# Gastroenterology, Hepatology and Nutrition

Cincinnati Children's

## Division Details

### Division Data Summary

#### Research and Training Details

| | |
|---|---|
| Number of Faculty | **30** |
| Number of Research Fellows | **1** |
| Number of Research Students | **3** |
| Number of Support Personnel | **66** |
| Direct Annual Grant Support | **$5,035,669** |
| Direct Annual Industry Support | **$37,207** |
| Peer Reviewed Publications | **75** |

#### Clinical Activities and Training

| | |
|---|---|
| Number of Clinical Staff | **49** |
| Number of Clinical Fellows | **12** |
| Inpatient Encounters | **9,159** |
| Outpatient Encounters | **18,013** |

### Division Photo

Row 1: S Saeed, M Cohen, S Pentiuk
Row 2: N Shroyer, L Denson, R Kohli, C Wetzel, S Huppert
Row 3: J Palermo, S Moore, D Dykes, M Leonis, C Cole

## Significant Accomplishments

### Intestinal Rehabilitation Program

Led by Noah Shroyer, PhD, the basic science and translational research program in intestinal rehabilitation has followed an interdisciplinary model to benefit from institutional strengths in Developmental Biology and the Perinatal Institute. Shroyer's research has focused on elucidating the mechanisms that control cell fate within the intestinal epithelium. He has characterized a network of transcription factors that control development and homeostasis of the intestine. More recently, his laboratory has discovered how this genetic network is subverted in colon cancer. Together with other investigators including Jeffrey Whitsett, MD, and James Wells, PhD, he has led a project to broaden this genetic network to evaluate embryonic intestinal organogenesis. Shroyer, Wells and Michael Helmrath, MD, MS, have developed 3-dimensional gastrointestinal organoid cultures from mouse and human tissues. These organoids function as a renewable and expandable source of patient-specific intestinal tissue and serve as a platform to discover novel therapeutics for treating intestinal diseases. In the future they also may provide source material for transplantation. Current projects include evaluation novel therapies in intestinal organoids from patients with cystic fibrosis and inherited diseases causing intestinal failure.

### Digestive Health Center

The Digestive Health Center (DHC) directed by Jorge Bezerra, MD, and managed by Cynthia Wetzel, PhD, recently received a five-year, $5.5 million competitive renewal grant from the National Institutes of Health. The

DHC is one of only 17 Silvio O. Conte Digestive Diseases Research Core Centers in the nation and is the only core center dedicated to research on pediatric digestive diseases. The goal of the DHC is to improve child health through better diagnosis, treatments and outcomes for chronic liver disease; inflammatory and diarrheal diseases; obesity and the digestive system and development and digestive diseases. Since 2007, the number of DHC investigators has increased from 58 to 88. These investigators have $35.6 million in extramural funds to support their research and they have published over 440 peer-reviewed articles. The DHC has an exceedingly successful Pilot and Feasibility Program, with a total of $1 million distributed among 26 junior investigators since 2007. These investigators have developed innovative programs and attracted $17.6 million in extramural grant funding to date.

### Cincinnati Center for Eosinophilic Disorders (CCED)

Research at theCincinnati Center for Eosinophilic Disorders (CCED) involves basic, clinical and translational studies. Phil Putnam, MD, and James Franciosi, MD, MS, have led projects including epidemiology, quality of life research, descriptive research databanks, specimen databanks, translational studies and clinical trials. The CCED participated in a major clinical trial of anti-Il5 in children who have eosinophilic esophagitis that was published in 2011. In the past year, the CCED team participated in the publication of more than 10 manuscripts on various aspects of eosinophilic disorders, including a major revision of the Consensus Recommendations for Diagnosis of Eosinophilic Esophagitis in children and adults. Marc Rothenberg, MD, PhD, continues basic science research to understand the genetic and immunologic bases for eosinophilic gastrointestinal disorders.

As a continuation of our $1.5 million NIH stimulus research grant awarded in 2009, the first national Registry for Eosinophilic Gastrointestinal Disorders (www.regid.org) has been launched in 2010 and continues to work toward enrolling patients. The CCED is leading a multi-center registry collaboration with eight pediatric and adult hospitals with plans for further expansion.

## Division Highlights

### Kathleen Campbell, MD; John Bucuvalas, MD; Jorge Bezerra, MD; Mike Leonis, MD, PhD

Pediatric Liver Transplant Program

The Pediatric Liver Transplant Program continues its' mission of advancing the care of liver transplant recipients by improving the health care delivery system, providing unparalleled clinical care, and addressing gaps in knowledge through patient-based and basic laboratory research. Our program remains one of the largest pediatric liver transplant programs in the country, with clinical outcomes at or above the national average. Programmatic highlights in fiscal year 2012 include a successful review of the program by the Centers for Medicare/Medicaid Services, addition of a hospital-wide solid organ transplant administrator and creation of an Integrated Solid Organ Transplant Program with John Bucuvalas, MD as the medical director. Clinically, the Cincinnati Children's Hospital Medical Center Pediatric Liver Transplant Program has maintained its' overall transplant volume and has continued to build expertise in transplantation for primary hepatic tumors. Since 2007, we have performed more pediatric liver transplants for primary hepatic tumors than any other program in the United States. Members of the Liver Transplant Program continue to act as leaders in national quality improvement efforts and multicenter clinical and translational research studies. These include: the Pediatric Acute Liver Failure Study Group (PALF), Medication Adherence in Children who had a Liver Transplant (MALT), Immunosuppression Withdrawal for Stable Pediatric Liver Transplant Recipients (iWITH), and the Studies in Pediatric Liver Transplantation (SPLIT) quality improvement community and clinical registry. In addition, the

program participated in a multicenter application to the Clinical Trials in Organ Transplantation in Children (CTOT-C) project, a cooperative research program sponsored by the National Institute of Allergy and Infectious Diseases (NIAID), with co-funding from the National Heart, Lung and Blood Institute (NHLBI).

### Conrad Cole, MD, Adam Mezoff, MD, Samuel Kocoshis, MD

Intestinal Rehabilitation Program

The Intestinal Rehabilitation Program continues to experience considerable growth and is positioned for a national leadership role in conducting basic scientific, translational and clinical research. We managed patients from 24 states and 3 countries in the past year. The multidisciplinary initiative to standardize care and facilitate research among the three disciplines (gastroenterology, neonatology and surgery) providing care to infants and children with intestinal failure have been successfully implemented. Currently the rate of survival without significant liver disease (as measured by cholestasis) of our patients with intestinal failure is among the highest nationally. Major clinical initiatives include weekly multidisciplinary bedside rounds; development of a specific emergency department protocol for standardized evaluation and treatment of fevers among children with central venous catheters; and pre-clinic planning meetings, which are expected to improve the patient's clinic experience. In addition, we have protocolized management of central venous catheters with suspected bacterial biofilms by initiating ethanol lock therapy and laboratory assessment of nutritional markers. These initiatives have significantly reduced the incidence of outpatient acquired central line bloodstream infections and we now have one of the lowest rates nationally.

Translational and clinical trials research initiatives were also implemented. These include developing in vitro culture methods to grow and expand both normal and diseased intestinal tissue from patients with intestinal failure; validating the use of bomb calorimetry as a measure of enteral energy balance among intestinal failure patients; and feeding advancement trial in patients with gastroschisis to identify the method that optimally decreases the duration of TPN. A NIH/Emmaus Inc. funded multicenter clinical trial evaluating the safety and efficacy of enteral glutamine in the infants with short bowel syndrome was initiated. We continue participation in the 15-center Pediatric Intestinal Failure Consortium and the data describing factors impacting outcomes in pediatric intestinal failure was recently published.

### Scott Pentiuk, MD

Interdisciplinary Feeding Team (IFT)

This multi-disciplinary team provides comprehensive evaluation of children with swallowing/feeding disorders. It includes members from gastroenterology, otolaryngology, human genetics, speech therapy, occupational therapy, social work, and nutrition. Dr. Scott Pentiuk MD is the pediatric gastroenterologist on the team. The IFT continues to grow at nearly 10% per year with over 1200 patient visits over the last year. The team has also expanded its outpatient treatment programs with the development of co-treatment sessions and Parent-Child Interaction Training for families. Current IFT research projects include the use and development of a pureed by G-tube diet, quality of life assessment of feeding therapies, methods to evaluate children with swallowing dysfunction, and the creation of a prospective database in order to track the effectiveness of therapies and patient outcomes.

### Samuel Kocoshis, MD

Intestinal Transplantation Program

Implementation of numerous quality improvement initiatives has translated into unprecedented clinical success for the intestinal transplantation program. The program was the first within our medical center to utilize medical

passports for patients. The medical passport gives a snapshot view of each of our patient's medical history from prior to transplant to the technical aspects of each transplant to the unique details of each post transplant history. Individual drug reactions, organ dysfunction of other organ systems, and clinical quirks of each patient are highlighted in a cogent story which provides caregivers with insights to our patients that they would never have otherwise acquired. These insights facilitate the care of our patients wherever they travel or whenever they are seen by either other divisions or by emergency physicians. Numerous physicians and other healthcare providers have commended us for providing such a comprehensive view of our patients that enhance communication greatly. In addition all clinical protocols were reviewed and updated according to new information obtained from the transplantation literature. Furthermore, our program has been an active participant in hospital wide QAPI initiatives. Our "dashboard" has shown striking improvement in all outcome measures, due in large part to our meticulous adherence to protocols. Yet another initiative was our close association with the "adherence" program from the behavioral science department. A psychologist sees all of our patients as inpatients and outpatients in order to analyze and correct barriers to adherence. Our initiatives were rewarded when the all of the institution's transplant programs were reviewed by CMS and the intestinal transplantation program was found to have absolutely no deficiencies. Moreover, among the 10 most recent patients transplanted between 2009 and 2011, we have 100% one-year survival, making us the most successful program in North America in terms of patient survival for the three year period between 2009 and 2012.

Our stunningly good results have placed us on the radar screen of a number of referring institutions nationally, and we have seen new referrals in the past 12 months from Michigan, Oklahoma, Texas, Tennessee, Wisconsin and Alabama. Our transplantation "waiting list" now numbers 4 patients, and we believe that a goal of performing 5-10 small bowel transplants per year is realistic.

Clinical and translational research is slowly evolving. Even though only one peer reviewed article emanated from our program during the past academic year, it is the "definitive" article on graft versus host disease in intestinal transplantation. We have learned from our experience and changed our immunosuppressive protocol and surgical technique to minimize the risk for graft versus host disease.

We are actively pursuing several research initiatives at present. We are working with the Behavioral Science Department, writing an observational paper on the contributions that an adherence program can make within a transplantation program. A second paper will be analysis of risk factors for poor psychosocial outcomes. A translational project that we are initiating is a cross sectional study regarding the prevalence and significance of anti-enterocyte antibodies in small bowel transplantation. If our hypotheses are correct, anti-enterocyte antibodies may function as sensitive and specific biomarkers for antibody mediated rejection in transplant patients. Yet another project is in its earliest stages. We are seeking funding to retrospectively stain biopsy specimens for FOXP3 within T lymphocytes , speculating that excessive absence or reduction of FOX P3 expression on intestinal lymphocytes predisposes to acute cellular rejection.

### Jorge Bezerra, MD, Alex Miethke, MD, Joseph Palermo, MD, Ph.D.

The Chronic Liver Disease Program

The Chronic Liver Disease Program provides comprehensive care for children with liver diseases. Staffed by 9 pediatric hepatologists, the Program serves a national and international referral population via a comprehensive evaluation of all medical and surgical aspects of liver disease and the prompt initiation of conventional and innovative treatments. The evaluation includes a full spectrum of metabolic analysis, inflammatory processes, and high-throughput gene sequencing to screen for genetic diseases. In addition to the consultation with expert hepatologists and clinical nurse specialists, the clinic facilitates the timely consultation with surgeons,

pathologists, radiologists, and nutritionists with expertise in pediatric liver disease. This coordinated approach enables a thorough evaluation of the impact of the illness on the child's well being. For children with advanced stages of liver disease, an evaluation for liver transplantation and close follow-up in the pre-transplant clinic enable the implementation of the most comprehensive treatment protocol to minimize complications, improve post-transplant course, and optimizes outcomes.

Recognizing that research is critical to improved care, the Clinic Staff leads multi-center studies sponsored by the National Institutes of Health to advance knowledge on mechanisms of pediatric liver disease and to develop new diagnostic and treatment modalities. Recent innovations include: 1) the development of a high-throughput gene chip to diagnose mutations in children with genetic liver diseases, 2) an ongoing trial to determine the efficacy of corticosteroids in children with biliary atresia, 3) studies to dissect the causes and develop new treatments for biliary atresia, 4) investigations of the role of immune dysregulation in the etiology of acute liver failure, 5) studies to discover biomarkers and new therapies for fatty liver disease, and 6) the development of new therapies for bile acid disorders. The clinical and research programs create an outstanding environment for the training of future leaders in the field via a fellowship-training program in Advanced Hepatology.

### Sean Moore, MD, Conrad Cole, MD, Mitchell Cohen, MD

Diarrhea and Malnutrition

Our goal is advance the quality of care for children with diarrhea and malnutrition by creating new knowledge through robust research and clinical collaborations between Cincinnati Children's Hospital Medical Center and international partners. We have established and evolving collaborations with colleagues in Brazil, Ghana, Nigeria and Pakistan focused on micronutrient deficiencies (zinc and iron), undernutrition, diarrheal diseases, and tropical/environmental enteropathy.

The Moore laboratory is broadly interested in understanding and reversing the "vicious cycle" of malnutrition and enteric infections in developing countries. Current areas of focus are: 1) laboratory and clinical studies of glutamine supplementation in enteroids, murine models of weanling malnutrition, and underweight children in Northeast Brazil (NIH, NASPGHAN Foundation), 2) murine models of environmental enteropathy and rotavirus immunization (Bill & Melinda Gates Foundation Grand Challenges Exploration), and 3) intestinal epithelial cell signaling networks linking cell cycle, metabolism, DNA damage response, and circadian rhythms (DARPA Biochronicity Program).

In a related program, Dr. Cohen completed phase I studies on a new candidate vaccine with potential efficacy against enterotoxigenic *E. coli* and cholera, two important causes of diarrhea in developing countries.

### Stavra Xanthakos, MD, Rohit Kohli, MD

Cincinnati Children's Steatohepatitis Center

The Cincinnati Steatohepatitis Center (CCSC) is a multidisciplinary clinic that provides care to a growing population of pediatric patients with nonalcoholic fatty liver disease (NAFLD) and nonalcoholic steatohepatitis (NASH). NAFLD, the hepatic consequence of obesity and metabolic syndrome, affects about 10% of children and ranges from fatty liver alone (NAFLD) to fatty liver with varying degrees of liver inflammation and fibrosis (NASH). NASH is estimated to progress to cirrhosis and liver failure in an estimated 25% of adult individuals and has become the third leading cause for liver transplantation in adults. NAFLD and NASH often begin in childhood and progressive severe fibrosis can occur in early adolescence. Early identification and intervention is critical to minimize progression to end-stage liver disease.

Since its inception in 2007, the program has evaluated over 190 children. The CCSC screens patients for

alternate causes of elevated liver enzymes and screens for closely related comorbidities including insulin resistance, hypertension, dyslipidemia, type 2 diabetes mellitus, polycystic ovarian syndrome and obstructive sleep apnea. Accordingly, our program collaborates with faculty from other obesity-related programs at CCHMC, including the Center for Better Health and Nutrition, Sleep, Hypertension and Lipid, and Diabetes Clinics, and the Surgical Weight Loss Program for Teens. First line treatment for NAFLD and NASH involves achieving a healthier weight. The CCSC provides individualized dietary consultation and activity recommendations, utilizing a patient centered approach to assess readiness for change and goal-setting. Families are also encouraged to participate in more intensive medical and surgical weight loss programs at CCHMC, as appropriate. Progress in meeting goals is tracked and quality outcomes measure change in BMI and serum aminotransferase levels over time.

Research programs in the CCSC aim to improve our understanding of pathogenesis and expand treatment options for this disease. Researchers in the CCSC are studying innovative animal models of bariatric surgery and NASH, including sleeve gastrectomy. The pre-clinical research program has further been supported by grants from Ethicon Endosurgery Inc. and the University of Cincinnati's CCTST T1 grant programs. In clinical research, the CCSC is a major participating pediatric site in the NIDDK-funded NASH Clinical Research Network (NASH CRN), a multi-center study investigating the natural history and determinants of NASH in adults and children. A new NASH CRN clinical trial investigating cysteamine versus placebo for the treatment of pediatric NASH (CyNCH) is now open for enrollment at our site.

The CCSC has published clinical and pre-clinical papers in the area of steatohepatitis research over the last year in the following journals: The Journal of Pediatrics; PLoS One; Indian Journal of Pediatrics; Journal of Pediatric Gastroenterology, Hepatology and Nutrition and Journal of Hepatology. CCSC faculty were invited to present at national scientific meetings, including the annual meeting of the American Gastroenterology Association last year.

### Lee (Ted) Denson, MD, Shehzad Saeed, MD

Inflammatory Bowel Disease

The number of patients receiving multidisciplinary care for IBD has continued to grow, with children from more than 25 states seen over the past year. State-of-the art services including diagnostic imaging modalities, which do not require radiation exposure, and targeted psychology interventions for nonadherence have been implemented. We have continued to contribute to international genome-wide association studies to identify susceptibility genes specifically for pediatric-onset disease, and prospective cohort studies to develop personalized models of disease behavior and response to therapy. Investigators have received funding from

the National Institutes of Health (NIH) to conduct the first multicenter North American randomized controlled trial in newly diagnosed children with ulcerative colitis, the PROTECT study. Within this trial, we will develop a model to predict individual patient therapeutic responses and clinic outcomes that will incorporate clinical, genetic and immune biomarkers that we have developed. At Cincinnati Children's, this trial will include collaborators in the Divisions of Pulmonary Biology and Biomedical Informatics. Under the leadership of Kevin Hommel, PhD, in the Adherence Center, we are one three centers conducting the first randomized controlled trial of telehealth interventions to improve medication adherence in children with IBD. It is anticipated that the knowledge gained from these studies will be rapidly translated to practice through our collaborations with Peter Margolis, MD, PhD, in clinical effectiveness, via his leadership of the ImproveCareNow (ICN) pediatric IBD quality improvement network. The IBD Center has continued to play a leading role in ICN, which has achieved a 20 percent improvement in patient remission rates with implementation of consensus patient care guidelines

and practices. Locally, we have recently achieved the milestone of an 80% remission rate across our IBD patient population. The ICN network was the basis for an NIH award to Margolis in the Center for Health Care Quality to develop an innovative web-based social networking model to improve outcomes for children with IBD, termed C3N. As part of this collaborative network, patient-focused activities are being developed to improve patient outcomes and engage patients and their families to become more involved in the care of their IBD.

## Significant Publications

Samson CM, Morgan P, Williams E, Beck L, Addie-Carson R, McIntire S, Booth A, Mendez E, Luzader C, Tomer G, **Saeed S,** Donovan E, **Bucuvalas J, Denson LA. Improved Outcomes with Quality Improvement Interventions in Pediatric Inflammatory Bowel Disease.** *J Pediatr Gastroenterol Nutr.* [Epub ahead of print] PMID: 22699837. Jun 13 2012.

The results show that significant improvements in patient outcomes are associated with quality improvement efforts that do not rely on new medication or therapies.

Softic S, Kirby M, Berger NG, **Shroyer NF,** Woods SC, **Kohli R** . **Insulin Concentration Modulates Hepatic Lipid Accumulation in Mice in Part via Transcriptional Regulation of Fatty Acid Transport Proteins**. *PLoS One*. 7(6):e38952. 2012.

Insulin is well understood to control flux of glucose into cells thus maintain blood glucose levels. In this context the role of the liver as an organ of glucose production during times of dearth is also well characterized. This report by Softic et al in the journal PLoS One highlights a novel role for insulin in liver physiology. Their data suggest that circulating plasma insulin levels also regulates the transport of fat into the liver. This seems to be determined through transcriptional level control of proteins called fatty acid transport proteins (FATP 2 and 5). This finding has clear and important implications for fighting the nation's obesity epidemic.

Gong R, Ding C, Hu J, Lu Y, Liu F, Mann E, Xu F,**Cohen MB**, Luo M. **Role for the membrane receptor guanylyl cyclase-C in attention deficiency and hyperactive behavior**. *Science.* 333:1642-6. 2011.

In this report, investigators identify that certain neurons in mice selectively express guanylyl cyclase-C (GC-C), a membrane receptor previously thought to be expressed mainly in the intestine. GC-C activation potentiates the excitatory responses mediated by glutamate and acetylcholine receptors via the activity of guanosine 3',5'-monophosphate-dependent protein kinase (PKG). Mice in which GC-C was knocked out exhibited hyperactivity and attention deficits. Moreover, their behavioral phenotypes were reversed by therapy for ADHD and by treatments to bypass the function of GC-C (PKG activation). These results indicate important behavioral and physiological functions for the GC-C/PKG signaling pathway within the brain and suggest new therapeutic targets for neuropsychiatric disorders related to the malfunctions of midbrain dopamine neurons.

## Division Publications

1. Abonia JP, Putnam PE. **Mepolizumab in eosinophilic disorders**. *Expert Rev Clin Immunol*. 2011; 7:411-7.
2. Bedel AN, Hemmelgarn TS, Kohli R. **Retrospective review of the incidence of cytomegalovirus infection and disease after liver transplantation in pediatric patients: comparison of prophylactic oral ganciclovir and oral valganciclovir**. *Liver Transpl*. 2012; 18:347-54.
3. Bezerra J. **Congenital disorders of glycosylation**. *Hepatologia em Pediatria: Diagnostico e Tratamento*. Sao Paulo, Brazil: Editora Manole; 2012:416-420.
4. Bezerra J. **Disorders of protein metabolism**. *Hepatologia em Pediatria: Diagnostico e Tratamento*. Sao Paulo, Brazil: Editora Manole; 2012:390-405.

5. Bezerra J. **Colestasis intrahepatica**. *Nutricion y enfermedades del aparato digestivo en ninos*. Mexico City: Nestle Nutrition Mexico; 2011:287-304.
6. Bondoc AJ, Taylor JA, Alonso MH, Nathan JD, Wang Y, Balistreri WF, Bezerra JA, Ryckman FC, Tiao GM. **The beneficial impact of revision of Kasai portoenterostomy for biliary atresia: an institutional study**. *Ann Surg*. 2012; 255:570-6.
7. Chernoguz A, Crawford K, Vandersall A, Rao M, Willson T, Denson LA, Frischer JS. **Pretreatment with anti-VEGF therapy may exacerbate inflammation in experimental acute colitis**. *J Pediatr Surg*. 2012; 47:347-54.
8. Cole CR. **Optimizing protein in the diets of critically ill children: time for re-evaluation**. *J Pediatr*. 2011; 159:5-6.
9. Cole CR, Hansen NI, Higgins RD, Bell EF, Shankaran S, Laptook AR, Walsh MC, Hale EC, Newman NS, Das A, Stoll BJ. **Bloodstream infections in very low birth weight infants with intestinal failure**. *J Pediatr*. 2012; 160:54-9 e2.
10. Cole CR, Ziegler TR. **Etiology and Epidemilogy of Intestinal Failure**. *Clinical management of intestinal failure*. Boca Raton, FL: CRC Press; 2012:3-12.
11. Crandall WV, Margolis PA, Kappelman MD, King EC, Pratt JM, Boyle BM, Duffy LF, Grunow JE, Kim SC, Leibowitz I, Schoen BT, Colletti RB. **Improved outcomes in a quality improvement collaborative for pediatric inflammatory bowel disease**. *Pediatrics*. 2012; 129:e1030-41.
12. Denson LA. **How does knowledge from translational research impact our clinical care of pediatric inflammatory bowel disease patients?**. *Curr Gastroenterol Rep*. 2012; 14:275-81.
13. D'Mello S, Trauernicht A, Ryan A, Bonkowski E, Willson T, Trapnell BC, Frank SJ, Kugasathan S, Denson LA. **Innate dysfunction promotes linear growth failure in pediatric Crohn's disease and growth hormone resistance in murine ileitis**. *Inflamm Bowel Dis*. 2012; 18:236-45.
14. Durand A, Donahue B, Peignon G, Letourneur F, Cagnard N, Slomianny C, Perret C, Shroyer NF, Romagnolo B. **Functional intestinal stem cells after Paneth cell ablation induced by the loss of transcription factor Math1 (Atoh1)**. *Proc Natl Acad Sci U S A*. 2012; 109:8965-70.
15. Foster MT, Shi H, Softic S, Kohli R, Seeley RJ, Woods SC. **Transplantation of non-visceral fat to the visceral cavity improves glucose tolerance in mice: investigation of hepatic lipids and insulin sensitivity**. *Diabetologia*. 2011; 54:2890-9.
16. Franciosi JP, Hommel KA, DeBrosse CW, Greenberg AB, Greenler AJ, Abonia JP, Rothenberg ME, Varni JW. **Development of a validated patient-reported symptom metric for pediatric eosinophilic esophagitis: qualitative methods**. *BMC Gastroenterol*. 2011; 11:126.
17. Freed GL, Dunham KM, Loveland-Cherry C, Martyn KK, Moote MJ. **Nurse practitioners and physician assistants employed by general and subspecialty pediatricians**. *Pediatrics*. 2011; 128:665-72.
18. Freed GL, Dunham KM, Loveland-Cherry C, Martyn KK, Moote MJ, American Board of Pediatrics Research Advisory C. **Private practice rates among pediatric subspecialists**. *Pediatrics*. 2011; 128:673-6.
19. Garza JM. **50 years ago in the journal of pediatrics: Duplications of the gastrointestinal tract**. *Journal of Pediatrics*. 2012; 160:401.
20. Garza JM, Nylund CM, Kaul A. **Time to stop blaming gastroesophageal reflux**. *Clin Pediatr (Phila)*. 2011; 50:1110-5.
21. Gilbert S, Zhang R, Denson L, Moriggl R, Steinbrecher K, Shroyer N, Lin J, Han X. **Enterocyte STAT5 promotes mucosal wound healing via suppression of myosin light chain kinase-mediated loss of barrier function and inflammation**. *EMBO Mol Med*. 2012; 4:109-24.
22. Gong R, Ding C, Hu J, Lu Y, Liu F, Mann E, Xu F, Cohen MB, Luo M. **Role for the membrane receptor guanylyl cyclase-C in attention deficiency and hyperactive behavior**. *Science*. 2011; 333:1642-6.
23. Grant FK, Martorell R, Flores-Ayala R, Cole CR, Ruth LJ, Ramakrishnan U, Suchdev PS. **Comparison of**

**indicators of iron deficiency in Kenyan children**. *Am J Clin Nutr*. 2012; 95:1231-7.
24. Grant FK, Suchdev PS, Flores-Ayala R, Cole CR, Ramakrishnan U, Ruth LJ, Martorell R. **Correcting for inflammation changes estimates of iron deficiency among rural Kenyan preschool children**. *J Nutr*. 2012; 142:105-11.
25. Gray WN, Denson LA, Baldassano RN, Hommel KA. **Treatment adherence in adolescents with inflammatory bowel disease: the collective impact of barriers to adherence and anxiety/depressive symptoms**. *J Pediatr Psychol*. 2012; 37:282-91.
26. Gray WN, Denson LA, Baldassano RN, Hommel KA. **Disease activity, behavioral dysfunction, and health-related quality of life in adolescents with inflammatory bowel disease**. *Inflamm Bowel Dis*. 2011; 17:1581-6.
27. Guerrant RL, Oria RB, Moore SR, Scharf R, Lima AA. **Enteric protozoa and human potential**. *Ann Trop Paediatr*. 2011; 31:201-3.
28. Guilfoyle SM, Denson LA, Baldassano RN, Hommel KA. **Paediatric parenting stress in inflammatory bowel disease: application of the Pediatric Inventory for Parents**. *Child Care Health Dev*. 2012; 38:273-9.
29. Helton ML, Balistreri WF. **Peering into peer-review**. *J Pediatr*. 2011; 159:150-1.
30. Helton ML, Balistreri WF. **Lights, camera, action**. *J Pediatr*. 2011; 159:A1.
31. Henderson CJ, Abonia JP, King EC, Putnam PE, Collins MH, Franciosi JP, Rothenberg ME. **Comparative dietary therapy effectiveness in remission of pediatric eosinophilic esophagitis**. *J Allergy Clin Immunol*. 2012; 129:1570-8.
32. Hommel KA, Franciosi JP, Hente EA, Ahrens A, Rothenberg ME. **Treatment adherence in pediatric eosinophilic gastrointestinal disorders**. *J Pediatr Psychol*. 2012; 37:533-42.
33. Hommel KA, Hente EA, Odell S, Herzer M, Ingerski LM, Guilfoyle SM, Denson LA. **Evaluation of a group-based behavioral intervention to promote adherence in adolescents with inflammatory bowel disease**. *Eur J Gastroenterol Hepatol*. 2012; 24:64-9.
34. Hommel KA, Herzer M, Ingerski LM, Hente E, Denson LA. **Individually tailored treatment of medication nonadherence**. *J Pediatr Gastroenterol Nutr*. 2011; 53:435-9.
35. Huff CD, Witherspoon DJ, Zhang Y, Gatenbee C, Denson LA, Kugathasan S, Hakonarson H, Whiting A, Davis CT, Wu W, Xing J, Watkins WS, Bamshad MJ, Bradfield JP, Bulayeva K, Simonson TS, Jorde LB, Guthery SL. **Crohn's disease and genetic hitchhiking at IBD5**. *Mol Biol Evol*. 2012; 29:101-11.
36. Ibrahim SH, Kohli R, Gores GJ. **Mechanisms of lipotoxicity in NAFLD and clinical implications**. *J Pediatr Gastroenterol Nutr*. 2011; 53:131-40.
37. Jeffreys RM, Hrovat K, Woo JG, Schmidt M, Inge TH, Xanthakos SA. **Dietary assessment of adolescents undergoing laparoscopic Roux-en-Y gastric bypass surgery: macro- and micronutrient, fiber, and supplement intake**. *Surg Obes Relat Dis*. 2012; 8:331-6.
38. Jenkins TM, Xanthakos SA, Zeller MH, Barnett SJ, Inge TH. **Distance to clinic and follow-up visit compliance in adolescent gastric bypass cohort**. *Surg Obes Relat Dis*. 2011; 7:611-5.
39. Kazanjian A, Shroyer NF. **NOTCH Signaling and ATOH1 in Colorectal Cancers**. *Curr Colorectal Cancer Rep*. 2011; 7:121-127.
40. Kevan EN, Simmons JR, Kocoshis SA, Cohen MB, Rudolph JA. **sTREM-1 and LBP in central venous catheter-associated bloodstream infections in pediatric intestinal failure**. *J Pediatr Gastroenterol Nutr*. 2011; 53:627-33.
41. Kocoshis SA. **The Morton's fork of total parenteral nutrition administration**. *J Pediatr*. 2012; 160:361-2.
42. Kohli R, Feldstein AE. **NASH animal models: are we there yet?**. *J Hepatol*. 2011; 55:941-3.
43. Kohli R, Stefater MA, Inge TH. **Molecular insights from bariatric surgery**. *Rev Endocr Metab Disord*. 2011; 12:211-7.

44. Lamouse-Smith ES, Kocoshis S. **Bacterial overgrowth of the small intestine**. *Clinical management of intestinal failure*. Boca Raton, FL: CRC Press; 2012:301-313.
45. Li J, Bessho K, Shivakumar P, Mourya R, Mohanty SK, Dos Santos JL, Miura IK, Porta G, Bezerra JA. **Th2 signals induce epithelial injury in mice and are compatible with the biliary atresia phenotype**. *J Clin Invest*. 2011; 121:4244-56.
46. Liacouras CA, Furuta GT, Hirano I, Atkins D, Attwood SE, Bonis PA, Burks AW, Chehade M, Collins MH, Dellon ES, Dohil R, Falk GW, Gonsalves N, Gupta SK, Katzka DA, Lucendo AJ, Markowitz JE, Noel RJ, Odze RD, Putnam PE, Richter JE, Romero Y, Ruchelli E, Sampson HA, Schoepfer A, Shaheen NJ, Sicherer SH, Spechler S, Spergel JM, Straumann A, Wershil BK, Rothenberg ME, Aceves SS. **Eosinophilic esophagitis: updated consensus recommendations for children and adults**. *J Allergy Clin Immunol*. 2011; 128:3-20 e6; quiz 21-2.
47. Lu TX, Sherrill JD, Wen T, Plassard AJ, Besse JA, Abonia JP, Franciosi JP, Putnam PE, Eby M, Martin LJ, Aronow BJ, Rothenberg ME. **MicroRNA signature in patients with eosinophilic esophagitis, reversibility with glucocorticoids, and assessment as disease biomarkers**. *J Allergy Clin Immunol*. 2012; 129:1064-75 e9.
48. Mann EA, Saeed SA. **Gastrointestinal infection as a trigger for inflammatory bowel disease**. *Curr Opin Gastroenterol*. 2012; 28:24-9.
49. Mohammed A, Grant FK, Zhao VM, Shane AL, Ziegler TR, Cole CR. **Characterization of posthospital bloodstream infections in children requiring home parenteral nutrition**. *JPEN J Parenter Enteral Nutr*. 2011; 35:581-7.
50. Moore SR, Lima AA, Guerrant RL. **Infection: Preventing 5 million child deaths from diarrhea in the next 5 years**. *Nat Rev Gastroenterol Hepatol*. 2011; 8:363-4.
51. Muise AM, Walters T, Xu W, Shen-Tu G, Guo CH, Fattouh R, Lam GY, Wolters VM, Bennitz J, van Limbergen J, Renbaum P, Kasirer Y, Ngan BY, Turner D, Denson LA, Sherman PM, Duerr RH, Cho J, Lees CW, Satsangi J, Wilson DC, Paterson AD, Griffiths AM, Glogauer M, Silverberg MS, Brumell JH. **Single nucleotide polymorphisms that increase expression of the guanosine triphosphatase RAC1 are associated with ulcerative colitis**. *Gastroenterology*. 2011; 141:633-41.
52. Ng VL, Alonso EM, Bucuvalas JC, Cohen G, Limbers CA, Varni JW, Mazariegos G, Magee J, McDiarmid SV, Anand R. **Health status of children alive 10 years after pediatric liver transplantation performed in the US and Canada: report of the studies of pediatric liver transplantation experience**. *J Pediatr*. 2012; 160:820-6 e3.
53. Noah TK, Donahue B, Shroyer NF. **Intestinal development and differentiation**. *Exp Cell Res*. 2011; 317:2702-10.
54. Pentiuk S, Baker R. **Development of a gastroenterology educational curriculum for pediatric residents using fellows as teachers**. *J Pediatr Gastroenterol Nutr*. 2012; 54:281-4.
55. Perman MJ, Lovell DJ, Denson LA, Farrell MK, Lucky AW. **Five Cases of Anti-Tumor Necrosis Factor Alpha-Induced Psoriasis Presenting with Severe Scalp Involvement in Children**. *Pediatr Dermatol*. 2011; 29:454-9.
56. Putnam PE. **Management of children who have eosinophilic esophagitis**. *J Pediatr Gastroenterol Nutr*. 2011; 53:129-30.
57. Saldana SN, Hooper DK, Froehlich TE, Campbell KM, Prows CA, Sadhasivam S, Nick TG, Seid M, Vinks AA, Glauser TA. **Characteristics of successful recruitment in prospective pediatric pharmacogenetic studies**. *Clin Ther*. 2011; 33:2072-81.
58. Samson CM, Jurickova I, Molden E, Schreiner W, Colliver J, Bonkowski E, Han X, Trapnell BC, Denson LA. **Granulocyte-macrophage colony stimulating factor blockade promotes ccr9(+) lymphocyte expansion in Nod2 deficient mice**. *Inflamm Bowel Dis*. 2011; 17:2443-55.

59. Saxena V, Shivakumar P, Sabla G, Mourya R, Chougnet C, Bezerra JA. **Dendritic cells regulate natural killer cell activation and epithelial injury in experimental biliary atresia**. *Sci Transl Med*. 2011; 3:102ra94.
60. Schlaudecker EP, Steinhoff MC, Moore SR. **Interactions of diarrhea, pneumonia, and malnutrition in childhood: recent evidence from developing countries**. *Curr Opin Infect Dis*. 2011; 24:496-502.
61. Setchell KD, Brown NM, Zhao X, Lindley SL, Heubi JE, King EC, Messina MJ. **Soy isoflavone phase II metabolism differs between rodents and humans: implications for the effect on breast cancer risk**. *Am J Clin Nutr*. 2011; 94:1284-94.
62. Shak JR, Sodikoff JB, Speckman RA, Rollin FG, Chery MP, Cole CR, Suchdev PS. **Anemia and Helicobacter pylori seroreactivity in a rural Haitian population**. *Am J Trop Med Hyg*. 2011; 85:913-8.
63. Shamoon H, Center D, Davis P, Tuchman M, Ginsberg H, Califf R, Stephens D, Mellman T, Verbalis J, Nadler L, Shekhar A, Ford D, Rizza R, Shaker R, Brady K, Murphy B, Cronstein B, Hochman J, Greenland P, Orwoll E, Sinoway L, Greenberg H, Jackson R, Coller B, Topol E, Guay-Woodford L, Runge M, Clark R, McClain D, Selker H, Lowery C, Dubinett S, Berglund L, Cooper D, Firestein G, Johnston SC, Solway J, Heubi J, Sokol R, Nelson D, Tobacman L, Rosenthal G, Aaronson L, Barohn R, Kern P, Sullivan J, Shanley T, Blazar B, Larson R, FitzGerald G, Reis S, Pearson T, Buchanan T, McPherson D, Brasier A, Toto R, Disis M, Drezner M, Bernard G, Clore J, Evanoff B, Imperato-McGinley J, Sherwin R, Pulley J. **Preparedness of the CTSA's structural and scientific assets to support the mission of the National Center for Advancing Translational Sciences (NCATS)**. *Clin Transl Sci*. 2012; 5:121-9.
64. Sheridan R, Lampe K, Shanmukhappa SK, Putnam P, Keddache M, Divanovic S, Bezerra J, Hoebe K. **Lampe1: an ENU-germline mutation causing spontaneous hepatosteatosis identified through targeted exon-enrichment and next-generation sequencing**. *PLoS One*. 2011; 6:e21979.
65. Sheridan RM, Gupta A, Miethke A, Knisely AS, Bove KE. **Multiple dysplastic liver nodules in PFIC2 underscore risk for neoplasia associated with functional BSEP deficiency**. *Am J Surg Pathol*. 2012; 36:785-6.
66. Shin CR, Nathan J, Alonso M, Yazigi N, Kocoshis S, Tiao G, Davies SM. **Incidence of acute and chronic graft-versus-host disease and donor T-cell chimerism after small bowel or combined organ transplantation**. *J Pediatr Surg*. 2011; 46:1732-8.
67. Softic S, Kirby M, Berger NG, Shroyer NF, Woods SC, Kohli R. **Insulin Concentration Modulates Hepatic Lipid Accumulation in Mice in Part via Transcriptional Regulation of Fatty Acid Transport Proteins**. *PLoS One*. 2012; 7:e38952.
68. Spellman Kennebeck S, Timm N, Farrell MK, Spooner SA. **Impact of electronic health record implementation on patient flow metrics in a pediatric emergency department**. *J Am Med Inform Assoc*. 2012; 19:443-7.
69. Sundaram SS, Alonso EM, Narkewicz MR, Zhang S, Squires RH. **Characterization and outcomes of young infants with acute liver failure**. *J Pediatr*. 2011; 159:813-818 e1.
70. Ueno PM, Oria RB, Maier EA, Guedes M, de Azevedo OG, Wu D, Willson T, Hogan SP, Lima AA, Guerrant RL, Polk DB, Denson LA, Moore SR. **Alanyl-glutamine promotes intestinal epithelial cell homeostasis in vitro and in a murine model of weanling undernutrition**. *Am J Physiol Gastrointest Liver Physiol*. 2011; 301:G612-22.
71. Varni JW, Kay MT, Limbers CA, Franciosi JP, Pohl JF. **PedsQL gastrointestinal symptoms module item development: qualitative methods**. *J Pediatr Gastroenterol Nutr*. 2012; 54:664-71.
72. Varni JW, Limbers CA, Sorensen LG, Neighbors K, Martz K, Bucuvalas JC, Alonso EM. **PedsQL Cognitive Functioning Scale in pediatric liver transplant recipients: feasibility, reliability, and validity**. *Qual Life Res*. 2011; 20:913-21.
73. Vitola B, Balistreri W. **Pediatric Liver Disease**. *Handbook of Liver Disease*. Philadelphia: Elsevier Science;

2011:308-319.
74. Vitolla B, Bezerra J. **The Liver and Biliary System**. *Textbook of Clinical Pediatrics*. New York City: Springer-Verlag; 2012:1959-1969.
75. Youssef NN, Mezoff AG, Carter BA, Cole CR. **Medical update and potential advances in the treatment of pediatric intestinal failure**. *Curr Gastroenterol Rep*. 2012; 14:243-52.

## Faculty, Staff, and Trainees

### Faculty Members

**Mitchell B Cohen, MD**, Professor

**Leadership** Gastroenterology Endowed Chair; Vice-Chair of Pediatrics for Clinical Affairs; Director, Division of Gastroenterology, Hepatology and Nutrition; Associate Director, Digestive Health Center

**Research Interests** Diarrheal diseases

**William F Balistreri, MD**, Professor

**Leadership** Dorothy M.M. Kersten Endowed Chair; Director Emeritus, Pediatric Liver Care Center; Medical Director Emeritus, Liver Transplantation; Program Director, Advanced Hepatology Fellowship; Editor, Journal of Pediatrics

**Research Interests** Chronic liver disease

**Jorge A Bezerra, MD**, Professor

**Leadership** William and Rebecca Balistreri Chair in Pediatric Hepatology; Director of Research, Division of Gastroenterology, Hepatology and Nutrition; Director, Biliary Atresia Center; Director, Digestive Health Center; Medical Director, Pediatric Liver Care Center; Director, Trustee and Procter Scholar Award Program

**Research Interests** Biliary atresia and chronic liver disease

**John C Bucuvalas, MD**, Professor

**Leadership** Endowed Chair in Pediatric Transplant Hepatology; Director, Integrated Solid Organ Transplant Center; Editorial Board, Hepatology; Associate Editor, Clinical Liver Disease

**Research Interests** Liver failure and liver transplantation

**Kathleen M Campbell, MD**, Assistant Professor

**Leadership** Medical Director, Pediatric Liver Transplant

**Research Interests** Pediatric liver transplantation, post-transplant renal dysfunction, long-term post-transplant outcomes

**Conrad R Cole, MD**, Associate Professor

**Leadership** Associate Medical Director, Intestinal Rehabilitation Program

**Research Interests** Intestinal failure

**Lee A Denson, MD**, Associate Professor

**Leadership** M. Susan Moyer Chair in Pediatric IBD; Director, Schubert-Martin Pediatric IBD Center

**Research Interests** Inflammatory Bowel Diseases

**Michael K Farrell, MD**, Professor

**Leadership** Chief of Staff

**Research Interests** Nutrition

**James Franciosi, MD**, Assistant Professor

**Research Interests** Eosinophilic Gastrointestinal Disorders

**Jose Garza, MD**, Assistant Professor

**Research Interests** Neurogastroenterological disorders

**Xiaonan Han, PhD**, Assistant Professor

**Research Interests** Inflammatory Bowel Diseases

**James E Heubi, MD**, Professor

**Leadership** Associate Chair for Clinical Investigation of Pediatrics; Associate Dean for Clinical and Translational Research; Co-Director, Center of Clinical and Translational Science & Training

**Research Interests** Chronic liver disease

**Ajay Kaul, MD**, Associate Professor

**Leadership** Director, Impedance/Motility Disorders Program; Medical Director, Liberty Campus for GI

**Research Interests** Intestinal motility disorders

**Samuel A Kocoshis, MD**, Professor

**Leadership** Medical Director, Pediatric Nutritional and Intestinal Care Center; Medical Director, Small Bowel Transplantation Program

**Research Interests** Intestinal Failure and Intestinal Transplantation

**Rohit Kohli, MD**, Assistant Professor

**Leadership** Co-Director, Steatohepatitis Center

**Research Interests** Non-alcoholic steatohepatitis

**Mike A Leonis, MD, PhD**, Assistant Professor

**Leadership** Director, GI Fellowship Program

**Research Interests** Liver failure and liver transplantation; liver tumors

**Tom K Lin, MD**, Assistant Professor

**Research Interests** Pancreaticobiliary disorders

**Adam G Mezoff, MD**, Professor

**Leadership** Associate Medical Director, Pediatric Nutritional and Intestinal Care Center; Clinical Director for Gastroenterology

**Research Interests** Intestinal failure and intestinal transplantation

**Alexander Miethke, MD**, Assistant Professor

**Research Interests** Biliary atresia and primary sclerosing cholangitis

**Sean Moore, MD**, Assistant Professor

**Research Interests** Diarrheal Diseases and International Health

**Joseph Palermo, MD, PhD**, Assistant Professor

**Research Interests** Disorders of the bile ducts

**Scott Pentiuk, MD**, Assistant Professor

**Leadership** Pediatric Residency Course Director for Gastroenterology

**Research Interests** Feeding disorders; medical education

**Philip E Putnam, MD**, Professor

**Leadership** Director, Endoscopy Services; Medical Director, Cincinnati Center for Eosinophilic Disorders

**Research Interests** Eosinophilic Gastrointestinal Disorders

**Shehzad A Saeed, MD**, Associate Professor

**Leadership** Associate Director, GI Fellowship Program; Clinical Director of the Schubert-Martin IBD Center

**Research Interests** Inflammatory Bowel Disease

**Pranav Shivakumar, PhD**, Assistant Professor

**Research Interests** Biliary Atresia

**Noah Shroyer, PhD**, Assistant Professor

**Research Interests** Intestinal development

**Kris Steinbrecher, PhD**, Assistant Professor

**Research Interests** Diarrheal diseases; Inflammatory Bowel Diseases

**Cynthia C Wetzel, PhD**, Assistant Professor

**Leadership** Program Manager, Digestive Health Center

**Research Interests** Research Administration

**Stavra Xanthakos, MD**, Assistant Professor

**Leadership** Medical Director, Surgical Weight Loss Program for Teens; Co-Director, Steatohepatitis Center; Physician Leader for the Clinical Research Coordinators

**Research Interests** Obesity; Non-alcoholic steatohepatitis

**Nada Yazigi, MD**, Associate Professor

**Leadership** Associate Medical Director, Multivisceral Transplantation Program; CSI Inpatient Co-Director, A4N

**Research Interests** Liver failure and liver transplantation

### Trainees

- **Samar Ibrahim, MD**, PL-7, Mayo Clinic, Rochester, MN
- **Frank Dipaola, MD**, PL-6, Vanderbilt Children's Hospital
- **Dana Dykes, MD**, PL-6, Children's Hospital at UAB
- **Jaime Echartea-Gonzalez, MD**, PL-6, Cincinnati Children's Hospital Medical Center
- **Kristin Bramlage, MD**, PL-6, NS-LIJ Health System
- **Monique Choquette, MD**, PL-5, Cincinnati Children's Hospital Medical Center
- **Phillip Minar, MD**, PL-5, Medical College of Wisconsin
- **George Zacur, MD**, PL-5, University of Miami/Jackson Memorial Hospital
- **Yael Haberman Ziv, MD**, PL-4, Tel Hashomer Medical Center, Tel Hashomer, Ramat Gan, Israel
- **Alexandra Menchise, MD**, PL-4, University of South Florida College of Medicine, Tampa
- **James Squires, MD**, PL-4, Cincinnati Children's Hospital Medical Center
- **Sandra Wright, MD**, PL-4, University of Alabama at Birmingham
- **Kazuhiko Bessho, MD, PhD**, Osaka University, Japan
- **Ingrid Jurickova, MD**, Second Medical Faculty, Charles University, Prague, Czech Republic
- **Felipe Leite de Oliveira, PhD**, Universidade Federal do Rio de Janeiro, Brazil
- **Jun Li, MD, PhD**, Beijing Medical University and Chinese Academy of Medical Science and Peking Union Medical College, Beijing, China
- **Elizabeth Mann, PhD**, State University of New York at Buffalo
- **Andriy Myronovych, MD, PhD**, University of Tsukuba, Tsukuba, Ibaraki, Japan

- **Taeko Noah, PhD**, University of Nevada, Reno
- **Celine Silva-Lages, PhD**, University Paris Diderot, Paris 7, Paris, France
- **Tara Willson, BS**, University of Kentucky, Lexington

## Division Collaboration

**Behavioral Medicine and Clinical Psychology »** Kevin A Hommel, PhD

Disease activity, behavioral dysfunction, and health-related quality of life in adolescents with inflammatory bowel disease - **Lee A Denson, MD**

Treatment adherence in adolescents with inflammatory bowel disease: the collective impact of barriers to adherence and anxiety/depressive symptoms - **Lee A Denson, MD**

Individually tailored treatment of medication nonadherence - **Lee A Denson, MD**

PedsQL Gastrointestinal symptoms module for pediatric patients with gastrointestinal disorders: field test - **Shehzad A Saeed, MD**

Longitudinal examination of adherence and disease severity in IBD (LEAD study) - **Shehzad A Saeed, MD**

**Pulmonary Biology »** Bruce C Trapnell, MD

Granulocyte-macrophage colony stimulating factor blockade promotes CCR9+ lymphocyte expansion in Nod2 deficient mice - **Xiaonan Han, PhD; Lee A Denson, MD**

Innate dysfunction promotes linear growth failure in pediatric Crohn's disease and growth hormone resistance in murine ileitis - **Lee A Denson, MD**

**Behavioral Medicine and Clinical Psychology »** Shanna M Guilfoyle, PhD and Kevin A Hommel, PhD

Paediatric parenting stress in inflammatory bowel disease: application of the pediatric inventory for parents - **Lee A Denson, MD**

Evaluation of a group-based behavioral intervention to promote adherence in adolescents with inflammatory bowel disease - **Lee A Denson, MD**

**Biomedical Informatics; Biostatistics and Epidemiology »** Bruce Aronow, PhD and Eileen C King, PhD

Differentiation factors as tumor suppressors - **Noah F Shroyer, PhD**

**Neonatology and Pulmonary Biology; Developmental Biology »** Jeffrey A Whitsett, MD and James M Wells, PhD

KLF5 regulation of intestinal development and stem cell homeostasis - **Noah F Shroyer, PhD**

**Developmental Biology »** James M Wells, PhD

Human endocrine cell development - **Noah F Shroyer, PhD**

**Developmental Biology; Pediatric Surgery »** James M Wells, PhD and Michael A Helmrath, MD

In vitro organoid models of the gastrointestinal tract - **Noah F Shroyer, PhD**

**Developmental Biology; Pediatric Surgery; Allergy and Immunology; Pulmonary Biology »** James M Wells, PhD, Michael A Helmrath, MD, Simon P Hogan, PhD, and John P Clancy, MD

Intestinal organoid models of cystic fibrosis - **Noah F Shroyer, PhD**

**Hematology/Oncology »** Joseph S Palumbo, MD

Hemostatic Factors in colitis and colitis-associated colon cancer - **Kris A Steinbrecher, PhD**

**Allergy and Immunology »** Simon P Hogan, PhD

Pathogenic role of the macrophage in ulcerative colitis - **Kris A Steinbrecher, PhD**

Effects of undernutrition on intestinal barrier function in mouse models of undernutrition - **Sean R Moore, MD**

**Pediatric Surgery; Developmental Biology »** Michael A Helmrath, MD, James M Wells, PhD, and Christopher N Mayhew, PhD

Regulation of adult stem cell homeostatic response to inflammatory injury - **Xiaonan Han, PhD**

**Bone Marrow Transplantation »** Stella M Davies, MD

Clinical and immunologic aspects as graft versus host disease in intestinal transplantation - **Samuel A Kocoshis, MD**

**Behavioral Science Adherence Program »** Yelena Wu, PhD

Facilitation of patient and family adherence in intestinal transplantation - **Samuel A Kocoshis, MD**

**Pathology »** Margaret H Collins, MD

Prevalence of anti-enterocyte antibodies in small intestinal transplantation - **Samuel A Kocoshis, MD**

**Pediatric Surgery »** Jaimie D Nathan, MD

Fully collaborative in all research projects (clinical and immunologic aspects of graft versus host disease in intestinal transplantation, facilitation of patient and family adherence in intestinal transplantation, prevalence of anti-enterocyte antibodies in small intestinal transplantation) - **Samuel A Kocoshis, MD**

**Biomedical Informatics »** Bruce Aronow, PhD and Anil Jegga, DVM, MRes

Computational science and systems biology in Pediatric Digestive Disease: *Bioinformatics Core* of the Digestive Health Center - **Jorge A Bezerra, MD**

Molecular phenotypes of biliary atresia – **Jorge A Bezerra, MD**

Genetic synergy as causes of chronic liver diseases in children - **Jorge A Bezerra, MD**

**Developmental Biology »** S Steven Potter, MD, Aaron M Zorn, PhD, and James M Wells, PhD

Embryogenesis and tissue organoids in Pediatric Digestive Disease: The Digestive Health Center – **Jorge A Bezerra, MD**

Development and function of the neonatal biliary system - **Jorge A Bezerra, MD**

**Pathology »** David P Witte, MD, Keith F Stringer, MD, Rachel Sheridan, MD, and Kevin E Bove, MD

Pathobiology of Pediatric Digestive Disease: *Integrative Morphology Core* of the Digestive Health Center - **Jorge A Bezerra, MD**

Mechanisms of hepatic tumorigenesis - **Jorge A Bezerra, MD**

Molecular staging of liver injury in biliary atresia - **Jorge A Bezerra, MD**

**Cellular and Molecular Immunology »** Claire A Chougnet, PhD, Kasper Hoebe, PhD, and Jochen Mattner, MD, PhD

The neonatal immune system and pathogenesis of biliary atresia - **Jorge A Bezerra, MD**

Liver disease modeling through in vivo mutagenesis - **Jorge A Bezerra, MD**

Mechanisms of auto-immune liver disease - **Jorge A Bezerra, MD**

**Pediatric Surgery »** Gregory M Tiao, MD and Jaimie D Nathan, MD

Mechanisms of virus-induced biliary atresia - **Jorge A Bezerra, MD**

Gut-biliary axis and pathogenesis of cholangiopathies - **Jorge A Bezerra, MD**

**Allergy and Immunology »** William M Ridgway, MD, PhD

Mechanisms of auto-immune liver disease - **Jorge A Bezerra, MD**

**Pathology; Allergy and Immunology; Psychology; Human Genetics; Rheumatology; Otorhinolaryngology; Neurology; Endocrinology; Cardiology; Pediatric Surgery »** CCED Team (Cincinnati Center for Eosinophilic Disorders), Margaret H Collins, MD , and Marc E Rothenberg, MD, PhD

Multidisciplinary evaluation and treatment of children and adults who have Eosinophilic Gastrointestinal Disorders - **Philip E Putnam, MD; Scott P Pentiuk, MD**

**Pulmonary; Otolaryngology; Social Work; Interdisciplinary Feeding Team; Speech and Language Pathology; Pediatric Surgery »** ADSC Team (Aero Digestive Sleep Center), Robert E Wood, PhD, MD, R Paul Boesch, DO, Robin T Cotton, MD, Michael J Rutter, MD, Alessandro de Alarcon, MD, J Paul Willging, MD, Daniel von Allmen, MD, Thomas H Inge, MD, PhD, and Victor F Garcia, MD

Evaluation and treatment of children who have complex airway disorders - **Philip E Putnam, MD; Scott P Pentiuk, MD**

**Otolaryngology; Human Genetics; Speech Therapy; Occupational Therapy; Social Work; Nutrition »** Interdisciplinary Feeding Team

Multi-disciplinary team provides comprehensive evaluation of children with swallowing/feeding disorders - **Scott P Pentiuk, MD**

**Infectious Diseases »** Monica Malone McNeal, MS and David I Bernstein, MD

Murine models of environmental enteropathy and effects on oral rotavirus vaccine immunogenicity - **Sean R Moore, MD**

**Pediatric Surgery »** Michael A Helmrath, MD

Intestinal and nutritional effects of IGF-1 in murine models of weanling malnutrition - **Sean R Moore, MD**

**Pathology »** Kevin E Bove, MD

Relationship of ultra-structural mitochondrial changes with histological severity and subtypes of pediatric NAFLD and NASH - **Stavra A Xanthakos, MD**

Mitochondrial ultrastructure changes in NASH - **Rohit Kohli, MD**

Bile acid synthetic defect pathology - **James E Heubi, MD**

**Surgical Weight Loss Program for Teens: Center for Bariatric Research & Innovation »** Thomas H Inge, MD and Todd M Jenkins, PhD

Biological determinants of steatohepatitis - **Stavra A Xanthakos, MD**

**Endocrinology »** Nancy A Crimmins, MD

NAFLD in youth with type 2 diabetes: an important but under-recognized co-morbidity - **Stavra A Xanthakos, MD**

**General & Community Pediatrics; Cardiology; Endocrinology »** Robert M Siegel, MD, Holly M Ippisch, MD, and Nancy A Crimmins, MD

Advanced Metabolic Clinic, a monthly multidisciplinary clinic for children with multiple obesity-related complications - **Stavra A Xanthakos, MD**

**Cardiology »** Bradley S Marino, MD

The association between biochemical markers and post-fontan cardiac index - **Kathleen M Campbell, MD**

**Allergy and Immunology »** Senad Divanovic, PhD

The role of IL-17 in NASH - **Rohit Kohli, MD**

**Mass Spectrometry Laboratory »** Kenneth D Setchell, PhD

Bile acids in animal models of bariatric surgery - **Rohit Kohli, MD**

Inborn errors of bile acid metabolism - **James E Heubi, MD**

**Pathology »** Lili Miles, MD

Hepatic histology in NASH animal models - **Rohit Kohli, MD**

**Pathology »** Peter Tang, PhD and Michael Miles, PharmD

Coenzyme Q as a biomarker for NASH - **Rohit Kohli, MD**

**Neonatology; Pediatric Surgery »** Andrew P South, MD and Michael A Helmrath, MD

Clinical and translational research characterizing children with and at risk for intestinal failure - **Conrad R Cole, MD**; **Samuel A Kochosis, MD**; **Adam G Mezoff, MD**; **Noah F Shroyer, PhD**

**Pediatric Surgery; Neonatology; Biostatistics and Epidemiology »** Michael A Helmrath, MD, Andrew P South, MD, and Eileen C King, PhD

Efficacy of enteral glutamine in pediatric SBS - **Conrad R Cole, MD**; **Samuel A Kocoshis, MD**; **Adam G Mezoff, MD**

**Pathology »** Rachel Sheridan, MD and Kevin E Bove, MD

Genetic basis of chronic cholestasis and co-authored two manuscripts - **Alexander G Miethke, MD**

**Community Pediatrics »** Heidi Kalkwarf, PhD

Bone disease in childhood - **James E Heubi**, MD

**Biomedical Informatics »** Bruce Aronow, PhD

Molecular phenotypes of nonalcoholic steatohepatitis - **Stavra A Xanthakos, MD**

**Immunology »** Lisa H Filipovich, MD

Etiopsthogenesis of pediatric acute liver failure - **John C Bucuvalas, MD**

**Center for Adherence and Self-Management »** Dennis Drotar, PhD

Medical adherence in liver transplant recipients - **John C Bucuvalas, MD**

**Pediatric Surgery; Oncology; Pathology; Radiology »** Gregory M Tiao, MD, James I Geller, MD, Anita Gupta, MD, Kevin E Bove, MD, Kamlesh Kukreja, MD, and Alexander J Towbin, MD

Liver Tumor Research Group - **Mike A Leonis, MD, PhD**

**Pulmonary Biology »** John P Clancy, MD

Centralized intestinal current measurement testing, and comparison of suction and forceps-based biopsy performance - **Shehzad A Saeed, MD**

**Adolescent Medicine »** Ellen A Lipstein, MD

Parent information needs when considering treatment with TNF-α inhibitors - **Shehzad A Saeed, MD**

**Anderson Center for Health System Excellence »** Peter Margolis, MD, PhD

Developing and testing systems to support patient, physician and researcher collaboration to conduct individual

"N of 1" trials - **Shehzad A Saeed, MD**

**Pediatric Surgery »** Jason S Frischer, MD

Diverting ileostomy in Crohn's disease: analysis of benefits, trends, and complications in the pediatric population - **Shehzad A Saeed, MD**

**Anderson Center for Health System Excellence »** Michael Seid, PhD

Passive PROs: using mobile sensing technology to measure outcomes in patients with IBD - **Shehzad A Saeed, MD**

**Infectious Diseases/VTEU »** David Bernstein, MD

Phase I studies of a candidate enterotoxigenic *E. coli*/cholera vaccine - **Mitchell B. Cohen, MD**

## Grants, Contracts, and Industry Agreements

| Grant and Contract Awards | | | | Annual Direct |
|---|---|---|---|---|
| **BEZERRA, J** | | | | |
| **Biological Basis of Phenotypes & Clinical Outcomes in Biliary Atresia** | | | | |
| National Institutes of Health | | | | |
| R01 DK 083781 | | 09/01/09-08/31/13 | | $213,172 |
| **Clinical Center for Cholestatic Liver Disease in Children** | | | | |
| National Institutes of Health | | | | |
| U01 DK 062497 | | 09/10/09-05/31/14 | | $468,673 |
| Bezerra, J | Administrative Core | | $348,108 | |
| Bezerra, J | RNA Core | | $56,557 | |
| Heubi, J | Bile Acid Core | | $29,808 | |
| Bove, K | Histopathy Core | | $34,200 | |
| **Digestive Health Center: Bench to Beside Research in Pediatric Digestive Disease** | | | | |
| National Institutes of Health | | | | |
| P30 DK 078392 | | 07/01/07-05/31/12 | | $718,626 |
| Bezerra, J | Administrative Core | | $247,081 | |
| Guasch, G | Pilot & Feasibility Grant | | $36,666 | |
| Flick, M | Pilot & Feasibility Grant | | $36,667 | |
| Zimmerman, N | Pilot & Feasibility Grant | | $36,666 | |
| Bezerra, J | Flow Cytometry/Luminex Core | | $64,354 | |
| Aronow, B | Bioinformatics Core | | $100,272 | |
| Witte, D | Integrative Morphology Core | | $107,435 | |
| Keddache, M | Sequencing Core | | $34,790 | |
| Potter, S | Gene Expression Core | | $54,695 | |
| **Immunologic Dystunction in Biliary Artresia** | | | | |
| National Institutes of Health | | | | |
| R01 DK 064008 | | 02/25/08-01/31/13 | | $208,271 |
| **BUCUVALAS, J** | | | | |
| **Medication Adherence in Children Who Had Liver Transplant** | | | | |
| National Institutes of Health(Mount Sinai Medical Center) | | | | |
| R01 DK 080740 | | 07/01/11-06/30/14 | | $56,311 |
| **Immunosupression Withdrawl for Stable Pediatric Liver Transplant** | | | | |
| National Institutes of Health(University of California, San Francisco) | | | | |
| U34 DK 083031 | | 09/26/2011-03/31/2013 | | $10,478 |

**COHEN, M**

**Pediatric Gastroenterology and Nutrition Training Grant**
National Institutes of Health
T32 DK 007727 | 07/01/10-06/30/15 | $411,434

**COLE, C**

**Efficacy of Enteral Glutamine in Reducing Bloodstream Infections in SBS Infants**
National Institutes of Health
R21 DK 088027 | 09/01/11-08/31/13 | $141,864

**DENSON, L**

**Biomarkers for Inflammatory Bowel Disease Behavior and Treatment Response**
National Institutes of Health
R01 DK 078683 | 04/01/09-03/31/13 | $362,674

**Innate Dysregulation and Growth Failure in Pediatric Crohn's Disease**
Crohn's & Colitis Foundation of America
CCFA Ref# 3189 | 07/01/11-06/30/14 | $117,000

**Risk Stratification and Identification of Immunogenetic and Microbial Markers of Complicated Disease Course**
Crohn's & Colitis Foundation of America(Emory University)
S305815 | 07/01/09-06/30/13 | $129,025

**Predicting Response to Standardized Pediatric Colitis: The PROTECT Study**
National Institutes of Health(Connecticut Children's Medical Center)
U01 DK 095745 | 05/01/2012-04/30/2017 | $193,411

**HEUBI, J**

**Intervention to Reduce Body Burden of PCBs in Residents of Anniston, Alabama**
National Institutes of Health(University of Cincinnati)
R21 ES 019206 | 08/01/10-07/31/12 | $87,234

**Sterol and Isoprenoid Diseases Rare Diseases Consortium**
National Institutes of Health(Oregon Health Sciences University)
U54 HD 061939 | 09/29/09-07/31/14 | $27,058

**KOHLI, R**

**Role of Ileum in Reducing Obesity Related Comorbidities**
National Institutes of Health
K08 DK 084310 | 09/01/09-08/31/13 | $139,300

**LEONIS, M**

**A Multi-Center Group to Study Acute Liver Failure in Children**
National Institutes of Health(University of Pittsburgh)
U01 DK 072146 | 09/01/2010-08/31/2015 | $109,621

**MIETHKE, A**

**Regulatory T cells and the Pathogenesis of Biliary Atresia**
American Liver Foundation
07/01/09-06/30/12 | $75,000

**MOORE, S**

**Cellular & Molecular Mechanisms of Alanyl-Glutamine Oral Nutrition Therapy**
Children's Digestive Health & Nutrition Foundation
11/15/11-11/14/13 | $75,000

**Cellular Molecular Mechanisms of Alanyl-Glutamine Oral Rehydration and Nutrition**
National Institutes of Health
K02 TW 008767 | 09/16/11-07/30/16 | $116,070

**Generate a mouse model of environmental enteropathy**
Bill & Melinda Gates Foundation

| | | |
|---|---|---|
| OPP1046564 | 11/01/11-04/30/13 | $100,000 |
| **BAA 11-16 Biochronicity** | | |
| Defense Advanced Reserach Projects Agency (DARPA)(University of Cincinnati) | | |
| DP12AP00005 | 01/01/12-12/31/15 | $91,702 |

**PALERMO, J**

| | | |
|---|---|---|
| **Longitudinal Study of Cystic Fibrosis Liver Disease** | | |
| Cystic Fibrosis Foundation Therapeutics, Inc(The Children's Hospital of Denver) | | |
| TCHG07083 | 12/28/09-12/31/14 | $59,675 |

**SAEED, S**

| | | |
|---|---|---|
| **Gene Discoveries in Subjects with Crohn's Disease of African Descent** | | |
| National Institutes of Health(Emory University) | | |
| R01 DK 087694 | 03/01/11-02/29/16 | $13,955 |

**SHIVAKUMAR, P**

| | | |
|---|---|---|
| **Innate and Adaptive Immune Systems in Biliary Atresia** | | |
| American Liver Foundation | | |
| | 07/01/11-06/30/14 | $75,000 |

**SHROYER, N**

| | | |
|---|---|---|
| **KLF5 Regulation of Intestinal Development and Stem Cell Homeostasis** | | |
| National Institutes of Health | | |
| R01 DK 092306 | 07/05/11-06/30/15 | $293,694 |
| **The Role of ATOH1 as a Tumor Supressor in Colorectal Cancer** | | |
| National Institutes of Health | | |
| R01 CA 142826 | 02/23/10-01/31/15 | $201,275 |
| **Human Endocrine Cell Development** | | |
| National Institutes of Health | | |
| R01 DK 092456 | 04/07/12-02/28/17 | $297,412 |

**XANTHAKOS, S**

| | | |
|---|---|---|
| **Bio Determinants of Steatohepatitis after Adolescent Bariatric Surgery** | | |
| National Institutes of Health | | |
| K23 DK 080888 | 07/01/08-06/30/13 | $164,300 |
| **CRN in Non-Alcoholic Steatohepatitis (NASH CRN)** | | |
| National Institutes of Health(Case Western University) | | |
| U01 DK 061732 | 08/30/09-04/30/14 | $78,434 |
| | **Current Year Direct** | **$5,035,669** |

## Industry Contracts

**SAEED, S**

| | |
|---|---|
| Connecticut Children's Medical Center | $524 |
| UCB Pharma, Inc. | $2,033 |

**KOHLI, R.**

| | |
|---|---|
| Ethicon Endo-Surgery, Inc | $34,650 |
| **Current Year Direct Receipts** | **$37,207** |
| **Total** | **$5,072,876** |