Division Details

**Research and Training Details**

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**Clinical Activities and Training**

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**Significant Accomplishments**

**Studies Break Ground in Controlling Inflammation**

Investigators in our Division published four important papers that suggest improved ways to control dangerous disease-related inflammation.

In a paper published in *Nature Medicine*, Jörg Kohl, PhD, and colleagues reported discovering an important and potent anti-inflammatory mechanism: the immune complex-mediated association of the inhibitory receptor, FcgRIIb, with a C-type lectin-like receptor, dectin-1, inhibits signaling through the proinflammatory receptor for the complement-derived anaphylatoxin, C5a. Because immune complex binding to the dectin-1 receptor depends heavily on galactosylation of the IgG in these complexes, the observations reported in this paper suggest that artificially galactosylated IgG can be used to inhibit the many inflammatory diseases that are mediated by C5a.

Marat Khodoun, PhD, Fred Finkelman, MD, and colleagues published findings in *the Journal of Allergy and Clinical Immunology* that demonstrate a novel approach that safely suppresses IgE-mediated allergy in a mouse model. Mice were injected with rising doses of a monoclonal antibody until inducing anaphylaxis. This approach gradually removed all IgE from these cells, without causing any apparent signs of disease. As a result, the approach eliminated sensitivity to IgE-mediated anaphylaxis. A similar approach could be used to treat human allergic disorders, including food and drug allergies, insect venom sensitivities, allergic skin disease, allergic rhinitis and asthma.

In a paper published in the journal *Blood*, Michael Jordan, MD, and C.E. Terrell explained how humans and mice with impaired perforin-dependent cytotoxic function can develop excessive T-cell activation and the fatal
inflammatory disorder hemophagocytic lymphohistiocytosis (HLH) after infection. Using a mouse model of HLH, they defined a feedback loop that is critical for immune homeostasis. This endogenous feedback loop involves perforin-dependent elimination of antigen-presenting dendritic cells (DCs) by CD8+ T cells; the abnormal persistence of antigen presentation in perforin-deficient mice drove T-cell activation well beyond normal limits, leading to the inflammatory disease. These new findings suggest that interventions to limit DC antigen presentation may be useful to treat HLH.

Julio Aliberti, MS, PhD, and colleagues published findings in *PLoS One* demonstrating that exogenous administration of anti-inflammatory lipoxins can protect against lethal inflammation in experimental malaria by inhibiting the production of the cytokines IL-12 and IFN-γ in the brain. Malaria-infected mice that lack the ability to produce lipoxins developed accelerated mortality, while treatment of wild-type mice with lipoxins as late as 3 days after malaria inoculation prevented early mortality. This suggests that lipoxins may be useful for treating cerebral malaria, a form of malaria that causes mortality and disability, particularly in children.

### Regulating the Growth of Leukemia Cells

James Phelan, H. Leighton Grimes, PhD, and colleagues published findings in *Cancer Cell* showing that leukemic cells depend on growth factor independence 1 (Gfi1) for survival. Acute lymphoblastic leukemia (ALL) cells rely on Gfi1 to escape the tumor-suppressing capabilities of another protein, p53, which normally initiates DNA repair that involves apoptosis, or programmed cell death, of cancer cells. Removal of Gfi1 in lymphoid tumors in mice caused ALL to regress through p53-induced apoptosis. Furthermore, removal of Gfi1 from human T-cell ALL cells implanted into mice again stopped the progression of leukemia in the mice, without any harmful effects. This suggests an approach that might be useful for the suppression of human ALL and, possibly, other malignancies.

### Administrative Accomplishments

After an 18-month search, Harinder Singh, PhD, was chosen to direct the Division of Immunobiology. He joins us after having led Immunology programs at the University of Chicago and at Genentech. David Hildeman, PhD, Edith Janssen, PhD, and Fred Finkelman, MD, were active participants in the search. Meanwhile, the German Federal Republic approved funding for a large, integrated immunology graduate program between the University of Lübeck and Cincinnati Children’s. Hildeman and Jörg Köhl, MD, led the effort with participation from several Division members. Graduate students from each institution are already rotating in labs at the other institution. This program promises to improve the quality of our future graduate students and post-doctoral fellows and could enhance recognition of Cincinnati Children’s in Europe.

### Research Highlights

**Claire Chougnet, PhD**

Claire Chougnet was awarded a Burroughs-Wellcome grant to study the immunological responses elicited by intra-amniotic Ureaplama parvum. Her application as a MPI NIH grant, with Louis Muglia, the Director for the Center for Prevention of Preterm Birth, also received a 5th percentile and should be funded. This multidisciplinary effort will study the connections between stress, infections and the immune response, with the hypothesis that infection and stress during pregnancy synergize to lead to preterm birth.

**Fred Finkelman, MD**
Fred Finkelman was awarded a 3 year Department of Defense grant for studying the pathogenesis of food allergy. He gave a plenary talk about mechanisms and prevention of anaphylaxis at the World Allergy Organization meeting in Milan.

David Hildeman, PhD

David Hildeman was elected a Fellow of the University of Cincinnati Graduate School.

Michael Jordan, MD

Michael Jordan received new research funding from the Histiocytosis Foundation of America.

Ian Lewkowich, PhD

Ian Lewkowich received an American Lung Association Biomedical Research Grant to address the role of TRAF3 in regulating IL-17A mediated enhancement of IL-13-driven STAT6 phosphorylation. He was an invited speaker at the 2013 AAAAI annual meeting in San Antonio and the 3rd International Forum on Respiratory Disorders in Chonqing, China and was invited to join the Editorial board of Allergy, Asthma and Clinical Immunology, the journal of the Canadian Society of Clinical Immunology.

**Significant Publications**


This paper reported the discovery of a previously recognized important and potent anti-inflammatory mechanism: the immune complex-mediated association of the inhibitory receptor, FcγRIIb, with a C-type lectin-like receptor, dectin-1, inhibits signaling through the proinflammatory receptor for the complement-derived anaphylatoxin, C5a. Because immune complex binding to the dectin-1 receptor depends on heavily galactosylation of the IgG in these complexes, the observations reported in this paper suggest that artificially galactosylated IgG can be used to inhibit the many inflammatory disease that are mediated by C5a.


Observations reported in this paper showed that leukemic cells depend on growth factor independence 1 (Gfi1) for survival. Acute lymphoblastic leukemia (ALL) cells rely on Gfi1 to escape the tumor-suppressing capabilities of another protein, p53. p53 normally initiates DNA repair that involves apoptosis, or programmed cell death, of cancer cells, but Gfi1 restricts p53 activity. Removal of Gfi1 in lymphoid tumors in mice caused ALL to regress through p53-induced apoptosis. Furthermore, removal of Gfi1 from human T-cell ALL cells implanted into mice again stopped the progression of leukemia in the mice, without any harmful effects. This suggests an approach that might be useful for the suppression of human ALL and, possibly, other malignancies.


This paper demonstrated a novel approach that safely suppresses IgE-mediated allergy in a mouse model. Mice were injected with a monoclonal antibody to FcεRI, the high affinity IgE receptor on mast cell and basophils, starting with a dose too small to induce disease and building over several hours to a dose that induces anaphylaxis in naïve mice. This approach eliminated basophils and initially made mast cells refractory

Humans and mice with impaired perforin-dependent cytotoxic function may develop excessive T-cell activation and the fatal inflammatory disorder hemophagocytic lymphohistiocytosis (HLH) after infection. This paper showed how this can happen by using a mouse model of HLH to define a feedback loop that is critical for immune homeostasis. This endogenous feedback loop involves perforin-dependent elimination of antigen-presenting dendritic cells (DCs) by CD8+ T cells; the abnormal persistence of antigen presentation in perforin-deficient mice drove T-cell activation well beyond normal limits, leading to the inflammatory disease. This suggests that interventions that limit DC antigen presentation may be useful to treat HLH.


*co-first authors

This report demonstrated that the cytokine IL-33 makes important contributions to host defense against infection with the hookworm, *Nippostrongylus brasiliensis*. Mice lacking IL-33 have profound defects in the ability of pulmonary type 2 innate lymphoid cells (ILC2s) to produce IL-13, but no defect in the development of IL-4- and IL-13-producing T cells. Despite the lack of a T cell defect, worm clearance was impaired in IL-33 KO mice. These data stress the importance of IL-33 in promoting the development of functional ILC2s in worm-infected mice, and highlights the importance of ILC2s in the clearance of these parasites.

Division Publications


22. Klarquist JS, Janssen EM. **Melanoma-infiltrating dendritic cells: Limitations and opportunities of**


Faculty, Staff, and Trainees

Faculty Members

Fred Finkelman, MD, Professor
  Leadership Interim Director, Division of Immunobiology; McDonald Professor, UC Department of Internal Medicine, Division of Rheumatology and Immunology
  Research Interests Allergy/Asthma, Intestinal Parasites

Julio Aliberti, PhD, Associate Professor
  Research Interests Induction and regulation of immune responses to intracellular pathogens

Claire A. Chougnet, PhD, Associate Professor
  Research Interests Mechanisms of immune dysregulation in HIV and aging; ontogeny of immune responses in early life

Senad Divanovic, PhD, Assistant Professor
  Research Interests Role of the innate immune system in obesity and its sequelae. Role of innate immune system in induction of preterm labor

H. Leighton Grimes, PhD, Associate Professor
  Leadership Director Cancer Pathology Program
  Research Interests Leukemia/Lymphoma

David A. Hildeman, PhD, Associate Professor
  Leadership Director, Immunobiology Graduate Program
  Research Interests T-cell Biology

Kasper Hoebe, PhD, Assistant Professor
  Research Interests Forward genetic analysis of the host immune response using ENU mutagenesis

Edith M. Janssen, PhD, Assistant Professor
  Research Interests Mechanistic analysis and translational exploitation of adaptive immune responses to antigens expressed by apoptotic cells

Michael B. Jordan, MD, Associate Professor
  Research Interests Childhood Immunodeficiency Diseases

Christopher Karp, MD, Adjunct
  Research Interests Molecular mechanisms underlying regulation and dysregulation of inflammatory responses in infectious, allergic, and genetic metabolic diseases

Jonathan Katz, PhD, Professor
  Research Interests The immunology of Type 1 Diabetes Mellitus

Joerg Koehl, MD, Adjunct
  Research Interests Regulation of innate and adaptive immune responses by the complement system

Ian Lewkowich, PhD, Assistant Professor
  Research Interests The role of PD-1 family members in differential control of immune responses/Mechanisms of severe allergic asthma

Jochen Mattner, MD, Assistant Professor
  Research Interests Autoimmune Liver Diseases
Marsha Wills-Karp, PhD, Adjunct

Research Interests Immunopathogenesis of asthma

Trainees

Halil Aksoylar, BS, GSY-6, Middle East Technical University, Ankara, Turkey
Maha Almanan, BS, GSY-1, University of Khartoum, Khartoum, Sudan
Nicholas Boespflug, BS, GSY-4, Seattle University, Seattle, Washington
Stacey Burgess, BS, GSY-5, Marietta College, Marietta, Ohio
Monica Cappelletti, PhD, PGY-2, University of Milan, Milan, Italy
Shan Chandrakasan, MD, PGY-2, Children's Hospital of Michigan, Detroit, Michigan
Jordan Downey, BS, GSY-4, Hendrix College, Conway, Arkansas
Changhu Du, PhD, PGY-9, Guangzhou Medical School, Guangzhou, China
Mehari Endale Mengistu, PhD, PGY-2, Kyungpook National University, Daegu, Korea
Maria Fields, BS, GSY-4, Universidad de Antioquia, Medellin, Antioquia, Colombia
Daniel Giles, BS, GSY-2, Case Western Reserve University, Cleveland, Ohio
Naina Gour, BS, GSY-4, University of Delhi, Delhi, India
Isaac Harley, BS, GSY-5, University of Oklahoma, Norman, Oklahoma
Jared Klarquist, BA, GSY-2, Dartmouth College, Hanover, New Hampshire
Sema Kurtulus, BS, GSY-6, Sabanci University, Istanbul, Turkey
Kun-Po Li, MS, GSY-2, Graduate Institute of Immunology, National Taiwan University, Taiwan
Andrew Lindsley, MD, PhD, PGY-6, Indiana University, Indianapolis, Indiana
Jaclyn McAlees, PhD, PGY-4, The Ohio State University, Columbus, Ohio
Cortez McBerry, BS, GSY-6, Southern Illinois University, Carbondale, Illinois
Jonathan McNally, BS, GSY-4, St. Mary's College, St. Mary's City, Maryland
Sara Meyer, PhD, PGY-4, University of Cincinnati, Cincinnati, Ohio
Scott Millen, PhD, PGY-2, University of Cincinnati, Cincinnati, Ohio
Edward Muench, MEng, GSY-1, University of Louisville, Louisville, Kentucky
Omar Niss, MD, PGY-6, University of Nebraska Medical Center
Samet Oksuz, BS, GSY-1, Middle East Technology University, Ankara, Turkey
Andre Olsson, PhD, PGY-7, Lund University, Lund, Sweden
James Phelan, BS, GSY-7, The Ohio State University, Columbus, Ohio
Jana Raynor, BS, GSY-5, North Georgia College and State University, Dahlonega, Georgia
Cesar Rueda Rios, PhD, PGY-2, Universidad de Antioquia, Medellin, Antioquia, Colombia
Rosa Maria Salazar-Gonzalez, PhD, PGY-4, Emory University, Atlanta, Georgia
Hesham Shehata, BA, GSY-3, Transylvania University, Lexington, Kentucky
Sara Stoffers, MS, GSY-2, University of Cincinnati, Cincinnati, Ohio
Robert Thacker, PhD, PGY-6, University of Cincinnati, Cincinnati, Ohio
Mark Webb, BS, GSY-5, Brigham Young University, Provo, Utah

Division Collaboration

Allergy and Immunology » Patricia Fulkerson, MD, PhD
Regulatory of Eosinophil production by TLRs (Hoebe).

Allergy and Immunology » Simon Hogan, PhD
The role of C5a in food allergy (Koehl).
Allergy and Immunology » Kimberly Risma, MD, PhD
The biology of cytotoxicity: Genotype/phenotype correlations (Jordan).

Asthma Research » Gurjit Khurana Hershey, MD, PhD
Experimental asthma (Finkelman).

Bone Marrow Transplantation and Immune Deficiency » Rebecca Marsh, MD
Immune profiling in Hemophagocytic Lymphohistiocytosis (Jordan).

Center for Autoimmune Genomics and Etiology » Nan Shen, MD
CD244 as a path to SLE (Janssen).

Developmental Biology » Timothy Weaver, MS, PhD
StarD7 - a novel inhibitor of allergic lung disease (Lewkowich).

Experimental Hematology & Cancer Biology » Marie-Dominique Filippi, PhD
Neutrophil migration (Finkelman.)

Experimental Hematology & Cancer Biology » Matthew Flick, PhD
Role of coagulation factors in development and progression of obesity and obesity-associated NAFLD (Divanovic).

Experimental Hematology & Cancer Biology » Punam Malik, MD
Novel methods to promote stem cell engraftment (Jordan).

Experimental Hematology & Cancer Biology » James Mulloy, PhD
NSGS Tg mice as a humanized model for in vivo infectious diseases (Aliberti).
Suppression of IgE-mediated disease by polyclonal rapid desensitization (Finkelman).
Prosurvival role for RUNX1 in acute myeloid leukemia (Grimes).

Experimental Hematology & Cancer Biology » Yi Zheng, PhD
Role of Cdc42 in development and progression of obesity and obesity-associated sequelae (Divanovic).

Experimental Hematology & Cancer Biology; Allergy and Immunology » Punam Malik, MD and Kimberly Risma, MD, PhD
Gene correction strategies for Hemophagocytic lymphohistiocytosis (Jordan).

Gastroenterology, Hepatology & Nutrition » Jorge Bezerra, MD
Dysfunction in biliary atresia (Chougnet).
Forward genetic analysis of immune-mediated liver disease using ENU mutagenesis (Hoebe).
NKT cells and autoimmune liver disease (Mattner).

Gastroenterology, Hepatology & Nutrition » Ted Denson, MD
Human IgG-mediated anaphylaxis (Finkelman).

Gastroenterology, Hepatology & Nutrition » Alex Miethke, MD
Treg in biliary atresia (Chougnet).

Gastroenterology, Hepatology & Nutrition » Greg Tiao, MD
Viral determinants in biliary atresia (Chougnet).

Hematology » Joseph Palumbo, MD
DC in tumorgenesis (Janssen).

Human Genetics; Bone Marrow Transplantation and Immune Deficiency. » Kejian Zhang, MD, MBA and
Rebecca Marsh, MD
Discovery and characterization of new primary immune deficiencies (Jordan).

**Immunobiology** » Julio Aliberti, PhD
The role of CD244 and Slp76 in Toxoplasma gondii infections (Hoebe).
Immune sensing of T. gondii infection by C5aR and CCR5 pairing (Koehl)

**Immunobiology** » Claire Chougnet, PhD
Assessing host-microbe cross-talk and determine the role of innate immune pathways on pregnancy outcomes (Hoebe).
Effect of aging on NK function (Hoebe).
Mapping of Ureaplasma signaling pathways (Hoebe).
Effect of aging on DC function (Janssen).
Human DC subsets (Janssen).
Immune sensing of HIV infection by C5aR and CCR5 pairing (Koehl).

**Immunobiology** » Senad Divanovic, PhD
Characterization of inflammatory pathways driving hepatic steatosis and steatohepatitis in Acox-1-deficient mice (Hoebe).

**Immunobiology** » Fred Finkelman, MD
Lipoxygenases and modulation of immune response to helminthic infections (Aliberti).
IL-4 and memory T cell homeostasis (Hildeman).
C5aR and IgG Fc receptor cross-talk in autoimmunity (Koehl).
NKT cells and TH2 responses (Mattner).

**Immunobiology** » David Hildeman, PhD
Regulatory T cells in aging (Chougnet).
Assessment of NK cells and their role in CD4+ T cell responses following LCMV infection (Hoebe).
Eliminating diabetogenic T cells by targeting Bcl-2 family members (Katz).

**Immunobiology** » Kasper Hoebe, PhD
Effect of aging on NK cell function and homeostasis (Chougnet).
Role of Acox-1 (Lampe1) in NAFLD progression (Divanovic).
Modulation of viral-specific CD4+ T cell responses by NK cells (Hildeman).
The role of C5a-mediated cross-talk between NK cells and dendritic cell in T.gondii infection (Koehl).
ENU mutagenesis and NKT cells (Mattner).

**Immunobiology** » Edith Janssen, PhD
Effect of aging on merocytic dendritic cell function (Chougnet).
The role of CD244 in DC function (Hoebe).
Antigen presentation and NKT cells (Mattner).

**Immunobiology** » Michael Jordan, MD
Exploiting the DNA damage response to selectively sculpt the TCR repertoire (Hildeman).
Gene therapy for Hemophagocytic Lymphohistiocytosis (Hoebe).
Elimination of encephalitogenic T cells without harming protective immunity (Katz).

Immunobiology » Christopher Karp, MD
- RP105/BAFF axis in obesity (Divanovic).
- Regulation of immune responses by 5-LO during L. major infection (Divanovic).
- Therapeutic enhancement of protective immunity during experimental Leishmania major infection (Divanovic).

Immunobiology » Jonathan Katz, PhD
- Control of diabetes by manipulation of Bcl-2 family members (Hildeman).
- Role of Merocytic DC in Type 1 diabetes (Janssen).

Immunobiology » Joerg Koehl, MD
- Suppression of complement-mediated inflammation (Finkelman).
- The role of Slp76 and C5AR in NK/NKT cell function (Hoebe).

Immunobiology » Ian Lewkowich, PhD
- Experimental asthma (Finkelman).
  C5a regulates Th17 development in experimental allergic asthma (Koehl).

Immunobiology » Jochen Mattner, MD
- The role of Slp76 and NKT cell function (Hoebe).

Immunobiology » Julio Aliberti, PhD and Joerg Koehl, MD
- CCR5-C5aR heterodimers and cell signaling (Chougnet).

Immunobiology » Claire Chougnet, PhD and Joerg Koehl, MD
- CCR5 and C5aR heterodimers in microbial recognition (Aliberti).

Immunobiology » David Hildeman, PhD and Jonathan Katz, PhD
- Exploiting the DNA damage response for selective immunomodulation (Jordan).

Immunobiology; Biomedical Informatics » David Hildeman, PhD and Bruce Aronow, PhD
- Growth factor independent-1 maintains Notch1-dependent transcriptional programming of lymphoid precursors (Grimes).

Immunobiology; Infectious Diseases » Claire Chougnet, PhD and Rhonda Cardin, PhD
- Homeostasis and Function of Regulatory T cells in aging (Hildeman).

Immunobiology; Pathology » Senad Divanovic, PhD and Rachel Sheridan, MD
- Modeling development and progression of NAFLD (Hoebe).

Immunobiology; Reproductive Sciences » Christopher Karp, MD, Edith Janssen, PhD, and SK Dey, PhD
- Role of type I IFN/IFNAR axis in TLR-driven induction of preterm birth (Divanovic).

Immunobiology; Reproductive Sciences » Christopher Karp, MD, Senad Divanovic, PhD, Edith Janssen, PhD, and SK Dey, PhD
- Defining the mechanisms underlying inflammation-driven preterm birth (Hoebe).

Infectious Diseases » Joseph Qualls, PhD
- Citrulline and intracellular microbial killing mechanisms (Aliberti).

Molecular Cardiovascular Biology » Jeffery Molkentin, PhD
- Identification of ENU germline mutants with heart defects (Hoebe).

Neonatology » Alan Jobe, MD, PhD, Paul Kingma, MD, PhD, and Jim Greenberg, MD
Biomarkers of immunologic function and preterm respiratory outcomes (Chougnet).

**Neonatology** » Suhas Kallapur, MD and Alan Jobe, MD, PhD  
Late preterm birth, Ureaplasma species and childhood lung disease (Chougnet).

**Neonatology and Center for Prevention of Preterm Birth** » Louis Muglia, MD, PhD  
Maternal temperament, stress, and inflammation in preterm birth (Chougnet).

**Neonatology and Pulmonary Biology; Experimental Hematology & Cancer Biology** » Jeffrey Whitsett, MD and Jose Cancelas-Perez, MD, PhD  
Kruppel-like-factor 5 (Klf-5) controls bone marrow homing of hematopoietic stem cells and progenitors through Rab5-mediated membrane β1/β2-integrin expression (Grimes).

**Reproductive Sciences** » SK Dey, PhD  
Role of cannabinoids/endocannabinoids in regulation of immune responses and preterm birth (Divanovic).  
Recombineering-based dissection of flanking and paralogous Hox gene functions in mouse reproductive tracts (Grimes).

**Grants, Contracts, and Industry Agreements**

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R01 AI 033325  
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National Institutes of Health  
R01 AG 033057  
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**Biomarkers of Immunologic Function and Preterm Respiratory Outcomes**  
National Institutes of Health  
U01 HL 101800  
05/01/10-04/30/14  
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**Better Mouse Models of Disease: Humanizing Experimental Atherosclerosis**  
National Institutes of Health  
R21 HL 113907  
04/01/12-03/31/14  
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The Leukemia and Lymphoma Society  
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<td>MicroRNA in Acute Myeloid Leukemia</td>
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<td>T-Cell Specific Lysosome Dysfunction as a Primary Cause of IBD in Gimap5sph/sph Mice</td>
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<td>National Institutes of Health (Mayo Clinic)</td>
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<td>Synergistic Roles of IL-17 in Asthma Susceptibility</td>
<td>Parker B. Francis Fellowship Program</td>
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<td>07/01/10-06/30/13</td>
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<td>MATTNER, J</td>
<td>Primary Biliary Cirrhosis: Molecular Genetics and Microbial Pathogenesis</td>
<td>National Institutes of Health</td>
<td>R01 DK 084054</td>
<td>06/01/09-05/31/14</td>
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<td>MCALEES, J</td>
<td>Der p 2-Driven TLR4 Signaling in Allergic Asthma</td>
<td>National Institutes of Health</td>
<td>F32 HL 110497</td>
<td>09/01/11-02/28/13</td>
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<td>MEYER, S</td>
<td>Environmental Carcinogenesis and Mutagenesis</td>
<td>National Institutes of Health(U of Cincinnati)</td>
<td>T32 ES 007250</td>
<td>02/01/13-06/30/13</td>
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<td>The Role of Specific MicroRNAs Associated with Oncongenic Translocations in</td>
<td>Ladies Auxiliary VFW National HQ</td>
<td></td>
<td>06/01/11-05/31/13</td>
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<td></td>
<td>Acute Myeloid Leukemia</td>
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<td>NISS, O</td>
<td>Primary Immune Deficiency Treatment Consortium</td>
<td>National Institutes of Health(The Regents of the University of California)</td>
<td>U54 AI 082973</td>
<td>09/01/12-08/31/13</td>
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| Current Year Direct   | $3,057,149                      |
| Total                | $3,057,149                      |

Additional Information
Immunobiology Graduate Program

The Immunobiology Graduate Program is an inter-departmental program within the University of Cincinnati that offers PhD and MS degrees in Immunology. The Division of Immunobiology serves as the administrative home of the Graduate Program. The program is governed by Director Dr. David Hildeman, and a Steering Committee composed of members of several departments/divisions at CCHMC and UC. Dr. Jonathan Katz is the Director of the Foundations in Immunology Course.

The Immunobiology Graduate Program provides broadly based instruction in immunology, along with rigorous research training that emphasizes modern approaches to understanding the function of the immune system in health and disease. To this end, the program currently has 48 faculty members from 5 departments and 15 divisions within the University of Cincinnati College of Medicine and CCHMC. We currently have a total of 45 outstanding students (39 PhD students and 6MS students) from around the country and abroad. This academic year we celebrated the graduation of 8 PhD students. Our students have distinguished themselves already by receiving several travel and research awards (AAAAI, Yates Scholarship Award, Albert J Ryan Fellowship Award, Distinguished Dissertation Fellowship, and an NIH F30 Award).

The Program is supported financially by a variety of sources. This year, tuition support was provided through University Graduate Scholarships awarded by the University of Cincinnati. Student stipends were supported through a variety of sources including funds from the University of Cincinnati, NIH training grants, external grants to their advisors, and funds from Cincinnati Children's Research Foundation. Thanks to a fantastic review for UC2019, the Immunobiology Graduate Program received funding from UC and CCHMC to support two new pilot projects. The first is a student research grant proposal award in which students will compete for a research grant supporting a novel and innovative project for their work. The second is a travel award in which students can use to go to another lab to learn a technique not already existing at UC/CCHMC. After 7 years of continued growth, the program is now focused on maintaining its size, planning on a target class size of 6-8 students per year.

This fall the Immunobiology Graduate Program has established an International Research Training Group (IRTG) with the University of Lübeck/Research Center Borstel in Lübeck, Germany.

The research focus of the IRTG is

1. Humoral and Cellular Pathways of Allergic Inflammation
2. Immuno-regulation of infection-driven inflammation

Students interested in research projects encompassed by these areas may have the opportunity to study and perform research in the beautiful city of Lübeck in north-central Germany for a 3-6 month period.

The Immunobiology Graduate Program (ImmGP), anticipates having between 2-4 doctoral students from our program to participate in the IRTG per year. Last fall 2 students spent 2-3 months each at the University of Lübeck working with collaborating faculty. And this summer the Immunobiology Graduate Program is hosting 3 students from the University of Lübeck.

Immunobiology Graduate Program Students

**Doctoral Students**

<table>
<thead>
<tr>
<th>Student</th>
<th>Faculty Mentor</th>
<th>Admission Year</th>
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</thead>
<tbody>
<tr>
<td>Jill Fritz</td>
<td>Timothy Weaver</td>
<td>2006</td>
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<tr>
<td>Name</td>
<td>Mentor</td>
<td>Year</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------</td>
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</tr>
<tr>
<td>Ibrahim Aksoylar</td>
<td>Kasper Hoebe</td>
<td>2007</td>
</tr>
<tr>
<td>Sema Kurtulus</td>
<td>David Hildeman</td>
<td>2007</td>
</tr>
<tr>
<td>Cortez McBerry</td>
<td>Julio Aliberti</td>
<td>2007</td>
</tr>
<tr>
<td>Rachael Mintz-Cole</td>
<td>Neeru Hershey</td>
<td>2007</td>
</tr>
<tr>
<td>Mark Webb</td>
<td>Marsha Wills-Karp</td>
<td>2007</td>
</tr>
<tr>
<td>Stacey Burgess</td>
<td>Marsha Wills-Karp</td>
<td>2008</td>
</tr>
<tr>
<td>Samuel Vaughn</td>
<td>John Harley</td>
<td>2008</td>
</tr>
<tr>
<td>Isaac Harley</td>
<td>Christopher Karp</td>
<td>2008</td>
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<tr>
<td>Jana Raynor</td>
<td>David Hildeman</td>
<td>2008</td>
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<tr>
<td>Bo Liu</td>
<td>Yui-Hsi Wang</td>
<td>2008</td>
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<tr>
<td>Nick Boespflug</td>
<td>Christopher Karp</td>
<td>2009</td>
</tr>
<tr>
<td>Jordan Downey</td>
<td>Marsha Wills-Karp</td>
<td>2009</td>
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<tr>
<td>Naina Gour</td>
<td>Marsha Wills-Karp</td>
<td>2009</td>
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<tr>
<td>Jonathan McNally</td>
<td>Jonathan Katz</td>
<td>2009</td>
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<tr>
<td>Maria Fields</td>
<td>Claire Chougnet</td>
<td>2009</td>
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<tr>
<td>Harini Raghu</td>
<td>Matthew Flick</td>
<td>2009</td>
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<tr>
<td>Akash Verma</td>
<td>George Deepe</td>
<td>2009</td>
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<tr>
<td>Olivia Ballard</td>
<td>Ardythe Morrow</td>
<td>2010</td>
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<tr>
<td>Kyle Bednar</td>
<td>William Ridgway</td>
<td>2010</td>
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<tr>
<td>Roger Fecher</td>
<td>George Deepe</td>
<td>2010</td>
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<tr>
<td>Wenting Huang</td>
<td>William Ridgway</td>
<td>2010</td>
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<tr>
<td>Jennifer Leddon</td>
<td>Timothy Cripe</td>
<td>2010</td>
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<tr>
<td>Ke Liu</td>
<td>John Harley</td>
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<tr>
<td>Hesham Shehata</td>
<td>Claire Chougnet</td>
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<tr>
<td>Rahul D'Mello</td>
<td>Marc Rothenberg</td>
<td>2011</td>
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<tr>
<td>Dan Giles</td>
<td>Senad Divanovic</td>
<td>2011</td>
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<tr>
<td>Mike Horwath</td>
<td>George Deepe</td>
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<tr>
<td>Jared Klarquist</td>
<td>Edith Janssen</td>
<td>2011</td>
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<tr>
<td>Student</td>
<td>Faculty Mentor</td>
<td>Admission Year</td>
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<tr>
<td>Kun-Po Li</td>
<td>David Hildeman</td>
<td>2011</td>
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<tr>
<td>Sara Stoffers</td>
<td>Ian Lewkowich</td>
<td>2011</td>
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<tr>
<td>Maha Almanan</td>
<td>David Hildeman</td>
<td>2012</td>
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<tr>
<td>Laura Brungs</td>
<td>Sue Thompson</td>
<td>2012</td>
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<tr>
<td>Jeremy Kinder</td>
<td>Sing Sing Way</td>
<td>2012</td>
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<tr>
<td>Xiaoaming Lu</td>
<td>John Harley</td>
<td>2012</td>
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<tr>
<td>Samet Oksuz</td>
<td>Lee Grimes</td>
<td>2012</td>
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<tr>
<td>Carolyn Rydzynski</td>
<td>Stephen Waggner</td>
<td>2012</td>
</tr>
<tr>
<td>Kristi Weage</td>
<td>Sean Moore</td>
<td>2012</td>
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</table>

### Master Students

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<tr>
<th>Student</th>
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<th>Admission Year</th>
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<tbody>
<tr>
<td>Kristina Bielewicz</td>
<td>Non-Thesis MS</td>
<td>2011</td>
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<tr>
<td>Lindsay Dunn</td>
<td>Non-Thesis MS</td>
<td>2011</td>
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<tr>
<td>Yuan Li</td>
<td>John Harley</td>
<td>2011</td>
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<tr>
<td>Yi Ting Tsai</td>
<td>Simon Hogan</td>
<td>2011</td>
</tr>
<tr>
<td>Upansana Parthasarathy</td>
<td>Andrew Herr</td>
<td>2012</td>
</tr>
<tr>
<td>Stuart Tinch</td>
<td>Non-Thesis MS</td>
<td>2012</td>
</tr>
</tbody>
</table>

#### Student Honors

**Kyle Bednar (2010)** - University of Cincinnati’s 33rd Graduate Student Research Forum Honorable Mention 2012

**Kristina Bielewicz (2011)** - Editorial Assistantship Award for the Journal of Allergy and Clinical Immunology has been awarded an editorial assistantship for 2013-14 by the graduate school

**Benjamin Davis (2012)** - American Academy of Allergy, Asthma and Immunology Fellow-In-Training Travel Grant 2012

**Rahul D’Mello (2011)** - 2012 Cincinnati Youth Collaborative Mentor of the Year Award

**Maria Fields (2009)**

- Dissertation Completion Fellowship 2012
- Albert Ryan Fellowship, University of Cincinnati 2012
- Millipore Amnis Travel Award, 99th Annual Meeting of the American Association of Immunologist
Jared Klarquist (2011) - Travel Award by the Pan-American Society for Pigment Cell Research, to present work at the 21st International Pigment Cell Conference. Sept 2011, Bordeaux, France

Cortez McBerry (2007) - 2013-Present NIH Intramural Research Training Award (IRTA) Fellowship

Harini Raghu (2009) - Graduate student summer research fellowship, University of Cincinnati Research council. Acceptance rate 13%. (May- June 2013)

Hesham Shehata (2010) - 1st place poster at the Annual Immunological Research Retreat CCHMC


Student Publications

Maha Almanan (2012)


Olivia Ballard (2010)


Kyle Bednar (2010)


Nicholas Boespflug (2009)


Stacey Burgess (2008)

Benjamin Davis (2012)


Jordan Downey (2009)


Maria Fields (2009)


Dan Giles (2011)


Naina Gour (2009)


Isaac Harley (2008)


Wenting Huang (2010)


Jeremy Kinder (2012)


Jared Klarquist (2011)

Klarquist JS, Janssen EM. Melanoma-infiltrating dendritic cells: Limitations and opportunities of mouse models. Oncoimmunology. 2012 Dec 1;1(9):1584-1593. PMID:23264904


Sema Kurtulus (2007)


Jennifer Leddon (2010)


**Cortez McBerry (2007)**


**Jonathan McNally (2009)**


**Mintz-Cole (2007)**


**Harini Raghu (2009)**


**Jana Raynor (2008)**


**Sara Stoffers (2011)**

Yi Ting Tsai (2011)


Samuel Vaughn (2008)


Alum publications resulting from graduate work

Katie Groshowitz (2005)


James Phelan (2006)


Joni Prasad (2006)


Amanda Waddell (2006)


Student Oral Presentations

Nicholas Boespflug (2009)

- South-Central Regional M.D./Ph.D. Conference, invited oral presentation, Louisville, KY, 2012

Jared Klarquist (2011)


Cortez McBerry (2007)

- 16th Annual Woods Hole Immunoparasitology Meeting Marine Biological Laboratory, Woods Hole, MA April 24. Oral Presentation, Trefoil Factor 2 regulates Type-1 Inflammation to *Toxoplasma gondii*.

Jonathan McNally (2009)

- AA1 2013
  - Block symposia and poster: An immuno-protective treatment strategy for autoimmune diseases

Harini Raghu (2009)

- Harini Raghu, Malinda D. Frederick, Alice Jone, Kathryn E. Talmage, Keith W. Kombrinck & Matthew J. Flick. Plasminogen mediates both positive and negative effects on TNFα-driven arthritis through fibrinogen-dependent mechanisms. Gordon Research Seminar on "Plasminogen activation and extracellular proteolysis". Ventura, CA. Feb 2012

Akash Verma (2009)

- **Akash Verma**, and George S. Deepe Jr. “IL-33, a novel downstream target of IL-4 during *Histoplasma capsulatum* infection”. Gordon Research Seminars on Immunology of Fungal Infections, Galveston, TX, Jan 2013.

Student Poster Presentations

Nicholas Boespflug (2009)

- University of Cincinnati Graduate Student Research Forum, poster presentation, Cincinnati, OH, 2012
Maria Fields (2009)


Roger Fecher (2010)

- Poster: Histoplasma capsulatum induces HIF-1a accumulation in murine macrophages
  
  Presented at the Internal Medicine Trainees’ Research Grand Rounds at UC May 2013

- Poster: Histoplasma capsulatum induces HIF-1a accumulation in bone marrow derived macrophages
  
  Presented at the Graduate Student Research Foundation at UC November 2012

Naina Gour (2009)


- Naina Gour, Marsha Wills-Karp. Carbohydrates in dust mite allergen modulate HDM-induced Th2 immune responses. Pathogenic Processes in Asthma and COPD, Keystone Symposia on Molecular and Cellular Biology, Santa Fe, NM 2013

- Naina Gour, Marsha Wills-Karp. Carbohydrates in dust mite allergen modulate HDM-induced Th2 immune responses. American Association of Immunologists Annual meeting, Honolulu, Hawaii 2013

Wenting Huang (2010)

- Huang, W. T. et al., Genetics and immunological characterization of NOD.Abd3 as a model for human primary biliary cirrhosis. 41st Annual Autumn Immunology Conference – Chicago Marriott Downtown (November 16 – 19, 2012)

Kun-Po Li (2011)

- KP Li, S Lajoie, IP Lewkowich, K Dienger, AA Sproles and M Wills-Karp. IL-17A expression in steroid refractory mice is associated with differential HDAC expression. The 40th Autumn Immunology Conference. Nov 2011. Chicago, IL. USA

Cortez McBerry (2007)


Jonathan McNally (2009)

- AA1 2013

  - Block symposia and poster: An immuno-protective treatment strategy for autoimmune diseases

Jana Raynor (2008)

homeostasis in aging

Hesham Shehata

- Autumn Immunology Conference, Chicago November 2012- “Aging has a complex effect on NK cells in mice, clearly affecting their homeostasis, but only partially affecting their function.”

Samuel Vaughn (2008)

- American Society for Clinical Investigation/Association of American Physicians Joint Annual Meeting Presented poster describing fine-mapping of PXK locus and genotypic changes in B cell receptor internalization phenotype
- Imaging and Cytometry Research Day, Ohio River Valley Cytometry Association
- Presented poster describing fine-mapping of PXK locus and the influence of PXK genotypes on B cell antigen receptor functions. Answered questions from judges regarding my poster and work

Akash Verma (2009)

- Akash Verma, and George S. Deepe Jr. “CCR2 regulates IL4-IL33 axis during Histoplasma capsulatum infection”. Gordon Research Conference on Immunology of Fungal Infections, Galveston, TX, Jan 2013

Kristi Weage (2012)

- Digestive Health Center Annual Scientific Retreat 2013, CCHMC Poster Session “Undernutrition by a regional basic diet increases serum interferon-gamma levels and enhances tolerance to oral lipopolysaccharide in weanling mice”
- Digestive Disease Week 2013, Poster Session “Undernutrition by a regional basic diet increases serum interferon-gamma levels and enhances tolerance to oral lipopolysaccharide in weanling mice”