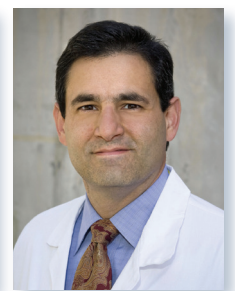
Dr. Klausner believes the collaborative initiative – which, in addition to the digestive diseases and infectious diseases divisions, involves UCLA’s Department of Pathology & Laboratory Medicine and the CareConnect program – can serve as a model for nationwide efforts to detect, treat and cure HCV infection. The UCLA team is evaluating the results of the initiative and will be sharing its findings with other institutions. Already, the program has resulted in a threefold increase in the number of patients being screened.

“As one of the country’s leading health systems, it is incumbent on us to identify patients who have a curable disease like hepatitis C,” Dr. Klausner says. “Our intention is to play a leadership role in promoting cost-effective interventions that prioritize prevention.”

“Hepatitis C is a major cause of liver disease, and now we can prevent these complications through early treatment,” adds Dr. Saab. “The biggest barrier to curing hepatitis C is knowing who is infected. That’s why this initiative is so critical.”



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## Dr. Bennett Roth to Retire After More Than Four Decades of Practice and Leadership

*Imparting his clinical know-how to fellows has been among the most rewarding aspects of Dr. Roth's career. The most important lesson he teaches? "Listen to the patients and make sure you delve into the details," he says.*

Dr. Bennett Roth began his career at UCLA in the early 1970s specializing in endoscopic procedures, but he soon found himself gravitating toward general gastroenterology. "I realized that what I liked best was having an ongoing dialogue with patients – being there for the evolution of their problems, hopefully leading to a cure," says Dr. Roth, who will retire from the Division of Digestive Diseases faculty October 1.

Although he continued to be a leader in endoscopy, Dr. Roth also saw patients with esophageal disorders, inflammatory bowel disease and other common GI conditions. In more recent years, he has increasingly taken on some of the most complicated and challenging cases referred to the Division. "That's what happens when you've been doing this for 43 years," Dr. Roth quips. "You've seen everything, or so you think."

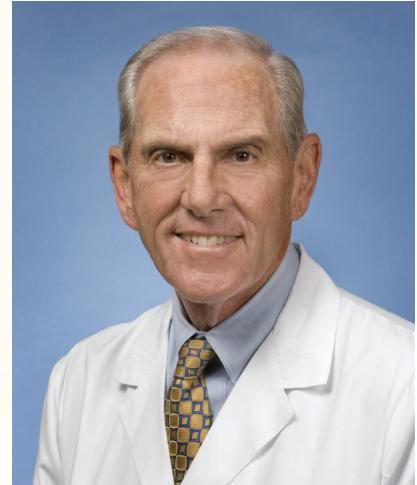
The challenge of "the detective work" involved in clinical practice was a major factor in Dr. Roth's decision to become a doctor. "A patient has an issue and you have to figure out what it is and what to do about it," he says. "And the more patients you see, the better you get.

Even with all of the changes in medicine over the years, I can't see myself doing anything else."

Dr. Roth completed his residency training at the University of Pennsylvania and his gastroenterology fellowship at UCLA before joining the faculty. At the time, he was only the third full-time clinician in the Division, and the first who had been trained in the burgeoning field of endoscopy. Dr. Roth helped to establish the Division's endoscopy unit, as well as its first esophageal motility unit.

After four years on the faculty he decided to go into private practice, though he continued to remain active in the GI training program at UCLA.

"I was most fortunate to have had the opportunity to establish and build a busy and successful practice and was blessed with having two outstanding partners in Dan Cole and Mike Albertson (who I'm thrilled to still have as colleagues here at UCLA)." Dr. Roth also became deeply involved with the American Society for Gastrointestinal Endoscopy (ASGE), becoming its president in 1994. "That was a tremendous experience in which I learned how to be an effective



administrator, leader and mentor," he recalls. Dr. Roth notes that at the outset of his career, "we mulled over a decision to do an endoscopy as if we were deciding whether to put someone on dialysis. Now it's a routine procedure that you rarely think twice about."

Missing the stimulation of the academic setting, Dr. Roth rejoined the UCLA Division of Digestive Diseases the year after his ASGE presidency, and has remained an active faculty member ever since. He was the Division's chief of clinical affairs for 17 years and continues to serve as associate chief of gastrointestinal endoscopy.

On his retirement to-do list is to learn to play the piano – something Dr. Roth has long considered but never had the time for. He also agreed to continue attending the Division's teaching conferences. Imparting his clinical know-how to fellows has been among the most rewarding aspects of Dr. Roth's career. The most important lesson he teaches? "Listen to the patients and make sure you delve into the details," he says.

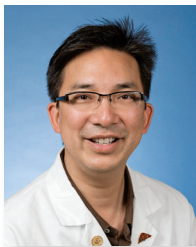
# Joel and Barbara Marcus Research Seed Grants Provide Key Start-Up Funds for Division Fellows

Breakthrough research starts with a good idea. Unfortunately, it is extremely difficult to secure research funding from the National Institutes of Health (NIH) and other major sources without preliminary findings to indicate that the idea has a good chance to succeed. It's a vicious circle – getting significant funding requires data, but obtaining the data requires funding. Seed grants break the impasse by providing the initial funding that enables researchers to investigate promising but untested ideas. By supporting these projects, seed grants can lead to much larger grants from the NIH and other funders.

The Joel and Barbara Marcus Research Seed Grants provide funds to UCLA's GI fellows in the Division of Digestive Diseases for just such a purpose – to conduct important studies in gastroenterology and hepatology for which alternative sources of funding are not readily available. These seed grants ensure that fellows have the opportunity to conduct high-quality research. The grants help to fund statistical services, laboratory assays, nursing support, and other research needs. Following are the most recently funded projects among the Division's fellows:



David Padua, MD, PhD



Steven-Huy Han, MD

## Measuring the Rate of Hyperfibrinolysis in the UCLA Cirrhosis Cohort

David Padua, MD, PhD | Mentor: Steven-Huy Han, MD

It has been observed that advanced hepatic disease is associated with coagulation factor deficiencies and accelerated fibrinolysis – in fact, the rapid re-liquidification of incubated, clotted blood from cirrhotic patients was described more than 100 years ago. The liver plays a major role in regulating the finely tuned hemostatic process: It is the site of synthesis of all the vitamin K-dependent coagulation proteins (factors II, VII, IX, and X, and proteins C and S), factor V, and factor XIII. In addition, the liver produces fibrinogen, antithrombin, alpha-2 antiplasmin, and plasminogen.

The breaking down of clots (fibrinolysis) is regulated by distinct factors that either activate the process, such as tissue plasminogen activator (tPA), or by factors that prevent activation, such as plasminogen activator inhibitor 1 (PAI-1) and alpha-2 antiplasmin. Patients with cirrhosis are at risk of developing severe coagulopathies, such as primary hyperfibrinolysis. While the etiology is unclear, cirrhotic patients may activate the fibrinolytic pathway by an increased endothelial release of tPA, decreased hepatic clearance of tPA, and decreased synthesis of alpha-2 antiplasmin and PAI-1. Additionally, stressors such as infections can further alter the balance of clotting and fibrinolytic systems. The activation of the fibrinolytic pathway can result in excess fibrin breakdown and lead to defective hemostasis.

Bleeding is a frequent and often severe complication of cirrhosis. Variceal hemorrhage can occur at a rate of five to 15 percent per year, with a mortality of 20 percent at six weeks. The cause of these esophageal and gastric varices is related to the portal hypertension, but the role of the coagulopathy of cirrhosis in gastrointestinal bleeding remains unclear. While coagulopathy may not play a role in initiating the variceal bleeding, a relationship between the severity of bleeding and coagulation defects has been proposed. Variceal bleeding is found to be more severe and difficult to control in patients with advanced liver disease with associated primary and secondary defects in hemostasis. Studies have suggested that hyperfibrinolysis may be one mechanism for this difficult-to-control bleeding.

Hyperfibrinolysis in cirrhotic patients usually causes mucocutaneous bleeding, but can also cause gastrointestinal bleeding. It is estimated that the incidence of hyperfibrinolysis in cirrhotic patients is up to 31 percent

and correlates with liver-disease severity. However, the extent of hyperfibrinolysis in liver cirrhosis and its role in the bleeding diathesis is still debatable. Dr. Padua's study investigates the rate of hyperfibrinolysis for cirrhotic patients treated at UCLA. By studying the incidence of this bleeding diathesis, he hopes to better understand the risk factors that contribute to the morbidity and mortality of cirrhotic patients.

## Genetic Investigations into Liver Fibrosis

Jihane Benhammou, MD | Mentor: Simon W. Beaven, MD, PhD

Previous research by Dr. Beaven and colleagues demonstrated that liver fibrosis is a genetically driven trait, based on a quantitative fibrosis analysis of 100 strains of inbred mice from the Hybrid Mouse Diversity Panel (HDMP) subjected to chronic liver injury. In the study, fibrosis was induced with biweekly injections of carbon tetrachloride (CCl<sub>4</sub>) in approximately 800 mice. Fibrosis was measured as a quantitative trait using digital histopathologic analysis coupled with an expert system to quantify picrosirius red staining in hepatic cross sections. A genome-wide association study (GWAS) identified a locus highly associated with fibrosis.

Stard3nl, an endosomal protein involved in intracellular lipid transport, is the only gene in the study's locus that is differentially expressed between fibrosis-resistant and susceptible strains. Expression of Stard3nl protein in the whole liver is reduced in fibrosis-susceptible strains, correlating with the gene expression findings. Dr. Benhammou's group therefore hypothesize that Stard3nl is the causative gene underlying the genome-wide association signal tied to liver fibrosis. The aim of this study is to knock out Stard3nl in a fibrosis-resistant mouse strain to see if this substantially increases the susceptibility to fibrosis.

Dr. Benhammou and colleagues have obtained *Stard3nl*<sup>-/-</sup> mice that were originally generated by Genentech and deposited in the UC Davis Knockout Mouse Project program. Preliminary data suggest that there is no overt difference in fibrosis between the CCl<sub>4</sub> and vehicle control, which could be due to the background strain studied. To knock out Stard3nl in mice that have a highly fibrosis-resistant strain, Dr. Benhammou intends to use clustered regularly interspaced short palindromic repeats (CRISPR) Cas 9, a novel method that has been successfully employed by collaborators in Dr. Peter Tontonoz's UCLA laboratory. The approach is to generate a guide RNA, which would be cloned in a vector and subsequently validated in a cell culture model by quantitative real-time PCR, western blotting and DNA sequencing. Once the construct is validated, Dr. Benhammou's group will have it injected into embryonic stem cells at the UC Irvine Transgenic Mouse Facility to generate the *Stard3nl*<sup>-/-</sup> mouse. The resulting mice will then be bred at UCLA and examined for fibrosis susceptibility in the laboratory by Dr. Benhammou's group.

## Improving the Quality of Endoscopic Reporting of Patients with Barrett's Esophagus: A Prospective Multicenter Study

Phillip Ge, MD | Mentor: V. Raman Muthasamy, MD, FACP, FASGE

Barrett's esophagus (BE) is a well-established precursor lesion for esophageal adenocarcinoma, a highly lethal cancer associated with a dismal five-year survival rate of less than 15 percent. The incidence of esophageal adenocarcinoma has rapidly increased in the United States, rising by more than 500 percent since the 1970s and at a rate higher than that of other cancers such as colon, prostate, and lung cancer. The stages of BE include intestinal metaplasia without cytologic atypia (i.e., non-dysplastic BE), low-grade dysplasia (LGD), high-grade dysplasia (HGD), intramucosal adenocarcinoma, and finally invasive adenocarcinoma.

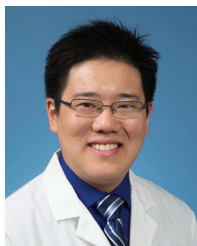
Traditionally, HGD and intramucosal adenocarcinoma were treated with esophagectomy, and LGD and non-dysplastic BE were managed with endoscopic surveillance. However, less invasive endoscopic eradication therapies (EET) have been developed, including endoscopic mucosal resection (EMR) and radiofrequency ablation (RFA). EET was originally indicated for the treatment of HGD and intramucosal adenocarcinoma, however data now additionally supports the use of EET, in particular RFA, in the treatment of LGD as well as selected individuals with nondysplastic BE.



Jihane Benhammou, MD



Simon W. Beaven, MD, PhD



Phillip Ge, MD



V. Raman Muthasamy, MD



Sequential advances in EET for BE, as well as increasing evidence to support its efficacy, have led to an increase in referrals for EET in patients with BE. The optimal care of patients referred for EET for BE is reliant upon detailed reporting of endoscopy findings and a standardized protocol for collection and interpretation of biopsies. The accurate endoscopic and pathological reporting of BE is critical to guiding management and avoidance of unnecessary or repeat procedures.

A previous multicenter study conducted by Dr. Ge and colleagues demonstrated that there is substantial variability in describing and documenting BE. Due to incomplete data or suboptimal tissue acquisition, initial EET strategy was altered in 13 percent of patients, and a repeat upper endoscopy was needed in 23 percent of patients to obtain proper mapping biopsies. This initial study won first place at the UCLA Department of Medicine Research Day Poster Competition in October 2015 and was presented at Digestive Disease Week in May 2016. The results from the study support the concept of quality improvement in the management of patients with BE in order to optimize patient care, reduce the need for additional procedures, and ultimately reduce costs.

Dr. Ge and colleagues are now planning to launch a UCLA-led quality-improvement initiative aimed at improving endoscopic reporting in patients undergoing endoscopy for screening and surveillance of BE, and reducing the incidence of repeat endoscopic procedures due to inadequate reporting. The immediate goal is an improvement in the quality of endoscopic reporting, with more precise identification of anatomic landmarks and presence of visible lesions on upper endoscopy, and adherence to a standardized protocol for acquisition of biopsy specimens. The ultimate goal is improved detection of dysplasia in patients with BE, and decreased incidence of repeat upper endoscopy or alteration in management strategy in patients with BE who are referred for EET.

## Role of Bile Acids and Receptor TGR5 in Regulating Glucose and Energy Homeostasis in Gastric Bypass Patients

Deepinder Goyal, MD | Mentor: Joseph R. Pisegna, MD

Approximately 80-90 percent of patients undergoing Roux-en-Y gastric bypass (RYGB) surgery show improvement in type 2 diabetes mellitus. The majority of these patients achieve remission of diabetes even before they achieve significant weight loss. This suggests a significant alteration in the basic physiology of energy balance and glucose metabolism post-RYGB.

One of the most important physiologic changes in RYGB patients is significant elevation in post-prandial levels of glucagon such as the peptide GLP-1. GLP-1 is a major insulin-releasing factor secreted by L cells in distal jejunum and ileum. However, the underlying mechanisms driving the altered secretion of GLP-1 in RYGB patients are still not well understood.

Interestingly though, patients who have undergone RYGB have been found to have significantly elevated levels of both primary and secondary bile acids due to increased entero-hepatic circulation from the altered gastrointestinal anatomy. One of the many receptors of bile acids is a newly discovered cAMP mediated cell surface G-protein coupled receptor TGR5. TGR5 has been found in liver, brown fat tissue, muscle, and endocrine cells of the gut epithelium. In-vitro activation of this receptor by bile acids and TGR5 ligands has been shown to increase secretion of GLP-1 in human and murine entero-endocrine cell lines. Furthermore, in adipose tissue, this receptor has been shown to activate de-iodinase enzyme converting inactive thyroid hormone T4 to its active form T3, thereby increasing basal metabolic rate and energy expenditure.

Dr. Goyal's study examines the effect of gastric bypass surgery on TGR5 receptor expression in the terminal ileum and correlates the levels of bile acids, TGR5 mRNA and protein with GLP-1 levels and insulin sensitivity. Dr. Goyal is also investigating the effect of gastric bypass surgery on thyroid hormone status and seeking to correlate changes in bile acids levels with serum T3/T4 ratio.



Deepinder Goyal, MD



Joseph R. Pisegna, MD



Neal Kaushal, MD, MBA



V. Raman Muthasamy, MD



Rusha Modi, MD, MPH



Lin Chang, MD

## Using Mobile App Technology to Analyze Efficiency in the Endoscopy Unit and Improve Operational Performance in the Endoscopy Center

Neal Kaushal, MD, MBA | Mentor: V. Raman Muthasamy, MD, FACC, FASGE

The principles of operations management may be useful in evaluating and enhancing operational performance in endoscopy centers. The aim of Dr. Kaushal's research in this area is to determine whether measuring performance and implementing operational changes can affect the delivery of care in endoscopy centers and help achieve optimal resource utilization, smoother workflow, and overhead cost savings.

Through a systematic analysis, a formal identification of factors constraining operational efficiency can improve performance and reduce costs for the endoscopy center. Ultimately, endoscopy centers may benefit from developing a system to benchmark and track performance metrics over time. Measuring these outcomes can have a significant impact on reducing healthcare spending, and may provide alternative ways to help save healthcare dollars.

With his seed grant, Dr. Kaushal will investigate the role of IT-based software solutions for GI practices to help optimize efficiency in the endoscopy unit. He will also generate data in a high-throughput, automated fashion using an interface that is a user-friendly mobile application, and will develop real-time measures of performance metrics for efficiency analysis.

## Fructose Reintroduction Protocol in IBS Patients Successfully Treated with a Low FODMAP Diet

Rusha Modi, MD, MPH | Mentor: Lin Chang, MD

Research supports the clinical experience that certain foods can trigger the emergence or exacerbation of symptoms in the majority of patients with irritable bowel syndrome (IBS). While IBS remains primarily a symptom-driven entity, the understanding of its pathophysiology is evolving. However, comparatively little research has focused on the specific role of certain foods and how they prompt the development of IBS symptoms.

Food may be linked to changes in motility, visceral sensation, gut microbiome, intestinal permeability, immune activation and brain-gut axis. Dr. Modi's study will focus on fructose, which is one of the main components of FODMAP (fermentable oligosaccharides, disaccharides, mono-saccharides and polyols) foods. Fructose is a common part of the Western diet and can be consumed as a free monosaccharide, part of sucrose, or in polymers referred to as fructans. There are no human gut-specific fructose transporters. Rather, glucose transporters are used, leading some to hypothesize that over-ingestion of these agents may trigger some of the enteric complaints of patients with IBS.

The literature on fructose malabsorption gives varying threshold amounts: from 15 to 50 grams in healthy controls, and from 5 to 50 grams in IBS patients/known malabsorbers. Average daily fructose consumption in the American diet is approximately 34 grams, with a range of 15 to 54 grams, which falls well within the threshold levels. FODMAP foods are thought to induce gastrointestinal symptoms including gas, bloating, abdominal pain or discomfort, and loose stools by increasing small bowel water content and increasing gas production by fermentation of foods by gut bacteria. Studies, including a recent controlled clinical trial, have demonstrated that a low FODMAP diet can be an effective nutritional therapy.

There are risks to prolonged use of a low FODMAP diet. A study from 2012 suggested that continued restriction of FODMAPs (longer than four weeks) can lead to a reduction of luminal bifidobacteria in patients with IBS. Bifidobacteria mainly inhabit the large intestine, where they produce short chain fatty acids (SCFA) as byproducts – including butyrate, shown to be important for colorectal cancer prevention and limiting enteropathogenic colonization. However, important clinical questions include when

FODMAPs can be safely reintroduced into the diet, how quickly this can be accomplished, and what is an acceptable daily threshold of intake for IBS patients who respond or do not respond to a low FODMAPs diet. There are no evidence-based answers to these questions.

Dr. Modi's seed grant-funded study aims to determine the amount and timing for the safe reintroduction of FODMAPs – specifically fructose – into the diet of IBS-D and IBS-M patients who have been successfully maintained on a low FODMAP diet.

## Colorectal Cancer Screening in Arab American Females

Hala Al-Jiboury, MD | Mentor: Folasade P. May, MD, PhD, MPhil

According to the U.S. Census, there are approximately 2 million Arab Americans in the United States, most of them in major metropolitan cities such as Detroit, Chicago, and Los Angeles. However, some experts believe this is an underestimation and that the number may be closer to 4 million. Because Arab Americans are instructed to identify their race as white for the purposes of the census, estimates are difficult to obtain – which has contributed to limited literature on cancer incidence, mortality rates, and screening practices of Arab Americans.

Studies have suggested that the incidence of colorectal cancer (CRC) among Arab Americans is similar to that of the general U.S. population – yet, Arab Americans have lower CRC screening rates. In a statewide telephone survey conducted in Michigan in 2013, the CRC screening rate among Arab Americans (45.7 percent) was much lower than that of all Michigan adults 50 and older (71.0 percent).

To elucidate the factors that contribute to low CRC screening rates in Arab Americans, it is important to understand the knowledge, attitudes and beliefs about cancer among members of the community. Two focus group studies, one in Michigan and the other in New York, aimed to understand cancer outcomes and behaviors around cancer prevention among Arab Americans. Both found that some Arabs believed that cancer was caused by diet, stress, and one's emotional well-being. Some believed in divine fatalism as a cause for their cancer. The studies also found a stigma associated with cancer in the Arab community. Some focus group participants reported that cancer reflects negatively on the family, so the diagnosis was kept secret from the family or from the patient.

The literature on CRC in particular is more limited. Focus group studies suggest that discordant patient-provider language and provider discrimination may be barriers to CRC screening. A separate survey conducted at an Islamic mosque during Friday prayer services in Dearborn, Mich., in 2013 found that barriers to CRC screening included a fear of discomfort during a screening procedure, language barriers, lack of knowledge about screening procedures, and lack of provider recommendation for screening. The participants in the study were all Muslim and predominately male. There have been no studies to date on facilitators and barriers to CRC screening in Arab American women, nor is there data on screening attitudes, knowledge, and beliefs in a predominantly Christian Arab population, a population more reflective of the larger U.S. Arab community. Dr. Al-Jiboury's study focuses on Arab American women, seeking to determine the major patient-reported barriers and facilitators to CRC screening; predictors of CRC screening; and the preferred modality for CRC screening among this population.



Hala Al-Jiboury, MD

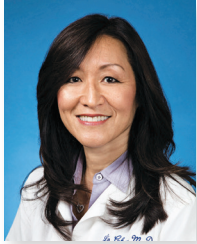


Folasade P. May, MD, PhD, MPhil

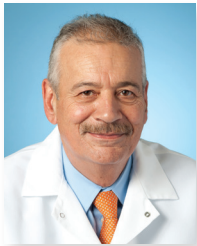




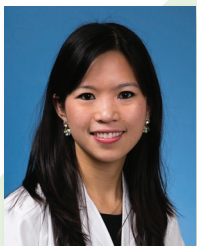
Beth Videlock, MD



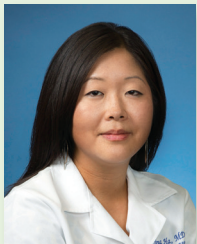
Lin Chang, MD



Harry Pothoulakis, MD



Michelle Vu, MD



Christina Ha, MD

## A Systems Biology Approach to Evaluation of LncRNAs in IBS

Beth Videlock, MD | Mentors: Lin Chang, MD and Harry Pothoulakis, MD

Irritable bowel syndrome is considered a functional gastrointestinal disorder. But, while people in the field once spoke in terms of functional vs. organic, a paradigm shift has occurred. There is now an acknowledgment that advances in science will lead to an understanding of the “organic” etiology of an increasing number of phenomena underlying pathogenesis and symptom generation/exacerbation in IBS. For example, studies have identified subsets of IBS patients with differences in gut microbiota. This finding is supported by a known association between exposure to infection or antibiotics and risk for IBS. There is also a clear association between stressful life events and both onset of IBS and symptom exacerbation. Dr. Videlock’s research project focuses on elucidating the biological mechanisms underlying this association between stress and IBS.

In preliminary studies, she and her colleagues have explored the expression of mRNA and long non-coding RNA (lncRNA) in a pilot sample of 10 patients with IBS and 10 healthy controls (HCs). The study of the function of lncRNAs, which are genes that do not encode protein and are >200 base pairs, is a growing area. Dr. Videlock’s interest in differential expression of lncRNAs as a potential mechanism connecting stress to symptoms in IBS stems from the knowledge that lncRNAs regulate gene expression, and that the expression of lncRNAs is both inducible by stimuli such as stress and highly tissue specific. She plans to test the general hypothesis that differential expression of lncRNAs in the colonic mucosa underlies the association between environmental/systemic stimuli (e.g. stress, diet) and symptoms in IBS.

Dr. Videlock’s study aims to identify lncRNAs that are differentially expressed in colonic mucosal biopsies from patients with IBS in comparison to HCs, using the nCounter Gene Expression Assay (Nanostring Technologies, Seattle). She also hopes to identify lncRNAs that correlate with clinical measures in IBS patients, such as severity of overall symptoms and abdominal pain, psychological symptoms, and life stress.

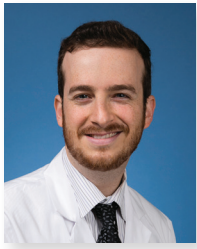
## Emergency Room Resource Utilization Among Inflammatory Bowel Disease Patients

Michelle Vu, MD | Mentor: Christina Ha, MD

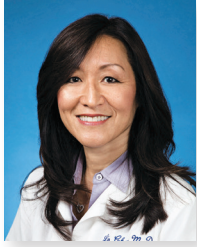
Inflammatory bowel disease (IBD) is a complex, chronic condition characterized by gastrointestinal inflammation resulting in abdominal pain, diarrhea, and gastrointestinal bleeding. The disease can be complicated and follows an unpredictable course. IBD exacerbations are common, with severe cases requiring powerful immunomodulatory and biologic agents, surgical intervention, multiple physician visits and inpatient admissions. Additional data also indicates an increase in IBD-related emergency department (ED) visits in recent years. While direct medical costs of caring for IBD patients and trends in ED visits by IBD patients have previously been evaluated, none of the studies analyzed resource utilization in the emergency room setting, where IBD patients with acute complaints receive initial diagnostic and therapeutic intervention.

Given the relatively early onset of disease and normal life expectancy, IBD-associated costs per patient can surpass those of other chronic diseases. As such, it is important to identify areas where cost-effective strategies that might improve quality of care have not yet been implemented. IBD patients in the ED are subject to diverse provider practices stemming from varied awareness of IBD practice guidelines. Unnecessary testing, disjointed care and lack of transparency in adherence to established guidelines in the busy ED arena are some of the potential contributors to the high cost of IBD care.

Dr. Vu’s study aims to identify patient characteristics and risk factors for ED visits among the IBD patient population, assess resource utilization in the ED setting among IBD patients, and identify potential measures to improve the quality of ED care and subsequent outpatient follow-up.



Guy Weiss, MD



Lin Chang, MD

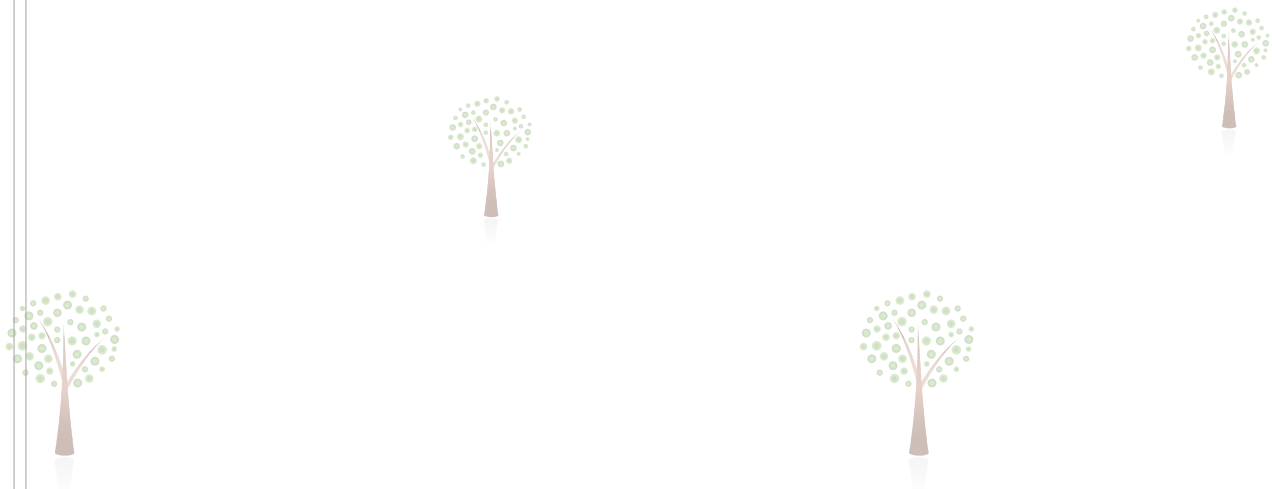
## UCLA Celiac Collective: Development of Longitudinal E-Cohort of Celiac Patients

Guy Weiss, MD | Mentor: Lin Chang, MD

The growing use and availability of the Internet provides innovative research opportunities for outcomes research. Dr. Weiss aims to develop a longitudinal Internet-based cohort (e-cohort) of patients with self-reported gluten-associated disorders, mainly celiac disease (CD) and non-celiac gluten sensitivity. His group is recruiting members of different celiac organizations and support groups. This e-cohort is termed the "UCLA Celiac Collective." Participants are requested to complete a baseline survey and follow-up surveys at six-month intervals.

Since most studies of CD rely on a retrospective review of medical records or administrative data and prospective studies carry a heavy financial burden, exploring a pre-existing online community is of great academic value. Retrospective studies often lack key clinical data that can only be obtained directly from the patient (such as a detailed diet, use of over-the-counter medications, and exercise). Other important patient-reported outcomes such as diet adherence, depression, anxiety, sleep disturbances, sexual dysfunction, and fatigue are often partial or lacking. The database will enable Dr. Weiss and colleagues to target specific patient populations (e.g., women, elderly, minorities, etc.) and explore disease-specific topics (screening, diet, etc.). External researchers will have the ability to submit research proposals to gain access to the unidentifiable database, and even add new survey modules. The project will span a period of several years, potentially resulting in multiple abstracts and publications in the field of CD. In addition to reduced-cost research, the UCLA Celiac Collective can be used for educational and interventional purposes.

Dr. Weiss's study aims to create an innovative e-cohort of CD patients that will enable researchers within and outside of UCLA to examine disease-specific parameters through a comprehensive database. His group will explore the association between psychological distress (i.e., depression, anxiety and stress), motivation and competence in relation to adherence to a gluten-free diet. The value of this quality-improvement study lies in its potential to identify and improve the factors that negatively affect adherence. Consequently, CD care will improve by reducing disease activity, improving quality of life, and reducing the number of office visits, thus resulting in an overall healthcare cost reduction.





## SATURDAY, MAY 21

Identification of a LncRNA Signature in Ulcerative Colitis: IFNG-AS1 Is a CD4<sup>+</sup> T-Cell LncRNA Associated with IBD SNP Loci

Distinguished Abstract Plenary

**David M. Padua, Swapna Mahurkar-Joshi, DQ Shih, Dimitrios Iliopoulos, Charalabos Pothoulakis**

### Hemorrhoid Therapies

Hands-on Workshop

BJ Dunkin, A Foxx-Orenstein, N Gupta, **Dennis M. Jensen**, SV Kantsevoy, M McGee, EM Pauli, WA Qureshi, T Savides

### Suturing and Closures

Hands-on Workshop

N Gupta, SV Kantsevoy, MA Khashab, N Kumar, S Shaikh, D Shapiro, AA Siddiqui, SN Stavropoulos, **Rabindra R. Watson**

### Cost-Effectiveness of HCV Therapy by Genotype

Clinical Symposium

**Sammy Saab**

### Update on Infections Related to Endoscope Reprocessing

Clinical Symposium

AS Ross, AL Faulx, **V. Raman Muthusamy**

### LincRNAs and Colon Cancer

Research Symposium

**Dimitrios Iliopoulos**

### Painful Matters: Is IBS Pain Different from Other Causes of Visceral Pain?

Translational Symposium

**Kirsten Tillisch**

Composition and Trainee Perception of EUS Training in Advanced Endoscopy Training Programs (AETPs) in the US: Results from a Prospective Multicenter Study Evaluating Competence Among Advanced Endoscopy Trainees (AETs)

Research Forum

RH Wilson, RN Keswani, M Hall, D Mullady, AY Wang, CJ DiMaio, **V. Raman Muthusamy**, A Rastogi, L Hosford, L Carlin, S Ellert, **Rabindra R. Watson**, S Komanduri, GA Cote, R Shah, S Edmundowicz, DS Early, S Wani

Endoscopic Ultrasound and Fine Needle Aspiration in the Management of Pancreatic Cystic Neoplasms: Evaluation of 2015 AGA Guidelines in a Large Multicenter Cohort

Research Forum

**Phillip S. Ge**, S Gaddam, **Roxana Y. Cortes Lopez**, DM Jaiyeola, **Jitin Makker**, **Stephen Kim**, **Alireza Sedarat**, **Timothy R. Donahue**, L Hosford, RH Wilson, D Grande, RN Keswani, V Kushnir, D Mullady, S Edmundowicz, DS Early, S Komanduri, S Wani, **V. Raman Muthusamy**, **Rabindra R. Watson**

*Helicobacter pylori* Infection Decreases Expression of the Na,K-ATPase in Gastric Epithelial Cells, Resulting in Acid-Induced Gastric Injury

Research Forum

**Elizabeth A. Marcus**, **Elmira Tokhtaeva**, **David R. Scott**, **Bita V. Naini**, **George Sachs**, **Olga Vagin**

Intracerebroventricular Corticotropin-releasing Factor (CRF) at Low Doses Induces a CRF1 Receptor-mediated Visceral Analgesia in Male Rats Through Recruitment of Brain Oxytocin

Research Forum

**Muriel H. Larauche**, **Mandy Biraud**, **Nabila Moussaoui**, **Won Ki Bae**, **Henri Duboc**, **Mulugeta Million**, **Honghui Liang**, **Yvette Taché**

Positive Crosstalk Between PKD1 and  $\beta$ -Catenin Signaling Pathways in Intestinal Epithelial Cells

Research Forum

**James Sinnott-Smith**, **Jia Wang**, **Nora Rozengurt**, **Steven H. Young**, **Enrique Rozengurt**

Probiotic *Saccharomyces boulardii* CNCM I-745 Inhibits Hypervirulent *Clostridium difficile*-associated Cecal Tissue Damage and Pro-inflammatory Cytokine Expression in Hamsters

Research Forum

**Hon Wai Koon**, **Diana Hoang-Ngoc Tran**, X Chen, CP Kelly, **Charalabos Pothoulakis**

The Impact of Race and Ethnicity on Healthcare Utilization and Mortality for Colorectal Cancer Patients in the United States

Research Forum

DM Gray, A Hinton, S Gupta, **Folasade P. May**

A Prospective Multicenter Study Evaluating Learning Curves and Competence in EUS and ERCP Among Advanced Endoscopy Trainees (AETs): The Rapid Assessment of Trainee Endoscopy Skills (RATES) Study

Topic Forum

S Wani, RN Keswani, M Hall, D Mullady, AY Wang, CJ DiMaio, **V. Raman Muthusamy**, A Rastogi, L Hosford, RH Wilson, L Carlin, S Ellert, **Rabindra R. Watson**, S Komanduri, GA Cote, R Shah, S Edmundowicz, DS Early

Detecting Recurrent Barrett's Esophagus After Successful Endoscopic Eradication Therapy: Determining an Appropriate and Efficient Surveillance Biopsy Strategy

Topic Forum

**Mahmoud Omar**, **Jitin Makker**, **Phillip S. Ge**, L Hosford, RH Wilson, D Grande, T Hollander, J Obuch, B Cinnor, BC Brauer, M Boniface, DS Early, GD Lang, V Kushnir, S Edmundowicz, K Krishnan, K Bidari, S Larue, **Stephen Kim**, **Alireza Sedarat**, **Rabindra R. Watson**, S Komanduri, S Wani, **V. Raman Muthusamy**

Development of Quality Indicators for Endoscopic Eradication Therapies (EET) in Barrett's Esophagus: The TREAT-BE (Treatment with Resection and Endoscopic Ablation Techniques for Barrett's Esophagus) Consortium

Topic Forum

S Wani, **V. Raman Muthusamy**, N Shaheen, R Yadlapati, RH Wilson, JA Abrams, J Bergman, A Chak, KJ Chang, A Das, JA Dumot, S Edmundowicz, G Eisen, GW Falk, MB Fennerty, LB Gerson, GG Ginsberg, D Grande, M Hall, BD Harnke, J Inadomi, J Jankowski, CJ Lightdale, **Jitin Makker**, RD Odze, O Pech, R Sampliner, SJ Spechler, G Triadafilopoulos, MB Wallace, KK Wang, I Waxman, S Komanduri

FFA3 Activation Inhibits Nicotine-induced Secretion and Motility via Enteric Nervous Reflex in Rat Proximal Colon

Poster Session

**Izumi Kajii**, **Yasutada Akiba**, T Furuyama, **Jonathan D. Kaunitz**

Status of ERCP Training in Advanced Endoscopy Training Programs (AETPs) in the U.S.: Results from a Prospective Multicenter Study Evaluating Competence Among Advanced Endoscopy Trainees (AETs)

Topic Forum

S Wani, RN Keswani, M Hall, D Mullady, AY Wang, CJ DiMaio, **V. Raman Muthusamy**, A Rastogi, L Hosford, RH Wilson, L Carlin, S Ellert, **Rabindra R. Watson**, S Komanduri, GA Cote, R Shah, S Edmundowicz, DS Early

Attitudes Toward Defined Quality Indicators (QIs) for Endoscopic Eradication Therapy (EET) of Barrett's Esophagus

Poster Session

S Komanduri, **V. Raman Muthusamy**, RH Wilson, **Jitin Makker**, D Grande, S Wani

Chromatin Regulation of IBD-susceptibility Loci by HDAC9 in Crohn's Disease

Poster Session

**Angelos Oikonomopoulos**, C Polytarchou, M Koutsioumpa, **Hanlin L. Wang**, **Daniel Hommes**, **Dimitrios Iliopoulos**

Colon Adenocarcinoma with Neuroendocrine Tumor (NET) Features are Prevalent: A Descriptive Study of Their Clinico-pathologic Characteristics

Poster Session

**Lisa Lin**, **Christine Yu**, K Lally, **David Oh**, **Michael Lewis**, **Folasade P. May**, **Joseph R. Pisegna**

Differences in Diagnoses, Prevalence, and Outcomes of Definitive, Presumptive and Incidental Diverticular Hemorrhage

Poster Session

**Dennis M. Jensen**, **Gordon V. Ohning**, **Thomas O. Kovacs**, **Kevin A. Ghassemi**, **Gustavo A. Machicado**, **Gareth Dulai**, **Alireza Sedarat**, **Rome Jutabha**

Guideline Adherence Evaluation Through Barrett's Esophagus Reporting

Poster Session

**Shelley Shi**, **Jitin Makker**, **Jeffrey Conklin**, **Eric Esrailian**, **Daniel Hommes**, **Christine Yu**

IFN- $\gamma$  Regulates the Immunosuppressive Properties of Bone Marrow Mesenchymal Stem Cells in a microRNA-29a/STAT-3 Dependent Manner

Poster Session

**Angelos Oikonomopoulos**, **Tamera Tomakili**, **Precious Lacey**, **Dimitrios Iliopoulos**, **Daniel Hommes**

Long-term Outcomes of Lung Transplantation in Patients with Hepatitis C Infection: The Data from the U.S. Transplant Registry

Poster Session

AB Koenig, M Stepanova, **Sammy Saab**, A Ahmed, RJ Wong, T Gogoll, ZM Younossi

Loss of Corticotropin Releasing Factor (CRF) Immunoreactivity (IR) in the Colonic Enteric Neurons and Propulsive Motor Response to Lipopolysaccharide (LPS) in Vasoactive Intestinal Peptide (VIP) Deficient Mice

Poster Session

**Pu-Qing Yuan**, **Joseph R. Pisegna**, **James Waschek**, **Yvette Taché**

Potent Suppression of the Growth of Human Pancreatic Cancer Cells by Combinations of Inhibitors of the PI3K/mTOR and MEK/ERK Pathways

Poster Session

**Qinhong Xu**, H Soares, **Steven H. Young**, **James Sinnett-Smith**, **Enrique Rozengurt**

Regulation of YAP Localization and Phosphorylation in Intestinal Epithelial Cells: Identification of a Novel Crosstalk Between YAP and PKD Signaling

Poster Session

**Jia Wang**, **Li-Li Han**, **James Sinnett-Smith**, **Enrique Rozengurt**

Risk Factors of Hepatocellular Carcinoma After Treatment and Obtaining Sustained Viral Response in HCV Genotype 3 Patients

Poster Session

**Kelvin T. Nguyen**, **Jenna K. Kawamoto**, **Alan Sheinbaum**

The Effect of Endoscope-connected Water Pump Flow Rates on Successful Unsedated Colonoscopy by Water Immersion Method

Poster Session

P Bayupurnama, N Ratnasari, F Indrarti, C Triwikatmani, S Maduseno, S Nurdjanah, **Felix W. Leung**

Water Exchange Enhances Lesion Detection in the Proximal Colon in Screening Patients with Decreased Need for Sedation

Poster Session

S Cadoni, M Liggi, P Gallittu, D Mura, E Murru, **Felix W. Leung**

## SUNDAY, MAY 22

Improving Techniques and Outcomes for Non-variceal Upper GI Bleeding

Breakfast with the Expert

**Dennis M. Jensen**, I Gralnek

Duodenoscope Reprocessing: Keeping Patients Safe & Keeping My Hospital Safe!

Postgraduate Course Luncheon Breakout Sessions

**V. Raman Muthusamy**

Assessment of Differences Between Academic and Non-academic Providers in Inflammatory Bowel Diseases Related Utilization Using a Large Administrative Dataset

Research Forum

**Welmoed K. van Deen**, M Skup, **Adriana Centeno**, **Natalie E. Duran**, **Precious Lacey**, D Jatulis, **Eric Esrailian**, MG van Oijen, **Daniel Hommes**

FOXA2 as a Novel Tumor Suppressor of Pancreatic Oncogenesis

Research Forum

**Christina Vorvis**, **Maria Hatzia Apostolou**, **Marina Koutsioumpa**, **Dimitrios Iliopoulos**

Guanylate Cyclase-C Expression is Down-regulated in Colonic Biopsies from Female Irritable Bowel Syndrome Patients with Constipation

Research Forum

S Garcia-Carraballo, A Harrington, J Castro, G Hannig, CB Kurtz, A Silos-Santiago, **Lin Chang**, S Brierley

Interplay Between DNA Methylation and KMT2D Histone Methyltransferase Regulates Pancreatic Cellular Growth Through a Glucose Metabolic Shift

Research Forum

**Marina Koutsioumpa**, M Hatzia Apostolou, C Polytarchou, **Swapna Mahurkar-Joshi**, **Christina Vorvis**, **Dimitrios Iliopoulos**

Mindfulness-based Stress Reduction Improves Cerebral Blood Flow and Symptoms in Patients with Irritable Bowel Syndrome (IBS)

Research Forum

**Michelle P. Chen**, **Paul Macey**, **Jean Stains**, **Suzanne R. Smith**, **John G. Serpa**, **Tiffany Ju**, **Zafar Gill**, **Jennifer S. Labus**, **Bruce D. Naliboff**, **Kirsten Tillisch**

(continued on page 14)

## SUNDAY, MAY 22

(continued from page 13)

The Impact of a Value-based Health Care in Inflammatory Bowel Diseases on Health Care Utilization

Research Forum

**Welmoed K. van Deen**, M Skup, **Adriana Centeno**, **Natalie E. Duran**, **Precious Lacey**, D Jatulis, **Eric Esrailian**, MG van Oijen, **Daniel Hommes**

Water Exchange CAP Assisted Colonoscopy (WECAC) Facilitates Completion of High Quality, Cost Effective Colonoscopy with Enhanced Access

Research Forum

**Felix W. Leung**

Quality Improvement in Colonoscopy – State-of-the-Art Lecture

Topic Forum

**Felix W. Leung**

Reproducibility of Water Exchange (WE) Method on Enhanced Adenoma Detection

Topic Forum

**Felix W. Leung**, **Hui Jia**, Y Pan, X Guo, K Wu

Water Exchange Method Significantly Improves Adenoma Detection Rate: A Multi-center, Randomized Controlled Trial

Topic Forum

H Jia, Y Pan, **Felix W. Leung**, X Guo, K Wu

Adipose Tissue Function in Ulcerative Colitis (UC): Mesenteric Preadipocytes from Patients with UC Exhibit Differential mRNA Expression Patterns and Alter Inflammatory Responses in Colonic Epithelial Cells and Mice with Colitis

Poster Session

**Jill M. Hoffman**, **Aristea Sideri**, **Jonathan J. Ruiz**, **Dimitris Stavrakis**, **Charalabos Pothoulakis**, **Iordanes Karagiannides**

Altered Functional and Anatomical Brain Network in Ulcerative Colitis

Poster Session

**Jennifer S. Labus**, **Kareem Hamadani**, **Kirsten Tillisch**, **Arpana Gupta**, **Mher Alaverdyan**, **Alexander Anavim**, **Cody Ashe-McNalley**, C Torgerson, J Van Horn, J Kornelsen, CN Bernstein, **Emeran A. Mayer**

Children with Functional Gastrointestinal Disorders Display Structural Brain Alterations Compared to Healthy Control Subjects

Poster Session

**Kirsten Tillisch**, **Jennie Tsao**, **Jennifer S. Labus**, **Alia C. Manetta**, **Cody Ashe-McNalley**, **James Versalovic**, **Emeran A. Mayer**, R Shulman

Differing Microbial Populations Induce TL1A-mediated Intestinal Fibrosis Independently of TL1A-mediated Inflammation

Poster Session

**Noam Jacob**, K Kumagai, Y Kanazawa, AM Hamill, E Flores, YH Kim, RB Sartor, S Targan, **Jonathan Jacobs**, DQ Shih

Functional Network Properties of Brain Regions in Irritable Bowel Syndrome

Poster Session

**Jennifer S. Labus**, **Kareem Hamadani**, **Arpana Gupta**, **Justin Gelman**, **Alexander Anavim**, **Mher Alaverdyan**, C Torgerson, **Cody Ashe-McNalley**, **Cathy Liu**, **Bruce D. Naliboff**, J Van Horn, **Kirsten Tillisch**, **Emeran A. Mayer**

Gut-derived Metabolites Involved in Tryptophan Metabolism Associated with Brain Morphometry

Poster Session

**Jennifer S. Labus**, **Kirsten Tillisch**, N Oezguen, T Savidge, J Versalovic, **Emeran A. Mayer**

High Dietary Protein Results in Reversal of Hepatic Steatosis in a Murine DIO Model of NAFLD by Regulating Metabolic Gene Transcription

Poster Session

**John P. Vu**, **Jihane N. Benhammou**, **Leon Luong**, **Michael Lewis**, **William F. Parsons**, **Suwan Oh**, **Patrizia M. Germano**, **Joseph R. Pisegna**

Impact of Cap-assisted Water Exchange (CAWE) and Cap-assisted Total Water (CATW) Methods on Adenoma Detection in Screening and Surveillance Colonoscopy

Poster Session

JW Leung, J Pearcy, AW Yen, **Felix W. Leung**

Impact of EUS-FNA on the Assessment of Resectability Following Downstaging Chemotherapy for Locally Advanced Pancreatic Cancer

Poster Session

**Nimah Jamaluddin**, **Stephen Kim**, S Komanduri, **Howard A. Reber**, **Oscar J. Hines**, **Timothy R. Donahue**, **V. Raman Muthusamy**, **Rabindra R. Watson**

Limited Nesting Stress Alters Maternal Behavior and In Vivo Intestinal Permeability in a Sex-dependent Manner in Wistar Rat Pups

Poster Session

**Nabila Moussaoui**, **Muriel H. Larauche**, **Mandy Biraud**, J Molet, **Mulugeta Million**, **Emeran A. Mayer**, **Yvette Taché**

Mechanism of Ca-sensing Receptor Signaling: Mutational Analysis of Allosteric Effects by Amino Acids and Extracellular Ca<sup>2+</sup>

Poster Session

**Steven H. Young**, **James Sinnett-Smith**, **Enrique Rozengurt**

Microbial and Metabolomics Features Associated with Endoscopic Recurrence After CD Surgical Resection - A NIDDK-IBDGC (IBD Genetics Consortium) Study

Poster Session

N Shen, J Torres, S Tamburini, M Goudarzi, **Jonathan Jacobs**, RH Duerr, D McGovern, SR Brant, P Schum, Y Sharma, JH Cho, **Jonathan Braun**, JC Clemente

Morphometric Correlates of Pain Sensation and Pain Affect in Irritable Bowel Syndrome

Poster Session

**Arpana Gupta**, **Jennifer S. Labus**, **Bruce D. Naliboff**, **Kirsten Tillisch**, **Aubrey D. Love**, BM Quigley, RS Firth, **Cathy Liu**, **Cody Ashe-McNalley**, **Jean Stains**, JM Lackner, **Emeran A. Mayer**

Neonatal Limited Nesting Stress Influences Basal and Post-stress Visceral Sensitivity in a Sex-dependent Manner in Adult Wistar Rats

Poster Session

**Muriel H. Larauche**, **Mandy Biraud**, **Won Ki Bae**, **Nabila Moussaoui**, J Molet, **Mulugeta Million**, **Yvette Taché**

Overpressure Traumatic Brain Injury (TBI) Causes Intestinal Mucosal Microhemorrhage, Alters In Vivo Intestinal Permeability and Induces Brain and Intestinal Inflammatory Gene Expression in Rats

Poster Session

**Hung Pham**, **Suwan Oh**, **Shuping S. Wu**, **Nabila Moussaoui**, **Mandy Biraud**, **Muriel H. Larauche**, **Oscar Scremin**, **Mulugeta Million**



Per-pass Diagnostic Yield of Endoscopic Ultrasound Guided Fine Needle Aspiration of Malignant Solid Pancreatic Masses in a Large Multicenter Cohort

Poster Session

**Phillip S. Ge, Jitin Makker, Stephen Kim, Alireza Sedarat, Mehdi Mohamadnejad, C Marshall, L Hosford, RH Wilson, S Komanduri, S Wani, Rabindra R. Watson, V. Raman Muthusamy**

Postnatal Stress Induced By Limited Nesting is Associated with Loss of Fiber-digesting and Butyrate-producing Bacteria in the Intestinal Microbiome of Rats at Weaning

Poster Session

**Jonathan Jacobs, Nabila Moussaoui, Muriel H. Larauche, Mandy Biraud, Yvette Taché**

Role of Probiotics in Hepatic Encephalopathy: An Updated Meta-analysis of Randomized Trials

Poster Session

**Duminda Suraweera, J Au, Sammy Saab, Elena Saab**

ROR $\gamma$ t-dependent CD4<sup>+</sup> T Cells Garden the Mucosa-associated Microbiome of the Small Intestine and Colon

Poster Session

**Jonathan Jacobs, Lin Lin, Venu Lagishetty, P Ruegger, J Borneman, Jonathan Braun**

Sex Differences in the Association of Body Mass Index (BMI) with the Anatomical Architecture of Extended Reward Network Regions

Poster Session

**Arpana Gupta, Emeran A. Mayer, Kareem Hamadani, Mher Alaverdyan, Kirsten Tillisch, Claudia Sanmiguel, Jennifer S. Labus**

Underwater Polypectomy: Heat-sink Effect in an Experimental Model

Poster Session

YH Hsieh, K Binmoeller, **Felix W. Leung**

Underwater Resection of Benign Colorectal Neoplasia in Routine Clinical Practice: A VA Experience

Poster Session

AW Yen, JW Leung, **Felix W. Leung**

VIP Knockout Mice are Resistant to a Western Diet-induced Body Weight and Fat Accumulation

Poster Session

**Leon Luong, Suwan Oh, John P. Vu, Joseph R. Pisegna, Patrizia M. Germano**

Visceral Analgesia Induced by Intranasal Administration of Oxytocin in Male Rats

Poster Session

**Won Ki Bae, Muriel H. Larauche, Mandy Biraud, Nabila Moussaoui, Mulugeta Million, Yvette Taché**

## MONDAY, MAY 23

Randomized Controlled Trial (RCT) of Doppler Endoscopic Probe (DEP) Assisted Treatment Compared to Standard Hemostasis of Severe Variceal or Portal Hypertensive Lesion UGI Bleeding

ASGE Presidential Plenary Session

**Dennis M. Jensen, Thomas O. Kovacs, Gordon V. Ohning, Kevin A. Ghassemi, Gustavo A. Machicado, Gareth Dulai, Alireza Sedarat, Jeffrey Lewis, Rome Jutabha, Jeffrey Gornbein**

Duodenoscope Reprocessing: Keeping Patients Safe & Keeping My Hospital Safe!

Postgraduate Course Luncheon Breakout Sessions

**V. Raman Muthusamy**

Colorectal Symposium: Fecal Incontinence, IBS and Constipation: Novel Diagnostic Approaches and Treatments

Clinical Symposium

AE Bharucha, A Lembo, **Lin Chang, MR Sood**

Nuclear Receptor Regulation of Lipid Metabolism

Research Symposium

**Simon W. Beaven**

Role of miRNAs in IBD and Digestive Tract Cancer

Translational Symposium

**Dimitrios Iliopoulos**

A High Protein Diet Reduces Body Fat Mass and Alters the Gut Microbiome, with Expansion of Akkermansia, in a Rat Model of Diet-induced Obesity

Research Forum

**Jonathan Jacobs, Lixin Wang, Mulugeta Million, Joseph R. Pisegna, Yvette Taché**

Ammonia Transport Mechanisms in Rat Duodenum and Colon

Research Forum

**Yasutada Akiba, Izumi Kaji, Hyder Said, Jonathan D. Kaunitz**

Commensal Microflora Modulates TL1A-mediated Spontaneous Ileitis and TL1A-mediated Immune Changes

Research Forum

K Kumagai, Y Kanazawa, **Jonathan Jacobs, Noam Jacob, AM Hamill, E Flores, YH Kim, RB Sartor, S Targan, DQ Shih**

Identification of a Novel Crosstalk Mechanism Between Protein Kinase D1 (PKD1) and p21-activated Kinase (PAK) in Intestinal Epithelial Cells

Research Forum

**James Sinnott-Smith, Jia Wang, Enrique Rozengurt**

Quantification of Patients' Preferences for Outcome Metrics in Inflammatory Bowel Diseases Using a Choice Based Conjoint Analysis

Research Forum

**Welmoed K. van Deen, Dominic Nguyen, Natalie E. Duran, Ellen Kane, MG van Oijen, Daniel Hommes**

Selective FFA3 Agonists Stimulates Duodenal Bicarbonate Secretion and Prevents NSAID-Induced Enteropathy via the GLP-2 Pathway in Rats

Research Forum

**Hyder Said, Yasutada Akiba, Izumi Kaji, Jonathan D. Kaunitz**

Statins Inhibit YAP Function and Potently Restrain the Proliferation of Pancreatic Ductal Adenocarcinoma Cancer Cells

Research Forum

**Qinhong Xu, Yinglan Zhao, Fang Hao, Jia Wang, James Sinnott-Smith, Enrique Rozengurt**

Upregulation of Gut Bitter Taste Receptor Subtypes, T2R138 and T2R16, in High Fat Diet-induced Obesity is Reversed Following Antibiotic Treatment

Research Forum

**Jennifer Huynh, Celine Duraffourd, David Casero, Jonathan Braun, Catia Sternini**

Xenin Induces Anion Secretion via Neural NTS1, NK1 and 5-HT3 Receptors in Rat Duodenum

Research Forum

**Izumi Kaji, Yasutada Akiba, Jonathan D. Kaunitz**

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## MONDAY, MAY 23

(continued from page 15)

**Bariatric Surgery is Associated with Changes in the Brain's Reward System Architecture and Eating Behaviors**

Poster Session

**Claudia Sanmiguel, Jennifer S. Labus, Arpana Gupta, Aubrey D. Love, Caleb J. Paydar, Charles Herdon, Tiffany Ju, Mher Alaverdyan, Cody Ashe-McNalley, Jeffrey L. Conklin, Jean Stains, Anna Balioukova, Yijun Chen, Erik Dutson, Emeran A. Mayer**

**Circulating LL-37 Levels Accurately Indicate IBD Disease Activity and Presence of Strictures**

Poster Session

**Diana Hoang-Ngoc Tran, Christina Ha, Wendy Ho, S. Anjani Mattai, Angelos Oikonomopoulos, Precious Lacey, Guy A. Weiss, Daniel Hommes, Hon Wai Koon**

**Colorectal Cancer Screening Utilization and Variation in an Integrated Veterans Affairs Healthcare Network**

Poster Session

**Jennifer Phan, Joseph R. Pisegna, Folasade P. May**

**Combined Endoscopic Trans-oral Outlet Reduction with Gastroplasty (TORe-G) Produces Robust Weight Loss in Patients with Roux-en-Y Gastric Bypass (RYGB) Failure**

Poster Session

**Deepinder Goyal, Stephen Kim, Yijun Chen, Erik Dutson, Joseph R. Pisegna, Rabindra R. Watson**

**Emergency Department Healthcare Utilization Among IBD Patients at an Academic Tertiary Care IBD Referral Center**

Poster Session

**Michelle Vu, Jennifer Phan, Christina Ha**

**Gut Microbial Composition Discriminates Between Obese Subjects Before and After Bariatric Surgery**

Poster Session

**Claudia Sanmiguel, Jennifer S. Labus, Jonathan Jacobs, Arpana Gupta, Kristen Coveleskie, Tiffany Ju, Jean Stains, Anna Balioukova, Yijun Chen, Erik Dutson, Emeran A. Mayer**

**Impact of Carbon Dioxide Insufflation and Water Exchange on Post-colonoscopy Outcomes: A Randomized Controlled Trial**

Poster Session

**S Cadoni, P Falt, P Gallittu, M Liggi, V Smajstrla, Felix W. Leung**

**Mindfulness Based Stress Reduction (MBSR) Improves Irritable Bowel Syndrome (IBS) Symptoms via Specific Aspects of Mindfulness**

Poster Session

**Kirsten Tillisch, Suzanne R. Smith, John G. Serpa, Jean Stains, Tiffany Ju, Zafar Gill, Lynn Connolly, Jennifer S. Labus, Bruce D. Naliboff**

**Reduction in Clinical and Economic Burden by Treating All Medicaid Patients with Chronic Hepatitis C (CHC): A Decision-analytic Model**

Poster Session

**ZM Younossi, SC Gordon, A Ahmed, D Dieterich, Sammy Saab, R Beckerman**

**Resilience is Decreased in Irritable Bowel Syndrome (IBS) and Associated with Poorer Quality of Life and Greater Symptom Severity**

Poster Session

**Vien Nguyen, Wendy Shih, A Presson, Bruce D. Naliboff, Lisa A. Kilpatrick, Arpana Gupta, Emeran A. Mayer, Lin Chang**

**The Outcomes of a Clinical Care Pathway for IBD Surgery**

Poster Session

**Anya Platt, Amy L. Lightner, Rutger J. Jacobs, Dipti Sagar, Welmoed K. van Deen, Tijmen Hommes, Sarah Reardon, Jonathan Sack, Daniel Hommes**

**Trough and Antibody Level Testing in Conjunction with the Use of a Standardized Clinical Assessment and Management Plan Does Not Improve Outcomes Among Patients with Inflammatory Bowel Disease**

Poster Session

**EL Barnes, JS Levine, Vikas Pabby, S Cantu, G Ciociolo, J Greenberg, K Laskowski, SR McLaughlin, DA Graham, JR Allegretti, PA Banks, M Currier, PS de Silva, S Friedman, M Hamilton, JR Korzenik, FL Makrauer, BA Norton, AM O'Toole, SB Snapper, M Tomczak, R Burakof**

**Validation of the NAFLD Fibrosis Score in a Veterans Healthcare System Cohort of Patients to Noninvasively Identify Patients with Hepatic Fibrosis**

Poster Session

**Jeremy Wang, Jihane N. Benhammou, Jenna K. Kawamoto, Joseph R. Pisegna, Folasade P. May**

## TUESDAY, MAY 24

**Black-White Disparity Trends in Colorectal Cancer Incidence and Stage at Presentation in the United States**

Distinguished Abstract Plenary

**Folasade P. May, Beth Glenn, Catherine Crespi, Ninez Ponce, Brennan Spiegel, Roshan Bastani**

**Lower GI Bleeding**

Clinical Symposium

**Dennis M. Jensen**

**Impact of Colonoscopy Insertion Techniques on Adenoma Detection**

Combined Research Forum

**S Cadoni, P Falt, S Sanna, M Argiolas, V Fanari, P Gallittu, M Liggi, D Mura, L Porcedda, V Smajstrla, M Erriu, Felix W. Leung**

**CSA13 Suppresses Colitis-associated Intestinal Fibrosis via Cathelicidin Receptor FPRL1-dependent Pathway**

Research Forum

**Diana Hoang-Ngoc Tran, Hon Wai Koon**

**Comparison of a Global Rating Scale and Checklists Using a Validated Tool in the Assessment of Competence in EUS and ERCP Among Advanced Endoscopy Trainees (AETs): Results from a Prospective Multicenter Study**

Research Forum

**S Wani, RN Keswani, M Hall, D Mullady, AY Wang, CJ DiMaio, V. Raman Muthusamy, A Rastogi, L Hosford, RH Wilson, L Carlin, S Ellert, Rabindra R. Watson, S Komanduri, GA Cote, R Shah, S Edmundowicz, DS Early**

Determining Effectiveness and Recurrence Post Endoscopic Eradication Therapy (EET) in Barrett's Esophagus: Results from a Multicenter Cohort Study

Research Forum

S Wani, S Komanduri, DS Early, V Kushnir, **Jenny Brook**, B Cinnor, J Obuch, S Gaddam, LL Fujii, **Phillip S. Ge**, GD Lang, RH Wilson, L Hosford, M Boniface, D Grande, T Hollander, S Larue, **Jitin Makker**, **Mahmoud Omar**, D Mullady, JB Klapman, CL Harris, BC Brauer, S Edmundowicz, **V. Raman Muthusamy**

Identification and Characterization of Colonic-exosomes: micro-RNA Mediated Horizontal Gene Transfer Within the Colonic Epithelia In Vitro and In Vivo

Research Forum

**Kyriaki Bakirtzi**, **Dimitrios Iliopoulos**, **Charalabos Pothoulakis**

Per-pass Analysis on the Diagnostic Yield of EUS-guided FNA in Solid Pancreatic Mass Lesions: Analysis from a Multicenter Randomized Controlled Trial

Research Forum

**Mehdi Mohamadnejad**, D Mullady, DS Early, A Rastogi, B Collins, JF Wang, C Marshall, S Sams, R Yen, M Rizeq, M Romanas, S Nawaz, O Ulsarac, T Hollander, L Hosford, RH Wilson, V Kushnir, SK Amateau, BC Brauer, A Attwell, S Gaddam, C Kohlmeier, RR Azar, S Komanduri, R Shah, A Das, S Edmundowicz, **V. Raman Muthusamy**, S Wani

Novel Methods for Increasing Colonoscopic Tolerance and Adenoma Detection

Topic Forum – State-of-the-Art

**Felix W. Leung**

Prospective Multicenter Randomized Controlled Trial Demonstrating Water Exchange (WE), but Not Water Immersion (WI), Significantly Increases Adenoma Detection Compared with Air Insufflation (AI) Even in Propofol Sedated Patients

Topic Forum

YH Hsieh, CW Tseng, CT Hu, M Koo, **Felix W. Leung**

Chronic Oral Exposure to Ultrafine Particulate Matter Alters the Cecal Microbiota Composition but Not Ileal Permeability in LDLR-null Male Mice Fed a High Fat Diet

Poster Session

**Muriel H. Larauche**, **Rongsong Li**, **Nabila Moussaoui**, **Jieping Yang**, **Susanne M. Henning**, **Joseph R. Pisegna**, C Sioutas, **Mohamad Navab**, **Zhaoping Li**, **Tzung Hsiai**

Colonic Immune Cells in Irritable Bowel Syndrome: A Systematic Review and Meta-analysis

Poster Session

M Bashashati, S Moossavi, N Rezaei, S Moraveji, C Cremon, PA Hughes, Z Bian, CH Choi, O Lee, M Coëffier, **Lin Chang**, L Ohman, MJ Schmulson, M Simren, KA Sharkey, G Barbara

Corticotropin-releasing Hormone Receptor 1 (CRH-R1) Polymorphisms are Associated with Irritable Bowel Syndrome (IBS) and Acoustic Startle Response (ASR)

Poster Session

AC Orand, **Bruce D. Naliboff**, **Wendy Shih**, A Presson, **Emeran A. Mayer**, **Lin Chang**

Current Attitudes and Practice Patterns Toward Endoscopic Eradication Therapy (EET) for Barrett's Esophagus (BE): A Nationwide Survey

Poster Session

S Komanduri, S Wani, RH Wilson, D Grande, **Jitin Makker**, **V. Raman Muthusamy**

Differences in Cortisol Responses to Hormone Challenge vs. Visceral Stressor in Irritable Bowel Syndrome

Poster Session

**Sarah Park**, **Wendy Shih**, A Presson, **Elizabeth J. Videlock**, **Emeran A. Mayer**, **Lin Chang**

Functional Pathways Associated with Differential Colonic Mucosal Expression of microRNA and mRNA in Irritable Bowel Syndrome

Poster Session

**Swapna Mahurkar-Joshi**, **Elizabeth J. Videlock**, **Dimitrios Iliopoulos**, **Emeran A. Mayer**, **Lin Chang**

IBS-associated SCN5A Mutation G615E Results in a Nav<sub>v</sub>1.5 Channel with Normal Na<sup>+</sup> Current Density but Loss of Mechanosensitivity

Poster Session

PR Strege, A Beyder, A Mazzone, C Bernard, DR Linden, SJ Gibbons, **Lin Chang**, **Emeran A. Mayer**, G Farrugia

Mesenteric Preadipocytes from Crohn's Disease Patients Exhibit Differential mRNA Expression Patterns and Induce Protective Responses in Colonic Epithelial Cells and Mice with Colitis

Poster Session

**Jill M. Hoffman**, **Aristea Sideri**, **Jonathan J. Ruiz**, **Dimitris Stavrakis**, **Charalabos Pothoulakis**, **Iordanes Karagiannides**

miR-31-3p is Involved in Substance P (SP)-associated Inflammation in Human Colonic Epithelial Cells and Experimental Colitis

Poster Session – Poster of Distinction

**Kai Fang**, **Ivy Ka Man Law**, **Aristea Sideri**, **Vanessa Huang**, **David M. Padua**, **Dimitrios Iliopoulos**, **Charalabos Pothoulakis**

Pharmacological Inhibition of Phosphatase and Tensin Homologue (Pten) Elicits Colitis in IL-10-KO Mice

Poster Session

**Sang H. Rhee**, **Charalabos Pothoulakis**

The High Affinity Receptor for PACAP (PAC1) Receptor is Protective in Inflammatory Bowel Disease (IBD)

Poster Session

**Emily Whang**, **John P. Vu**, **Suwan Oh**, **Leon Luong**, **Joseph R. Pisegna**, **Patrizia M. Germano**

The Impact of Inflammatory Bowel Disease on Patients' Caregivers

Poster Session

**Aria Zand**, **Anya Platt**, **Welmoed K. van Deen**, **Daniel Hommes**

The Quality and Impact of Endoscopic Reporting of Patients with Barrett's Esophagus Referred for Endoscopic Eradication Therapy at Tertiary Care Centers

Poster Session

**Phillip S. Ge**, **Nikki Nguyen**, B Cinnor, **Jitin Makker**, **Mahmoud Omar**, **Stephen Kim**, **Alireza Sedarat**, L Hosford, J Obuch, BC Brauer, RH Wilson, D Grande, S Komanduri, S Wani, **Rabindra R. Watson**, **V. Raman Muthusamy**

The Trans-Golgi Network Protein Aftiphilin Regulates Colonic Epithelial Cell Permeability Through Modulating Expression of Genes Involved in Cell Junctions in Colonic Epithelial Cells

Poster Session

**Ivy Ka Man Law**, **Ryan G. Rogero**, **Charalabos Pothoulakis**



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