Pediatric General and Thoracic Surgery

Division Details

RESEARCH AND TRAINING DETAILS	
Faculty	**24**
Joint Appointment Faculty	**2**
Research Fellows and Post Docs	**4**
Research Graduate Students	**1**
Total Annual Grant Award Dollars	**$2,961,292**
Total Annual Industry Award Dollars	**$355,801**

CLINICAL ACTIVITIES AND TRAINING	
Clinical Fellows	**9**
Inpatient Encounters	**7,677**
Outpatient Encounters	**10,563**

Row 1: N Timchenko, J Nathan, R Brown, R Dasgupta, G Tiao

Row 2: M Helmrath, J Peiro, V Garcia, J Frischer, D von Allmen

Visit Pediatric General and Thoracic Surgery

Division Highlights

Alexander Bondoc, MD

Dr. Alexander Bondoc, MD, is a new investigator in the Division of Pediatric General and Thoracic Surgery. Dr. Bondoc's laboratory works in conjunction with Dr. Nikolai Timchenko's lab investigating novel molecular pathways important in the development of aggressive hepatoblastoma (HBL), the most common primary liver tumor in children. Additionally, Dr. Bondoc's laboratory is attempting to create patient derived xenografts (PDX) in mice using human HBL and hepatocellular carcinoma (HCC) in order to augment understanding the genotypic and phenotypic behavior of pediatric liver tumors. Additionally, there is hope that these murine models will provide an in vivo method for therapeutic testing, and drug development.

Richard Falcone, Jr., MD, MPH

Pediatric trauma research continues to focus on the triage of pediatric trauma patients within the trauma system, and at the level of the pediatric trauma hospital. Funding for this work provided by the Ohio Department of Public Safety. At the system level, this work allowed an improved understanding of state wide under-triage of injured children, and has demonstrated that triage of pediatric traumatic brain injury patients throughout the state trauma system is better than the overall population. Unfortunately, worse outcomes seems to have an association with under-triage. The trauma group is actively participating in an important multi-center study developing a tool for identifying when it is possible to avoid abdominal CT following blunt abdominal trauma. Additionally, our work in collaborating and supporting other developing/established pediatric trauma centers continues to drive quality improvement across centers. This program, the Pediatric Trauma Transformation Collaborative (PTTC), has four partners within the U.S., and have recently begun a partnership with a hospital in Poland which is striving to be the first pediatric trauma center in the country. Finally, our injury prevention work continues to explore the impact of our home safety program, and our national Buckle Up for Life program on reducing pediatric injuries. We have now impacted over 1,000

homes with our home safety program, and have had an impact in 48 states with our Buckle Up for Life Program. This important work has funding from Kohl's Cares for Kids, Messer Construction Company, and Toyota.

Michael Helmrath, MD

Dr. Michael Helmrath, MD, focuses his career on complex gastrointestinal diseases. He actively participates in translational, and basic science research. He currently serves as the director of Surgical Research for Cincinnati Children's Hospital Medical Center. Dr. Helmrath currently oversees ongoing national, and international, clinical trials for intestinal failure and bariatric surgery. These studies include the GIFT'2 and TeenLabs. Translational studies for both gastric disease, and cystic fibrosis, receive support from multiple grants, NAREN1610 and R01DK083402. His basic science laboratory specifically focuses on the role of intestinal stem cells in small intestinal physiology. His work has been continuously funded by multiple NIH awards. His U01 award, U01DK103117, aims to lead to a deeper understanding of regional influence within the intestinal stem cell populations that may contribute to physiological and disease specific differences commonly seen between the proximal and distal intestine. As part of the Intestinal Stem Cell Consortium, he is actively involved in the intestinal stem cell field. His long-term research goal is to establish translational therapies for the management of patients with complex gastrointestinal diseases.

Todd Jenkins, PhD, MPH

Dr. Todd Jenkins, PhD, MPH, is an associate professor in the Division of Pediatric General and Thoracic Surgery, and deputy director of the Data Coordinating Center for Teen-Longitudinal Assessment of Bariatric Surgery (Teen-LABS). His research focuses on obesity, surgical outcomes, and geographic information systems. He was recently awarded a UM1 from the National Institutes of Health, NIDDK, titled "Continuation of Teen Longitudinal Assessment of Bariatric Surgery (Teen-LABS), Biostatistics Research Center" in collaboration with Dr. Changchun Xie, PhD, associate professor of Biostatistics, Department of Environmental Health, at the University of Cincinnati.

Helen Jones, PhD

Dr. Helen Jones, PhD, and her lab members investigate the maternal-fetal interface in a broad range of pathologies, and are developing targeted gene therapy protocols to use during pregnancy to improve placental function and fetal growth. The recent award of a R01 for the nanoparticle-mediated gene therapy project means studies are continuing into the inclusion of a targeting peptide onto the nanoparticles for systemic delivery, incorporation of MiRNA seed sequences to address off-target effects, and expanding to include the use of a guinea pig model of fetal growth restriction to assess longer term in vivo treatment. A newly established collaboration with researchers at Texas Tech University Health Sciences Center, will also permit the investigation of nanoparticle use in a perfusion model of human placenta, taking another step towards future use in the patient population.

In collaboration with Dr. James Cnota, MD, and the Heart Institute, the Jones lab has demonstrated significant alteration of placental development in cases of congenital heart defects (CHD), including hypoplastic left heart syndrome (HLHS), and transposition of the great arteries in humans. They are currently investigating the similarities and differences in the molecular mechanisms underlying disrupted concurrent placental and heart development in these subtypes of CHD. Using mouse models of HLHS and CHD that recapitulate the human placental phenotype, they are investigating disturbances in the heart-placenta axis throughout gestation. Dr. Jones has established a new collaboration with Dr. Shelley Ehrlich, MD, ScD, MPH, in the Division of Biostatistics and Epidemiology, to investigate the effects of environmental exposures on placental development, signaling and fetal programming resulting in several collaborative National Institutes of Health (NIH) applications.

Dr. Jones and her team have also furthered collaborations with Dr. Kasper Hoebe, PhD, in the Division of Immunobiology, to study the role of maternal immune modulation of placental invasion with the submission of a collaborative NIH application; and Dr. Gruschen Veldtman, FRCP, MBChB, director of Adult Congenital Heart Disease, to investigate placentation in mothers with heart diseases. Dr. Jones has maintained collaborations with Dr. Laura Woollett, UC Pathology, to study the effects of cholesterol on placental development and function, as well as collaborations with Drs. Louis Muglia, MD, PhD, and Dr. Michaela Pavlicev, PhD, in the Center for Prevention of Preterm Birth, to investigate placental involvement in preterm birth. These collaborations have been fruitful leading to both impactful publications, and two successful NIH grant applications.

Maxime Mahe, PhD

Dr. Maxime Mahe, PhD, is an instructor in the Division of Pediatric General and Thoracic Surgery. His research goals are to study human enteric nervous system regulation of intestinal development and its impact on gastrointestinal dysfunctions. Dr. Mahe studies the molecular and cellular mechanisms underlying the effects of the enteric nervous system on intestinal functions using integrated human gut models derived from pluripotent stem cells. The overall goal of his research is to provide insight into the gastrointestinal development and the pathophysiology relevant to functional disorders including Hirschsprung disease. Additionally, Dr. Mahe received the Athena Blackburn Research Scholar Award from the American Gastroenterology Association and a NIH K99DK110414 Career development award from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK).

Jaimie Nathan, MD

Dr. Jaimie Nathan, MD, surgical director of the Intestinal Transplant Program, and his team are investigating the role of intestinal microbiota in intestinal transplantation and in progression of chronic liver diseases. With grant funding from the American Society of Transplant Surgeons, the team has been studying the role of intestinal microbiota in acute rejection after intestinal transplantation with the goal of identifying novel non-invasive biomarkers to predict the development of rejection. Investigating the role that changes in intestinal microbiota play in the progression of chronic liver disease and its complications, and in the development of post-liver transplantation complications in children is the focus of another study funded by the Markham Family Award on Liver Diseases/Liver Transplantation.

Jose Peiro, MD

A research team led by Dr. Jose L. Peiro, MD, director of Endoscopic Fetal Surgery at the Cincinnati Fetal Center, is continuing investigating the basic mechanisms of pediatric and fetal surgical congenital malformations, focusing especially upon fetal myelomeningocele (MMC), congenital diaphragmatic hernia (CDH), and gastroschisis.

New Trends in Spina Bifida and Neural Tube Defects

Improving the fetoscopic approach for intrauterine repair by evaluating different patches and sealants in animal models in collaboration with biomedical engineers at the University of Cincinnati, Professor Chia-Ying Lin's Laboratory, and then translating these techniques for use in the human fetus is the focus in MMC. A new clinical trial is now comparing fetoscopic MMC repair in humans against the standardized open fetal surgery approach. A MRI prenatal assessment is now in process to analyze the early anatomic improvements after fetal surgery for MMC. Researchers are determining the mechanistic processes, and pathways activated, in the neuro-inflammation and neurodegeneration that appear in open neural tube defects by means rodent models. The team is also studying ways to use neural progenitor cells collected from the cerebrospinal and amniotic fluid of MMC patients as a potential form of neural regeneration (cell therapy). In collaboration with Dr. Shaaban's lab, they are using a mouse model of neural tube defects to investigate how maternal immune status can influence incidence of congenital malformations.

Evaluating Fetal Surgery to Support Lung Development

In CDH, they continue studies in animal models that indicate that early fetal tracheal occlusion may induce faster and better fetal lung growth. A new animal model of CHAOS ligation of the fetal trachea early in gestation perfectly resembles the human histology of this condition in the sheep and mouse model. They described comparison of a novel CDH surgically induced model in rats with gene-expression to the teratogen nitrofen-induced CDH model in a collaborative study with Dr. Jeffrey Whitsett's research group. This group is determining a new radiologic prenatal and postnatal biomarker for better prognosis of pulmonary hypertension. Also discovered in left and right CDH, and following tracheal occlusion in a rabbit model of congenital diaphragmatic hernia were echocardiographic, and molecular cardiac effects. They continue to clinically offer fetoscopic tracheal occlusion in human fetuses with severe CDH by detachable balloon insertion. This work will contribute to an ongoing multicenter TOTAL trial.

Neuroenteric and Lymphatic Disorders Related to Gastroschisis

In gastroschisis, researchers are analyzing the neurodegenerative and lymphatic anomalies that associates with fetal gastroschisis, and their relation with intestinal hypomotility and malabsortion in the fetal rabbit model. They are also studying the origin and presence of intrauterine growth restriction in these fetuses with gastroschisis, in collaboration with Dr. Mounira Habli, MD, and Dr. Helen Jones' lab. Esophageal lengthening In collaboration with biomedical engineers at the University of Cincinnati, and Professor Chia-Ying Lin's Laboratory, researchers are testing a new patented device used for external or internal esophageal traction in vitro in a rabbit esophageal pouch model to improve stretching techniques that can rescue the own patient's esophagus to repair long gap esophageal atresia.

Soona Shin, PhD

Dr. Soona Shin, PhD, is a member of the Liver Tumor Program. Her research aims to decipher the molecular and cellular mechanism of childhood liver cancer, with a focus on adult hepatic progenitor cells, fetal hepatoblasts, and hepatocytes. Facultative adult hepatic progenitor cells and fetal hepatoblasts are tissue-specific stem cells that can differentiate into hepatocytes and cholangiocytes, the two major epithelial cell populations in the liver. The research team investigates the hypothesis that while adult hepatic progenitor cells promote pathological angiogenesis, dysregulated differentiation of both fetal hepatoblasts and hepatocytes initiates tumorigenesis. The Shin lab employs molecular genetic approaches to test this hypothesis and collaborates with Drs. Nikolai Timchenko, PhD, Alexander Bondoc, MD, and Anita Gupta, MD, to discover novel strategies for prevention and treatment of liver cancer.

Gregory Tiao, MD

Dr. Gregory Tiao, MD, is the director of the Division of Pediatric General and Thoracic Surgery, and surgical director of liver transplantation. Dr. Tiao is also a member of the Liver Tumor Program, and a member of the Children's Oncology Group Rare Tumor Liver Subcommittee. Dr. Tiao's lab, including Dr. Sujit Mohanty, along with research assistants Bryan Donnelly, and Sarah Mowery, continues work on the pathogenesis of biliary atresia. Recently published data from his lab identified a novel cell binding site on rhesus rotavirus's (RRV) VP4 protein. The amino acid sequence "SRL" (445-447) within VP4 protein binds to the heat shock cognate protein 70 (Hsc70) expressed on cholangiocytes membrane. A sequence search of the National Center for Biotechnology Information (NCBI) revealed that the sequence "SRL" is also present on one of the attachment proteins of certain strains of CMV, reovirus, Epstein-Barr virus (EBV), and HPV. All of these viruses have been isolated from patients with biliary atresia.

A second publication detailed an innovative reverse genetics system used to generate a mutant RRV with a single amino acid where altered arginine (R) in the "SRL" sequence becomes glycine (G). Cholangiocytes (biliary epithelial cells) infected with this mutant virus replicated to a significantly lower level when compared to wild-type RRV. Mice injected with this mutant RRV no longer develop murine biliary atresia. Currently they are generating a series of VP4 mutants with amino acid substitutions in other binding sites, and are studying their effects in disease pathogenesis.

Nikolai Timchenko, PhD

Dr. Nikolai Timchenko, PhD, is a professor in the Division of Pediatric General and Thoracic Surgery at Cincinnati Children's Hospital Medical Center and UC Department of Surgery. He is also the head of Liver Tumor Biology for the Liver Tumor Program. His lab investigates mechanisms of hepatoblastoma (HBL), hepatocellular carcinoma (HCC), and mechanisms of non-alcoholic fatty liver disease (NAFLD).

Liver Cancer: The origin of liver cancer is under intensive investigations; however, there is little known about tumor originating cell types and mechanisms which initiate aggressive pediatric liver cancer. Dr. Timchenko's lab has generated five unique animal models with accelerated or inhibited liver cancer after treatments with certain carcinogens. Investigations of molecular pathways in these animal models showed that de-differentiation of hepatocytes into stem-like cells is the origin of hepatocellular carcinoma. In collaboration with Dr. Gregory Tiao, MD, from the Division of Pediatric General and Thoracic Surgery; Dr. James Geller, MD, from the Division of Oncology; and Dr. Anita Gupta, MD, from the Division of Pathology; along with other members of Liver Tumor Program, Dr. Timchenko has analyzed a large cohort of liver samples from patients with HBL and discovered molecular basis for two types of HBL. He found that classic (mild) HBL is the result of a failure of hepatic stem cells to differentiate into hepatocytes; while aggressive (chemo-resistant) HBL is the results of de-differentiation of hepatocytes into stem-like cells. Using animal models of HBL, Dr. Timchenko identified a unique type of hepatocytes which display properties of tumor initiating cells and gives rise to aggressive pediatric liver cancer. Current studies focus on the generation of the patient-derived xenograft models (PDXs), and the development of drugs to inhibit classic and aggressive HBL. These studies translate the knowledge of the molecular mechanisms of liver cancer generated in animal models to clinical application in human patients. NAFLD. Investigations of NAFLD by Dr. Timchenko's lab resulted in the discovery of a triggering event that causes NAFLD. This event is the elevation of cdk4 and subsequent stimulation of a cascade of pathways that lead to NAFLD. Dr. Timchenko also found that the inhibition of cdk4 prevents/reverses early steps of NAFLD. Since the FDA approved the use of cdk4 inhibitors, and they are in clinical trials for liver cancer, it is possible to initiate clinical trials for NAFLD with these drugs. Published studies in *Cell Reports* are also the focus of extensive media coverage. Currently Dr. Timchenko's studies of a molecular basis of NAFLD also include investigations of the role of proliferation in NAFLD.

Division Publications

1. Workman MJ; Mahe MM; Trisno S; Poling HM; Watson CL; Sundaram N; Chang CF; Schiesser J; Aubert P; Stanley EG. **Engineered human pluripotent-stem-cell-derived intestinal tissues with a functional enteric nervous system.** *Nature Medicine*. 2017; 23:49-59.

2. von Allmen D; Davidoff AM; London WB; Van Ryn C; Haas-Kogan DA; Kreissman SG; Khanna G; Rosen N; Park JR; La Quaglia MP. **Impact of Extent of Resection on Local Control and Survival in Patients From the COG A3973 Study With High-Risk Neuroblastoma.** *Journal of Clinical Oncology*. 2017; 35:208-216.

3. Inge TH; Jenkins TM; Xanthakos SA; Dixon JB; Daniels SR; Zeller MH; Helmrath MA. **Long-term outcomes of bariatric surgery in adolescents with severe obesity (FABS-5+): a prospective follow-up analysis.** *Lancet Diabetes and Endocrinology*. 2017; 5:165-173.

4. Wang KS; Tiao G; Bass LM; Hertel PM; Mogul D; Kerkar N; Clifton M; Azen C; Bull L; Rosenthal P. **Analysis of Surgical Interruption of the Enterohepatic Circulation as a Treatment for Pediatric Cholestasis.** *Hepatology*. 2017; 65:1645-1654.

5. Mohanty SK; Donnelly B; Lobeck I; Walther A; Dupree P; Coots A; Meller J; McNeal M; Sestak K; Tiao G. **The SRL Peptide of Rhesus Rotavirus VP4 Protein Governs Cholangiocyte Infection and the Murine Model of Biliary Atresia.** *Hepatology*. 2017; 65:1278-1292.

6. Lages CS; Simmons J; Maddox A; Jones K; Karns R; Sheridan R; Shanmukhappa SK; Mohanty S; Kofron M; Russo P. **The Dendritic Cell-T Helper 17-Macrophage Axis Controls Cholangiocyte Injury and Disease Progression in Murine and Human Biliary Atresia.** *Hepatology*. 2017; 65:174-188.

7. Shin S; Wangensteen KJ; Teta-Bissett M; Wang YJ; Mosleh-Shirazi E; Buza EL; Greenbaum LE; Kaestner KH. **Genetic Lineage Tracing Analysis of the Cell of Origin of Hepatotoxin-Induced Liver Tumors in Mice.** *Hepatology*. 2016; 64:1163-1177.

8. Tiao G; Geller J; Timchenko NA. **Generation of Pediatric Liver Cancer Patient-Derived Xenograft Platforms for Pediatric Liver Cancer: A Critical Stage in the Development of Anticancer Treatments.** *Hepatology*. 2016; 64:1017-1019.

9. Beamish AJ; Olbers T; Kelly AS; Inge TH. **Cardiovascular effects of bariatric surgery.** *Nature Reviews. Cardiology*. 2016; 13:730-743.

10. Ryder JR; Edwards NM; Gupta R; Khoury J; Jenkins TM; Bout-Tabaku S; Michalsky MP; Harmon CM; Inge TH; Kelly AS. **Changes in Functional Mobility and Musculoskeletal Pain After Bariatric Surgery in Teens With Severe Obesity Teen-Longitudinal Assessment of Bariatric Surgery (LABS) Study.** *JAMA Pediatrics*. 2016; 170:871-877.

11. Nalapareddy K; Nattamai KJ; Kumar RS; Karns R; Wikenheiser-Brokamp KA; Sampson LL; Mahe MM; Sundaram N; Yacyshyn MB; Yacyshyn B. **Canonical Wnt Signaling Ameliorates Aging of Intestinal Stem Cells.** *Cell Reports*. 2017; 18:2608-2621.

12. Jin J; Valanejad L; Thuy PN; Lewis K; Wright M; Cast A; Stock L; Timchenko L; Timchenko NA. **Activation of CDK4 Triggers Development of Non-alcoholic Fatty Liver Disease.** *Cell Reports*. 2016; 16:744-756.

13. Nehus EJ; Khoury JC; Inge TH; Xiao N; Jenkins TM; Moxey-Mims MM; Mitsnefes MM. **Kidney outcomes three years after bariatric surgery in severely obese adolescents.** *Kidney international*. 2017; 91:451-458.

14. Asai A; Aihara E; Watson C; Mourya R; Mizuochi T; Shivakumar P; Phelan K; Mayhew C; Helmrath M; Takebe T. **Paracrine signals regulate human liver organoid maturation from induced pluripotent stem cells.** *Development (Cambridge)*. 2017; 144:dev.142794.

15. Katzenstein HM; Furman WL; Malogolowkin MH; Krailo MD; McCarville MB; Towbin AJ; Tiao GM; Finegold MJ; Ranganathan S; Dunn SP. **Upfront Window Vincristine/Irinotecan Treatment of High-Risk Hepatoblastoma: A Report From the Children's Oncology Group AHEP0731 Study Committee.** *Cancer*. 2017; 123:2360-2367.

16. Wagner LM; Kremer N; Gelfand MJ; Sharp SE; Turpin BK; Nagarajan R; Tiao GM; Pressey JG; Yin J; Dasgupta R. **Detection of Lymph Node Metastases in Pediatric and Adolescent/Young Adult Sarcoma: Sentinel Lymph Node Biopsy Versus Fludeoxyglucose Positron Emission Tomography Imaging-A Prospective Trial.** *Cancer*. 2017; 123:155-160.

17. Strong BSI; Newkold TJ; Lee AE; Turner LE; Alhajjat AM; Heusel JW; Shaaban AF. **Extrinsic allospecific signals of hematopoietic origin dictate iNKT cell lineage-fate decisions during development..** *Scientific Reports*. 2016; 6:28837.

18. Rothstein DH; Dasgupta R; Surg AAPS. **Transition of Care From Pediatric to Adult Surgery.** *Pediatrics*. 2016; 138:e20161303.

19. Depinet H; von Allmen D; Towbin A; Hornung R; Ho M; Alessandrini E. **Risk Stratification to Decrease Unnecessary Diagnostic Imaging for Acute Appendicitis.** *Pediatrics*. 2016; 138:e20154031.

20. Lobeck IN; Sheridan R; Lovell M; Dupree P; Tiao GM; Bove KE. **Cystic Biliary Atresia and Choledochal Cysts Are Distinct Histopathologic Entities.** *American Journal of Surgical Pathology*. 2017; 41:354-364.

21. Emery SP; Hasley SK; Catov JM; Miller RS; Moon-Grady AJ; Baschat AA; Johnson A; Lim F-Y; Gagnon AL; O'Shaughnessy RW. **North American Fetal Therapy Network: intervention vs expectant management for stage I twin-twin transfusion syndrome..** *American Journal of Obstetrics and Gynecology*. 2016; 215:346.e1-346.e7.

22. Streck CJ; Vogel AM; Zhang J; Huang EY; Santore MT; Tsao K; Falcone RA; Dassinger MS; Russell RT; Blakely ML. **Identifying Children at Very Low Risk for Blunt Intra-Abdominal Injury in Whom CT of the Abdomen Can Be Avoided Safely.** *Journal of the American College of Surgeons*. 2017; 224:449-458.e3.

23. Cohran V; Managlia E; Bradford EM; Goretsky T; Li T; Katzman RB; Cheresh P; Brown JB; Hawkins J; Liu SXL. **Epithelial PIK3R1 (p85) and TP53 Regulate Survivin Expression during Adaptation to Ileocecal Resection.** *The American journal of pathology*. 2016; 186:1837-1846.

24. Utzinger LM; Gowey MA; Zeller M; Jenkins TM; Engel SG; Rofey DL; Inge TH; Mitchell JE; Teen Longitudinal Assessment of Bariatric Surgery (Teen-LABS) Consortium. **Loss of control eating and eating disorders in adolescents before bariatric surgery.** *International Journal of Eating Disorders*. 2016; 49:947-952.

25. Averin K; Bucuvalas J; Alonso MH; Kohli R; Heubi JE; Johnson ND; Goldstein BH. **Treatment of Inferior Vena Cava Obstruction Following Pediatric Liver Transplantation: Novel Use of a Customized Endovascular Stent.** *The Journal of Pediatrics*. 2017; 180:256-260.

Grants, Contracts, and Industry Agreements

Annual Grant Award Dollars

Investigator	Title	Sponsor	ID	Dates	Amount
Michael Anthony Helmrath, MD James Wells, PhD	Investigation of Regional Identity in Human Intestinal Stem Cells	National Institutes of Health	U01 DK103117	09/01/2014 - 08/31/2019	$210,130
Nikolai Timchenko, PhD	NAFLD: Mechanisms and Treatments	National Institutes of Health	R01 DK102597	01/01/2015 - 12/31/2018	$351,000
Jaimie Nathan, MD	The Role of Intestinal Microbiota in Acute Rejection	American Society of Transplant Surgeons	ASTS - NATHAN,JAIMIE	07/01/2015 -	$50,000

	in Small Bowel Transplant Recipients			06/30/2017	
Helen Nichola Jones, PhD	Pre-conception Obesity “Programs” Placenta Function and Inflammation	National Institutes of Health (University of Cincinnati)	R21 HD087536	07/01/2016 - 06/30/2018	$13,177
Maxime M Mahe, PhD	Human In Vivo Model to Study the Role of a Functional Enteric Nervous System on Intestinal Development and Maturation	National Institutes of Health	K99 DK110414	09/16/2016 - 08/31/2018	$91,171
Michael Anthony Helmrath, MD	Multi-institutional Trial of Non-operative Management of Uncomplicated Pediatric Appendicitis	Patient-Centered Outcome Research Inst. (Nationwide Children's Hospital)	CER-1507-31325	08/01/2016 - 07/31/2018	$67,725
Todd M Jenkins, PhD	Teen Longitudinal Assessment of Bariatric Surgery (Teen-LABS) Biostatistical Research Center	National Institutes of Health (University of Cincinnati)	UM1 DK095710	09/01/2016 - 08/31/2021	$909,731
Thomas Inge	Teen Longitudinal Assessment of Bariatric Surgery (Teen-LABS) Research Project	National Institutes of Health	UM1 DK072493	09/01/2016 - 08/31/2021	$933,928
Donna Laake	Health Improvement and Wellness, Health Promotion, Violence and Injury Prevention	Ohio Department of Health	GG-2016-SA-00-00-003	11/16/2015 - 09/30/2017	$38,845
Marilyn J Haas, RN, CNP	Pediatric Traumatic Brain Injury: Impact of Under-Triage	Ohio Department of Public Safety	Haas ODPS 16-17	07/01/2016 - 06/30/2017	$53,326
Jaimie Nathan, MD	Advancing Treatment for Pancreatitis: A Prospective Observational Study of TPIAT	National Institutes of Health (University of Minnesota)	R01 DK109124	06/01/2016 - 03/31/2021	$15,249
Foong-Yen Lim, MD	Identification of Novel Genes for Congential Diaphragmatic Hernia	Columbia University Medical Center	Trustee Co - Lim,Foo	07/01/2016 - 06/30/2017	$10,000
Anusua Roshni Dasgupta, MD	Timing of Inguinal Hernia Repair in Premature Infants: A Randomized Trial	National Institutes of Health (Vanderbilt University Medical Center)	U01 HD076733	06/01/2016 - 05/31/2017	$2,075
Michael Anthony Helmrath, MD	Internal Startup	Nationwide Children's Hospital	184111	01/15/2016 - 07/31/2016	$34,400
Jaimie Nathan, MD	Advancing Treatment for Pancreatitis: A Prospective	National Institutes of Health (University of Minnesota)	R01 DK109124	06/01/2016 -	$12,870

	Observational Study of TPIAT			03/31/2017	
Michael Anthony Helmrath, MD James Wells, PhD	Establishment of In Vitro and In Vivo Models of Human Gastrointestinal Organoids with a Functional ENS	National Institutes of Health	U18 EB021780	09/30/2015 - 07/31/2018	$167,665
Total Annual Grant Award Dollars					**$2,961,292**

Annual Industry Award Dollars

Investigator	Industry Sponsor	Amount
Anusua Roshni Dasgupta, MD	Cardinal Health	$61,588
Michael Anthony Helmrath, MD	Nutrinia, LTD	$294,213
Total Annual Industry Award Dollars		**$355,801**