Allergy and Immunology

Division Summary

RESEARCH AND TRAINING DETAILS

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CLINICAL ACTIVITIES AND TRAINING

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Significant Accomplishments

Zeroing in on under-recognized allergens

Few people know as much about slime mold as Michelle Lierl, MD. Her recent study, published in the Annals of Allergy, Asthma and Immunology, suggests that myxomycete (slime mold) spores may be under-recognized as airborne allergens. However, conducting the research needed to reach this conclusion presented a significant challenge. No extracts of these spores are commercially available, so Lierl collects the spores herself and makes the experimental extracts needed for allergy skin testing. Having also discovered a lack of photographs available of these microscopic spores, she launched a website to share images of basidiomycete, ascomycete and myxomycete spores as a reference source. Now Lierl is testing
methods for growing myxomycetes in bulk, a necessary step for wider-scale research.

**Setting the guidelines for Ohio’s SCID screening initiative**

In July 2013, the state of Ohio added severe combined immune deficiency disease (SCID) screening to its list of mandatory infant screenings. This life-threatening genetic disorder causes a lack of functional T cells that makes children with SCID extremely vulnerable to infectious diseases. Kimberly Risma, MD, PhD, who developed Cincinnati Children’s guidelines for responding to an abnormal SCID screening test, worked with members of the Ohio Department of Health (ODH) Newborn Screening Laboratory and other pediatric immunologists to develop algorithms that will guide pediatricians’ response statewide. The new testing requirement is a critical improvement in newborn screening and will allow physicians to identify patients with SCID prior to them becoming ill from exposure to bacterial, viral or fungal agents or to live vaccines such as those for rotavirus. The most common treatment for SCID is bone marrow transplantation (BMT), although recent gene therapy trials are showing promise.

**Developing new diagnostics for rare food allergy**

A team of researchers led by Ting Wen, PhD, and Marc Rothenberg, MD, PhD, developed a molecular diagnostic panel for eosinophilic esophagitis (EoE), a severe, often painful allergy that renders children unable to eat a wide variety of foods. Their recent study, published in *Gastroenterology*, demonstrated that the EoE Diagnostic Panel is accurate and reliable; can quantitatively measure the degree of disease activity; can identify patients who have been exposed to topical glucocorticoids; and can be done within hours after biopsy procurement. The test was recently licensed to Diagnovus, LLC, and is now commercially available as the ENGUAGE™ GI-EoE.

**Research Highlights**

**Discovery of Impaired Barrier Function in Eosinophilic Esophagitis**

Faculty researcher Joseph D. Sherrill, PhD, identified impaired barrier function in eosinophilic esophagitis (EoE) in a publication in *Mucosal Immunology*. Researchers from Cincinnati Children’s, University of North Carolina School of Medicine and Nestle Research Centre in Switzerland investigated desmosomal cadherin desmoglein 1 (DSG-1), an essential intercellular adhesion molecule that is altered in various human skin disorders. Examining esophageal biopsies from patients with EoE, the investigators observed a specific decrease in DSG-1. They further demonstrated that decreasing expression of DSG-1 weakened the barrier function of the esophageal epithelium, suggesting a potential mechanism by which patients with EoE are hypersensitized to food antigens. Additionally, they showed that reducing DSG-1 expression promoted a pro-allergic cascade. These findings may serve as a basis for new EoE therapeutics designed to improve barrier function, Sherrill was awarded a Digestive Health Center Pilot and Feasibility Award for his project “Characterization of the Antimicrobial Peptide RNase 7 in Eosinophilic Esophagitis”.

**Division Clinical Director Shares Expertise in Food Allergy**

Amal H. Assa’ad, MD, lectured on food allergy, eczema and eosinophilic disorders at the plenary session of the American College of Allergy, Asthma Immunology (ACAAI) and in Turkey and Mexico on the topic of dietary prevention of food allergies. Her efforts were recognized by the Donald Fournier Lectureship from Louisiana State University. In conjunction with her sharing of expertise and knowledge through lectures and mentorship, her program in food allergy research has expanded to three treatment clinical trials with high patient enrollment. Notably, she published about the food-specific serum IgE measurements in children presenting with food allergy, this novel analysis of serum IgE testing for foods in children with food allergy showed for that food-specific IgE, a commonly utilized test, has results that fall in different ranges depending on the food and that a food-specific interpretation of the test would provide a more valid clinical application than the current ‘one size fits all’ interpretation of the test.
Discovery of a Novel Mode of Biochemically Regulating Eosinophil Cell Death

Nives Zimmermann, MD, was awarded a special invited lectureship by the American Academy of Allergy, Asthma and Immunology (AAAAI), the 2014 ARTrust™ and Donald Y. M. Leung, MD, PhD, FAAAAI-JACI Lecture: “Investing Together in Our Future” award, for her symposium presentation entitled "Siglec-8 engagement induces apoptotic or lytic eosinophil cell death, depending on cell activation status" at the annual AAAAI meeting. Her presented and published work has demonstrated a novel way of biochemically regulating eosinophil cell death. Death of eosinophils can have a protective role, as when removed by a non-inflammatory process such as apoptosis, or a harmful role, as when removed by lysis, a process that releases intracellular granules and cytokines, which contribute to tissue damage and inflammation. Zimmermann demonstrated that the same molecule on the cell surface of eosinophils, Siglec-8, could lead to either apoptosis (IL-5/anti-Siglec-8 costimulation) or lysis (anti-Siglec-8 stimulation). In activated eosinophils, ligation of Siglec-8 leads to reactive oxygen species-dependent enhancement of IL-5–induced ERK phosphorylation, a novel mode of biochemically regulating eosinophil cell death. Further understanding the mechanisms involved may provide new avenues for therapeutics by permitting manipulation of eosinophils to a more beneficial cell death pathway.

Excellence of Division Trainees and Junior Investigators

The Division of Allergy and Immunology is proud of the excellence of its undergraduate, graduate, postdoctorate, and clinical trainees and junior investigators. Several have been recognized for their achievements throughout the year. Abby Stein, a medical student researcher in the Fulkerson Lab, and Patrick McWeeney, a medical student researcher in the Hogan Lab, won awards at the 55th Annual National Student Research Forum (University of Texas, Medical Branch campus, Galveston, Texas). Abby’s presentation of eosinophil progenitors in experimental asthma won the best poster presentation in the Immunology category, and Patrick’s presentation won the best poster presentation in the Biochemistry and Molecular Biology section. These two medical student researchers were part of Cincinnati Children’s Summer Medical Student Respiratory Research Fellowship (SMURRF) program and represented Cincinnati Children’s, the University of Cincinnati and our division well. Michael Stephens, an undergraduate researcher in the Fulkerson Lab, presented at the annual, regional meeting of the Northeast-4 district (the states of KY, OH, and MI) of the National Biological Honors Society and won the Frank G. Brooks award for ranking first place in podium presentations. He was presented with a plaque and certificate and provided funds for him to present at the national conference this year. Rahul D’Mello, MD, and PhD student in the Rothenberg Lab, spoke about his experiences about shaping the next generation of physician-scientists in a University of Cincinnati College of Medicine article. Ting Wen, PhD, a research fellow in the Rothenberg Lab, won the second-place prize at the third annual Ohio River Valley Cytometry Association’s Imaging and Cytometry Research Day. David Morris, MD, a clinical fellow in the Fulkerson Lab, was awarded a 2014 ARTrust mini-grant entitled “Characterization of eosinophil progenitors (EoPs) in the peripheral blood of pediatric patients with active eosinophilic esophagitis (EoE)”. Julie Caldwell, a research associate in the Rothenberg Lab, won first at the 2014 Digestive Health Center Research Symposium for her project “CDH26: a Functional Integrin-Binding Cadherin Involve in Eosinophilic Gastrointestinal Disorders”. Nurit Azouz, a research fellow in the Rothenberg Lab, received an American Heart Association (AHA) Postdoctoral Fellowship award.

Division Director at Cincinnati Children’s Elected AAAS Fellow

Marc Rothenberg, MD, PhD, Director of the Division of Allergy and Immunology and the Cincinnati Center for Eosinophil Disorders at Cincinnati Children’s, has been elected as a Fellow of the American Association for the Advancement of Science (AAAS). Fellows are elected by their peers and recognized for meritorious efforts to advance science and its applications. Dr. Rothenberg’s research focuses on elucidating the mechanisms of allergic responses, especially in mucosal tissues such as the gastrointestinal tract and lung. The goal of his research is to identify mechanisms of allergic inflammation, with the aim of developing and testing novel pharmaceutical targets for the treatment and cure of patients with a variety of allergic diseases, especially eosinophilic gastrointestinal disorders, such as eosinophilic esophagitis. His extensive publications include more than 300 articles on molecular mechanisms of allergic responses. He has served on
various review panels for journals and grant agencies, including the Burroughs Trust, the Medical Research Council of the United Kingdom and the National Institutes of Health, where he served on the Advisory Council of the National Institute of Allergy and Infectious Disease. His research has been supported by numerous sources, including the National Institutes of Health, USA Department of Defense, Human Frontier Science Program Organization, Burroughs Wellcome Fund, Dana Foundation, Campaign Urging Research for Eosinophilic Diseases Foundation and Food Allergy Research Education, Inc. In addition to his own research, Rothenberg has mentored numerous scientists and clinicians, sees patients suffering from allergic and immunological diseases from around the world, and has helped to build a top program in pediatric allergy and immunology.

**Inhibitory Receptor LILRB3 in Inflammatory Bowel Disease**

Simon P. Hogan, PhD, (Principal Investigator), in collaboration with Artem Barski PhD, Lee A. Denson, MD and Yael Haberman Ziv, MD, recently received a Crohn’s Colitis Foundation of America Senior Research Award to study the contribution of the inhibitory receptor LILRB3 in pediatric inflammatory bowel disease (IBD). Inhibitory receptors act as “brakes” and restrain or inhibit inflammatory signals in an attempt to prevent an uncontrolled and/or exaggerated inflammatory response. Consistent with this idea, in mouse-based studies, Hogan and colleagues have shown that loss of the inhibitory receptor LILRB3 causes an immune cell called macrophages to produce excessive amounts of proinflammatory proteins (i.e. IL-6, TNF-a and IL-1b), which cause intestinal inflammation and IBD. In new preliminary studies, these researchers have identified a new form of LILRB3 that appears to be expressed differently in IBD patients. This variant of LILRB3 has lost the part of the protein that is critical for activating the “brakes signal” and thus this protein’s ability to restrain inflammation. Hogan and his collaborators hypothesize that the protein LILRB3 is important in applying the “brakes” on intestinal immune signals and prevents intestinal inflammation and that the LILRB3 isoforms expressed in IBD cause a loss of this braking mechanism, causing exaggerated inflammation and more severe IBD. Successful completion of the proposed studies will provide a new and substantive departure from the current understanding of the underlying immune pathways that lead to exaggerated intestinal inflammation in IBD and will identify innovative therapeutic targets focused around LILRB3 for the treatment and prevention of IBD by blocking immune signals and inflammation.

**STARD7 in Food Allergy and Anaphylaxis**

Simon P. Hogan, PhD, in collaboration with Timothy E. Weaver, MS, PhD, (Principal Investigator), was recently awarded a Digestive Health Center Pilot and Feasibility Award to study the involvement of STAR-related lipid transfer domain containing 7 (STARD7) in food allergy and anaphylaxis. In preliminary studies, Weaver and Hogan have identified a strong link between intestinal, epithelial-specific deletion of STARD7, epithelial barrier dysfunction and food sensitization and that STARD7 regulates epithelial barrier gene expression via a novel interaction of STARD7 and phosphatidylcholine (PC) with the ligand-activated transcription factor peroxisome proliferator-activated receptor (PPAR). In this study, the investigators will define the importance of intestinal, epithelial-specific STARD7 in maintaining the protective epithelial barrier function and, in turn, food tolerance. They also expect to delineate the importance of PC:PPAR signaling in nuclear STARD7 modulation of the expression of barrier proteins and intestinal epithelial barrier function. Successful completion of the proposed studies will provide important, new insight into this protective pathway by identifying cells, signaling pathway(s) and target genes that mediate the putative cell-specific, barrier-enhancing and anti-inflammatory functions of STARD7.

**Collaborative Modeling of the Epigenetics of Environmental Enteropathy**

Simon P. Hogan, PhD, in collaboration with Sean R. Moore, MS, MD (Principal Investigator), was recently awarded a Bill & Melinda Gates Foundation Phase II Grand Challenges Exploration application entitled, "Bad water, bad diet, bad stem cells: Epigenetic modeling of environmental enteropathy in mice". Environmental enteropathy (EE) describes subclinical pathologic changes to the mucosal lining of the small intestine in individuals who lack access to safe water and good diets
in settings of global poverty. EE is the single most important barrier to achieving healthy growth and development for children worldwide. In this study, the investigators will define the relationship between microbiome and diet in intestinal stem cell dysfunction and development of EE. The Grand Challenges Explorations is an initiative that encourages bold and unconventional ideas for global health in order to foster innovation in global health research.

**Significant Publications**


This study translated the authors' prior findings regarding the eosinophilic esophagitis (EoE) transcriptome into a test, the EoE Diagnostic Panel (EDP), which can be performed with fresh biopsy tissue or with formalin-fixed, paraffin-embedded tissue, and demonstrated that the EDP is accurate and reliable in distinguishing EoE from control biopsies, including biopsies from patients with reflux disease; can quantitatively measure the degree of disease activity; can identify patients who have been exposed to topical glucocorticoids; and can be done within hours after biopsy procurement. This transformative research offers an opportunity to improve diagnosis and treatment for EoE and serves as a platform approach for other eosinophilic disorders and inflammatory diseases. Marc Rothenberg, MD, PhD and Ting Wen, PhD are co-inventors of the Cincinnati Children's patent. The EDP has been recently licensed by Cincinnati Children's to Diagnovus, LLC and is now commercially available as the ENGUAGE™ GI-EoE.


This research demonstrated two distinct functions for Siglec-8, a molecule on the cell surface of eosinophils. Siglec-8 could lead to either eosinophil apoptosis (IL-5/anti-Siglec-8 costimulation) or eosinophil lysis (anti-Siglec-8 stimulation) depending on whether IL-5 was present or absent. Notably, Siglec-8 ligation leads to enhanced IL-5–induced ERK phosphorylation via reactive oxygen species, comprising a novel mode of biochemically regulating eosinophil apoptosis and cell death. As eosinophil cell death can have a protective function, further understanding the mechanisms involved may provide new avenues for therapeutic treatment of eosinophil-related diseases.


This investigation provides clinical and molecular evidence indicating a high prevalence of EoE in patients with inherited connective tissue disorders (CTDs). An 8-fold risk of EoE in patients with CTDs was present compared with the general population, and esophageal transcript profiling identified a distinct subset of genes, including COL8A2, in patients with EoE and CTDs. The remarkable association of EoE with CTDs and evidence for a differential expression of genes involved in connective tissue repair supports stratifying patients with EoE and CTDs into a subset referred to as EoE-CTD.


Examining esophageal biopsies from patients with eosinophilic esophagitis (EoE), the investigators observed a
specific decrease in desmosomal cadherin desmoglein 1 (DSG-1), an essential intercellular adhesion molecule that is altered in various human skin disorders. They further demonstrated that decreasing expression of DSG-1 weakened the barrier function of the esophageal epithelium, suggesting a potential mechanism by which patients with EoE are hypersensitized to food antigens. These findings suggest that the DSG-1 and barrier function may underlie pathogenesis of EoE.


To identify whether outdoor slime mold (myxomycete) spores are previously unrecognized airborne allergens (aeroallergens), this study conducted allergy skin testing with myxomycete spore extracts. As no extracts of these spores are commercially available, the author collected the spores herself to make the experimental extracts for the allergy skin testing. The findings support that myxomycete spores may be significant aeroallergens, as 42% of patients with seasonal allergic rhinitis were sensitized to these myxomycete spores, including a significant subset that had negative skin test results to standard aeroallergen panels.

Division Publications


32. Zhu X, Mose E, Hogan SP, Zimmermann N. **Differential eosinophil and mast cell regulation: Mast cell viability and accumulation in inflammatory tissue are independent of proton-sensing receptor GPR65.** *Am J Physiol Gastrointest Liver Physiol.* 2014; 306:G974-82.

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**Faculty, Staff, and Trainees**

**Faculty Members**

**Marc E. Rothenberg, MD, PhD**, Professor  
**Leadership** Director, Division of Allergy and Immunology; Director, Cincinnati Center for Eosinophilic Disorders  
**Research Interests** Elucidating mechanisms, genetics and novel therapies for allergic diseases with a focus on eosinophilic esophagitis

**J. Pablo Abonia, MD**, Associate Professor  
**Research Interests** Investigates eosinophilic esophagitis and focuses on informatics analysis of medical records and the Registry of Eosinophilic Gastrointestinal Disorders (REGID)

**Amal H. Assa‘ad, MD**, Professor  
**Leadership** Clinical Director  
**Research Interests** Investigates food allergy (natural history of IgE-mediated food allergy, diagnostic tools, association with cardiovascular morbidity) and conducts clinical trials of novel therapies for atopic disorders (food allergy, eosinophilic disorders, asthma)

**Artem Barski, PhD**, Assistant Professor  
**Research Interests** Investigates chromatin biology and epigenomic and transcriptional regulation of immune
responses and uses epigenomic data to augment genome-wide association studies

Sheharyar Durrani, MD, Assistant Professor
Research Interests Implementing mobile health technology into the care of difficult-to-treat pediatric asthma

Thomas J. Fischer, MD, Adjunct
Research Interests Focuses on the pharmacologic management of asthma and immune deficiency diseases

Patricia C. Fulkerson, MD, PhD, Assistant Professor
Research Interests Researches the biology of the eosinophil-lineage committed progenitor (EoP). Aiming to identify novel therapeutic targets to block eosinophil production for the treatment of patients with eosinophilic disorders

Simon P. Hogan, PhD, Associate Professor
Leadership Research Director
Research Interests Studies allergies, food allergies, eosinophil biology and gastrointestinal inflammation

Michelle B. Lierl, MD, Adjunct
Research Interests Investigates the role of basidiomycete and myxomycete fungal spores as aeroallergens, conducts allergen component testing for food allergies and participates in food allergy research to desensitize patients to food allergens (e.g. peanut)

Andrew W. Lindsley, MD, PhD, Instructor
Research Interests Role of sphingolipids in the pulmonary inflammatory response, especially in asthma and during viral infections; Humoral immunity with a special interest in terminal B cell differentiation

Santa J. Ono, PhD, Professor
Research Interests Focuses on the transcriptional regulation in the human immune system, mechanisms of mast cell-dependent inflammation on the ocular surface and the immune component of age-related macular degeneration

Kimberly A. Risma, MD, PhD, Assistant Professor
Leadership Director, Allergy and Immunology Division Fellowship Program
Research Interests Develops novel diagnostic/therapeutic approaches to improve outcomes for children with hemophagocytic lymphohistiocytosis, an inflammatory disease caused by genetic defects in the cytotoxic pathways of natural killer cells and cytotoxic T lymphocytes

Joseph D. Sherrill, PhD, Instructor
Research Interests Functional analysis of genetic variants affecting the mucosal barrier function, as well as the role of antimicrobial peptides and the host microbiome in allergic disease

Yui-Hsi Wang, PhD, Assistant Professor
Research Interests Investigating how inflammatory mediators regulate the function of adaptive CD4+ T-helper cells and innate effector cells in order to understand whether the interplay between these cells contributes to allergic responses in the airway and gut

Nives Zimmermann, MD, Adjunct
Research Interests Focuses on deciphering the mechanisms of eosinophilia and eosinophil survival and death in allergic inflammation and asthma

Joint Appointment Faculty Members

Alexandra H. Filipovich, MD, Professor (Hematology/Oncology Diagnostic Laboratory)
Research Interests Primary immunodeficiencies; BMT for primary immunodeficiencies; Hemophagocytic lymphocytosis; Post-BMT immune reconstruction

Kenneth M. Kaufman, PhD, Professor (Division and Center for Autoimmune Genomics and Etiology)
Research Interests Focuses on understanding genetic disease mechanisms using high density SNP arrays and Next-Generation DNA sequencing technology
Gurjit Khurana Hershey, MD, PhD, Professor (Asthma Research)

Research Interests Integrating clinical, translational and basic research to identify genetic & environmental factors that promote asthma, delineate the mechanisms underlying their contributions and develop new strategies for asthma prevention, management and treatment

Clinical Staff Members
- Benjamin P. Davis, MD, Staff Physician
- Harpinder K. Kalra, MD, Staff Physician

Trainees
- Jinzhu Li, MD, PhD, PGY-6, Wayne State University, Detroit, MI
- Maya Nanda, MD, PGY-6, Albany Medical College, Albany, NY
- Michael Goodman, MD, PGY-5, Washington University, St. Louis, MO
- David Morris, MD, PGY-5, Wright State University, Detroit, MI
- Leilanie Perez-Ramerez, MD, PGY-5, University of Puerto Rico School of Medicine, San Juan, Puerto Rico
- Nurit P. Azouz, PhD, Tel Aviv University, Tel Aviv, Israel
- Carine Bouffi, PhD, University of Montpellier, Montpellier, France
- Benjamin P. Davis, MD, University of Iowa, Des Moines, IA
- Adrianne E. Hontz, PhD, University of Kansas Medical Center, Kansas City, KS
- Chong Liu, PhD, University of Kentucky, Lexington, KY
- Kan Liu, PhD, Beijing Institute of Genomics, Beijing, China
- Simone Vanoni, PhD, Paracelsus Medizinische Privatuniversität, Salzburg, Austria
- Alexandra A. Vrazo, PhD, Northwestern University, Evanston, IL
- Masashi Yukawa, PhD, University of Tokyo, Tokyo, Japan
- Rahul D’Mello, BS, Johns Hopkins University, Baltimore, MD
- Bo Liu, BS, Tsinghua University, Beijing, China
- Jared B. Travers, BS, University of Cincinnati, Cincinnati, OH
- Netali Ben-Baruch Morgenstern, MS, Tel Aviv University, Tel Aviv, Israel
- Matthew deGannes, MS, University of Massachusetts, Amherst, MA
- Josi L. Herren, DO, Ohio University Heritage College of Osteopathic Medicine, Athens, OH
- Patrick McWeeney, BS, University of Cincinnati, Cincinnati, OH
- Ahmad H. Saqr, BS, University of Cincinnati, Cincinnati, OH

Division Collaboration
The Cincinnati Center for Eosinophilic Disorders (CCED) is the international leader in both caring for patients with eosinophilic conditions and researching the best treatments and cure. The CCED was the first center established that brings together experts in allergy/immunology, gastroenterology, social work, nutrition and pathology to evaluate, treat and study these chronic medical problems in children and adults. The CCED’s multidisciplinary team has extensive experience with these disorders and aims to provide personalized care and learn from each patient. Several of the faculty of the Division of Allergy and Immunology are physicians and researchers on the CCED’s multidisciplinary team: Marc E. Rothenberg, MD, PhD; J. Pablo Abonia, MD; Patricia C. Fulkerson, MD, PhD; Simon P. Hogan, PhD; Kimberly A. Risma, MD, PhD; and Joseph D. Sherrill, PhD.

Cincinnati Center for Eosinophilic Disorders (CCED) » Margaret H. Collins, MD, Vincent A. Mukkada, MD, Philip E. Putnam, MD, Nicole E. Zahka, PhD, and Alison Cassin, MS, RD, LD

Analysis and Expansion of the Eosinophilic Esophagitis Transcriptome by RNA Sequencing (J. Pablo Abonia, MD; Marc E. Rothenberg, MD, PhD; Joseph D. Sherrill, PhD)

Cincinnati Center for Eosinophilic Disorders » Margaret H. Collins, MD, Vincent A. Mukkada, MD, and Philip E. Putnam, MD

Division of Biomedical Informatics » Bruce J. Aronow, PhD

Division of Gastroenterology, Hepatology and Nutrition » Ajay Kaul, MD and Samuel A. Kocoshis, MD

Gene Therapy For Perforin Deficiency (Kimberly A. Risma, MD, PhD)

Cancer and Blood Diseases » Punam Malik, MD and Michael B. Jordan, MD

The Digestive Health Center (DHC) is focused on bench-to-bedside research in pediatric digestive disease and is one of only 17 Silvio O. Conte Digestive Diseases Research Core Centers in the nation supported by the National Institute of Diabetes and Digestive and Kidney Diseases. Artem Barski, PhD, Patricia C. Fulkerson, MD, PhD, Simon P. Hogan, PhD, Marc E. Rothenberg, MD, PhD, Joseph D. Sherrill, PhD, Yui-Hsi Wang, PhD, and Nives Zimmermann, MD are members.

Digestive Health Center » Jorge A. Bezerra, MD and Kasper Hoebe, PhD

The Division of Asthma Research at Cincinnati Children’s focuses its research efforts on individual variations in asthma presentation, treatment response and outcomes. Faculty of the Division of Asthma Research and the Division of Allergy and Immunology frequently collaborate as evidenced by a shared NIH U19 AADCRC grant. Our Asthma and Allergic Diseases Cooperative Research Center (AADCRC) is one of only 12 such centers in the United States. Marc E. Rothenberg, MD, PhD, is a project principal investigator for this center, which received a renewal of its NIH-funded U19 grant in 2011. The center’s overarching hypothesis is that epithelial cell genes play a central role in the pathogenesis of allergic disorders.

Division of Asthma Research » Gurjit Khurana Hershey, MD, PhD

Mechanism of Airway Acidification in Asthma (Nives Zimmermann, MD)

Division of Asthma Research » Gurjit Khurana Hershey, MD, PhD

Type-2 Innate Lymphoid Cells and CD4+ TH2 Cells in Eosinophilic Asthma (Yui-Hsi Wang, PhD)

Division of Asthma Research » Gurjit Khurana Hershey, MD, PhD

Behavioral Functioning, Treatment Adherence and Symptom Assessment in Pediatric Eosinophilic Gastrointestinal
Disorders (Marc E. Rothenberg, MD, PhD)
Division of Behavioral Medicine and Clinical Psychology » Kevin A. Hommel, PhD

MicroRNA Signatures and Regulation of IL-13 Mechanisms in Eosinophilic Esophagitis (Marc E. Rothenberg, MD, PhD)
Division of Biomedical Informatics » Bruce J. Aronow, PhD

Transcriptomics of T cell Anergy (Artem Barski, PhD)
Division of Biomedical Informatics » Nathan Salomonis, PhD

Human Genetics and Relationship of Connective Tissue Disorders and Eosinophilic Gastrointestinal Disorders (Marc E. Rothenberg, MD, PhD)
Division of Cardiology / Division of Human Genetics / Heart Institute » Stephanie M. Ware, MD, PhD, FACMG

Epigenomics and Transcriptomics Data Production and Analysis (Artem Barski, PhD)
Division of Developmental Biology » Raphael Kopan, PhD
Division of Experimental Hematology / Cancer Blood Diseases Institute » Ruhikanta A. Meetei, PhD
Division of Immunobiology » H. Leighton (Lee) Grimes, PhD and David A. Hildeman, PhD

The Division of Gastroenterology, Hepatology and Nutrition at Cincinnati Children’s specializes in treatment and research for gastrointestinal, liver and nutritional disorders. Faculty of the Division of Gastroenterology, Hepatology and Nutrition and the Division of Allergy and Immunology, such as Marc E. Rothenberg, MD, PhD and Simon P. Hogan, PhD, frequently collaborate in areas of research including eosinophilic gastrointestinal disorders and inflammatory bowel diseases.
Division of Gastroenterology, Hepatology and Nutrition » Jose M. Garza, MD, MS, Philip E. Putnam, MD, and Noah F. Shroyer, PhD

Contribution of Inhibitory Receptor LILRB3 in Pediatric Inflammatory Bowel Disease (Simon P. Hogan, PhD)
Division of Gastroenterology, Hepatology and Nutrition » Lee A. Denson, MD and Yael Haberman Ziv, MD

Epigenetic Modeling of Environmental Enteropathy in Mice (Simon P. Hogan, PhD)
Division of Gastroenterology, Hepatology and Nutrition » Sean R. Moore, MS, MD

Role of Eosinophils in Pediatric Inflammatory Bowel Diseases (Simon P. Hogan, PhD)
Division of Gastroenterology, Hepatology and Nutrition » Lee A. Denson, MD and Kris A. Steinbrecher, PhD

Role of Myeloid Cell-Derived NF-κB in LPS Toxicity (Simon P. Hogan, PhD)
Division of Gastroenterology, Hepatology and Nutrition » Kris A. Steinbrecher, PhD
Division of Immunobiology » Kasper Hoebe, PhD

The Division of Immunobiology at Cincinnati Children’s conducts research toward understanding the cellular, molecular and genetic mechanisms that drive immunologically mediated disorders in children. Fred Finkelman, MD, of the Division of Immunobiology actively collaborates, publishes and co-mentors with faculty of the Division of Allergy and Immunology. Our faculty member, Simon P. Hogan, PhD, serves as the Director of Admissions for the Immunobiology Graduate Program.
Division of Immunobiology » Fred Finkelman, MD

Intestinal Innate Helper Cells and Food Allergy (Yui-Hsi Wang, PhD)
Mechanisms of Allergy, Asthma, and Immunology (Marc E. Rothenberg, MD, PhD)

Mechanisms of Food Allergy and Anaphylaxis (Simon P. Hogan, PhD, Yui-Hsi Wang, PhD)

Thermoneutrality and Obesity in Food Allergy and Anaphylaxis (Simon P. Hogan, PhD)

Metal Sensitivity in Patients with Scoliosis (Michelle B. Lierl, MD)

Can Pre-surgical Skin Patch Testing for Metal Hypersensitivity to Nickel and Other Metals Present in Surgical Stainless Steel Help Prevent Post-Surgical Complications in Patients with Scoliosis? (Michelle B. Lierl, MD)

Molecular Mechanism of Eosinophil Cell Death (Nives Zimmermann, MD, Marc E. Rothenberg, MD, PhD)

STARD7 in Food Allergy and Anaphylaxis (Simon P. Hogan, PhD)

RNF8 directs active epigenetic modifications and escape gene expression from inactive sex chromosomes in male germ cells. (Artem Barski, PhD)

Consortium of Food Allergy Research (CoFAR) - Eosinophilic Esophagitis and Food Allergy (Marc E. Rothenberg, MD, PhD)

Collaborative Mentoring of Postdoctoral Fellow (Marc E. Rothenberg, MD, PhD)

Genetics of Eosinophilic Esophagitis (Marc E. Rothenberg, MD, PhD)

Role of Mast Cell-Derived Proteases in Experimental Asthma (Simon P. Hogan, PhD) via the International Research Training Group with the University of Lubeck/Research Center Borstel in Lubeck, Germany

Grants, Contracts, and Industry Agreements
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