

2014 Research Annual Report

Immunobiology



Division Summary

RESEARCH AND TRAINING DETAILS

Number of Faculty	17
Number of Research Fellows	12
Number of Research Students	16
Number of Support Personnel	28
Direct Annual Grant Support	\$3,714,416
Peer Reviewed Publications	50

CLINICAL ACTIVITIES AND TRAINING

Number of Clinical Fellows	2
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Division Photo



Row 1: T Alenghat, Y Rochman
Row 2: S Divanovic, C Chougnet, M Khodoun
Row 3: S Morris, A Herr, HL Grimes, E Janssen, H Singh, J Katz
Row 4: D Hildeman, R Strait, K Hoebe, I Lewkowich, M Jordan, F Finkelman

Significant Accomplishments

Studies Suggest Method for Controlling Inflammatory Disorders in Premature Infants

The laboratory of **Claire Chougnet, PhD**, is focusing on the functioning of a critical subset of CD4⁺ T cells termed regulatory T cells (Tregs) in the context of preterm birth. Tregs are required both to establish and sustain immunological self-tolerance and to limit responses to foreign antigens such as those derived from beneficial commensal bacteria. Tregs arise at an early stage during the development of the human infant immune system. In a recent article published in *The Journal of Immunology*, Chougnet's laboratory showed that intra-amniotic inflammation induced by administration of IL-1 β in Rhesus macaques, a particularly suitable model for humans, leads to fetal lung inflammation and rapidly alters the balance between regulatory T cells and IL-17-producing T cells in fetal lymphoid organs. These data have been extended to another model of prenatal inflammation. Chougnet's laboratory is now studying the underlying molecular mechanisms. The loss of Tregs that is accompanied by the generation of IL-17-producing T cells may play a role in several debilitating diseases in prematurely born infants, including bronchopulmonary dysplasia and necrotizing enterocolitis. These findings suggest that boosting Treg cells and/or neutralizing IL-17 may provide new therapeutic interventions for uncontrolled inflammatory disorders in premature infants. The NIH and Burroughs-Wellcome fund are supporting this and related research initiatives in the Chougnet laboratory, some of which involve collaborations with **Lou Muglia, MD, PhD**, in the Perinatal Institute.

Research Explores Connection Between Obesity and Liver Disease

The research program of **Senad Divanovic, PhD**, is focused on cellular and molecular mechanisms underlying chronic inflammation in obesity and obesity-associated conditions such as non-alcoholic fatty liver disease

(NAFLD), the most common chronic liver disease in the developed world. Divanovic recently published findings in the journal *Hepatology* that also were highlighted by an accompanying editorial. The observations that obesity is associated with increased activation of IL-17 signaling and that this molecular pathway can instigate liver damage in diverse contexts prompted Divanovic to explore the role of IL-17 signaling in the progression of NAFLD. His laboratory has demonstrated that loss or inhibition of IL-17 signaling significantly reduces obesity-driven hepatocellular damage in mice. This research formed the basis of an NIH RO1 application titled, "Immunopathogenesis of Non-alcoholic Fatty Liver Disease" which was funded on its first attempt, a remarkable achievement for a junior Investigator in a period of constrained federal research funding.

Research Highlights

IL-13 receptor signaling and asthma

The enigmatic role of IL-13R α 2 in allergic inflammation was clarified by demonstrating that it contributes to development of experimental allergic asthma in mice. The work was published in *JACI* and involved collaboration with the **Finkelman, Wills-Karp and Hershey** laboratories.

Targeting miRNAs in leukemia-initiating cells

Acute myelogenous leukemia (AML) subtypes that result from oncogenic activation of homeobox (HOX) transcription factors are associated with poor prognosis. The **Grimes** laboratory collaborating with **M Jordan, J Mulloy, J Cancelas and B Aronow** identified miRNA targets of HOXA9. In an article published in *JCI* they demonstrated that targeting of the miRNAs led to leukemia-free survival in a murine AML model and delayed onset of disease in xenograft models.

Regulation of cell death and the control of effector T cell responses

The **Hildeman** laboratory in collaboration with **J Opferman** uncovered an important role for the anti-apoptotic protein Mcl-1 in regulating the expansion of pathogen-specific CD4 and CD8 T cells during an LCMV infection. The work was published in the journal, *Cell Death and Differentiation*.

Significant Publications

Clark MR, Mandal M, Ochiai K, **Singh H**. **Orchestrating B cell lymphopoiesis through interplay of IL-7 receptor and pre-B cell receptor signalling**. *Nat Rev Immunol*. 2014 14(2):69-80.

Singh and colleagues review recent advances that have revealed the molecular circuitry which orchestrates B cell development. They propose a model involving two rival signalling systems, namely the interleukin-7 (IL-7) receptor and the pre-B cell receptor. Counteracting signals from these receptors ensure that proliferation and immunoglobulin gene recombination are mutually exclusive, thereby maintaining genomic integrity during B cell development.

Pierson W, Cauwe B, Policheni A, Schlenner SM, Franckaert D, Berges J, Humblet-Baron S, Schoenefeldt S, Herold MJ, **Hildeman D**, Strasser A, Bouillet P, Lu LF, Matthys P, Freitas AA, Luther RJ, Weaver CT, Dooley J, Gray DH, Liston A. **Antiapoptotic Mcl-1 is critical for the survival and niche-filling capacity of Foxp3(+) regulatory T cells**. *Nat Immunol*. 2013 14(9):959-65.

David Hildeman and colleagues recently demonstrated in *Nat Immunol* a critical role for the anti-apoptotic molecule, myeloid cell leukemia-1 (Mcl-1) in the survival of regulatory T cells. In depletion studies examining the homeostatic repopulation of the regulatory T cell compartment, they found that IL-2 was essential for maintaining expression of Mcl-1 within regulatory T cells. Notably, this niche-filling capacity of Mcl-1 was independent of Bcl-2 a prominent survival factor for non-regulatory T cells. The significance of the work is that such differential dependence upon Bcl-2 family members could be exploited via newly developed Bcl-2-related

cancer therapeutics to manipulate regulatory versus conventional T cell responses to improve vaccinations or limit autoimmunity.

Hess C, Winkler A, Lorenz AK, Holeccka V, Blanchard V, Eiglmeier S, Schoen AL, Bitterling J, Stoehr AD, Petzold D, Schommartz T, Mertes MM, Schoen CT, Tiburzy B, Hermann A, **Koehl J**, Manz RA, Madaio MP, Berger M, Wardemann H, Ehlers M. **T cell-independent B cell activation induces immunosuppressive sialylated IgG antibodies.** *J Clin Invest* 2013 123(9):3788-96.

In a paper published in *J Clin Invest*, Marc Ehlers, PhD, Jörg Köhl, MD, and colleagues uncovered a new mechanism by which T cell-independent (TI) activation of B cells drives the production of antigen-specific anti-inflammatory IgG antibodies. The immunosuppressive nature of such antibodies results from high sialylation of their Fc part. The finding identifies TI activation of B cells as a novel means of Fc glycan modification that has a regulatory impact on infection, vaccination and autoimmune responses.

Harley IT, **Stankiewicz TE**, **Giles DA**, Softic S, Flick LM, **Cappelletti M**, Sheridan R, Xanthakos SA, Steinbrecher KA, Sartor RB, Kohli R, **Karp CL**, **Divanovic S**. **IL-17 signaling accelerates the progression of nonalcoholic fatty liver disease in mice.** *Hepatology*. 2014 59(5):1830-9.

Inflammation plays a central pathogenic role in the pernicious metabolic and end organ sequelae of obesity. Among these sequelae, non-alcoholic fatty liver disease (NAFLD) has become the most common chronic liver disease in the developed world. Observations in this paper showed the first evidence for a critical role for IL-17 axis in regulating NAFLD development and progression, as well as the first report of a role for microbe-driven IL-17 production in exacerbating hepatocellular damage in NAFLD. Specifically, genetic deletion of IL-17RA as well as antibody-mediated neutralization of IL-17A led to protection from steatohepatitis, NADPH-oxidase activation and hepatocellular damage in mouse models of obesity-induced NAFLD. Furthermore, colonization of mice with segmented filamentous bacteria (SFB), a bacterium known to augment IL-17 production, exacerbated and accelerated hepatocellular damage, whereas depletion of SFB led to protection from obesity-induced hepatocellular damage. These findings suggest that targeting the IL-17 pathway may represent a novel therapeutic approach to NAFLD.

McNally JP, **Elfers EE**, **Terrell CE**, Grunblatt E, **Hildeman DA**, **Jordan MB**, **Katz JD**. **Eliminating encephalitogenic T cells without undermining protective immunity.** *J Immunol*. 2014 192(1):73-83.

Multiple sclerosis (MS) is characterized by encephalitogenic T cells that attack the myelin sheath surrounding nerve fibers in the CNS and cause brain pathology. Current MS therapies often broadly dampen immune cell responses, which minimizes the autoimmune activity of pathogenic T cells but also adversely affects protective immunity against pathogens and tumors. In an effort to specifically target disease-causing encephalitogenic T cells without reducing beneficial immune responses, McNally et al. induced the MS-like disease experimental autoimmune encephalomyelitis (EAE) in mice, and then treated them with etoposide, a topoisomerase inhibitor used clinically to combat cancer and found that providing etoposide after EAE induction delayed the onset and reduced the severity of autoimmunity, preventing EAE incidence in 60% of mice, relative to EAE-induced mice treated with a vehicle control. Importantly, etoposide administration caused selective apoptosis, dampened cytokine production, and reduced Ag spread in myelin-specific T cells without hindering naive and memory T cell responses to viral pathogens, indicating that etoposide solely affected autoreactive T cells.

Division Publications

1. Asgari E, Le Friec G, Yamamoto H, Perucha E, Sacks SS, Kohl J, Cook HT, Kemper C. **C3a modulates IL-1 β secretion in human monocytes by regulating ATP efflux and subsequent NLRP3 inflammasome activation.** *Blood*. 2013; 122:3473-81.

2. Boespflug ND, Kumar S, McAlees JW, Phelan JD, Grimes HL, Hoebe K, Hai T, Filippi MD, Karp CL. **ATF3 is a novel regulator of mouse neutrophil migration.** *Blood*. 2014; 123:2084-93.
3. Chen H, Assmann JC, Krenz A, Rahman M, Grimm M, Karsten CM, Kohl J, Offermanns S, Wettschreck N, Schwaninger M. **Hydroxycarboxylic acid receptor 2 mediates dimethyl fumarate's protective effect in EAE.** *J Clin Invest*. 2014; 124:2188-92.
4. Chen W, Sivaprasad U, Gibson AM, Ericksen MB, Cunningham CM, Bass SA, Kinker KG, Finkelman FD, Wills-Karp M, Khurana Hershey GK. **IL-13 receptor alpha2 contributes to development of experimental allergic asthma.** *J Allergy Clin Immunol*. 2013; 132:951-8 e1-6.
5. Clark MR, Mandal M, Ochial K, Singh H. **Orchestrating B cell lymphopoiesis through interplay of IL-7 receptor and pre-B cell receptor signalling.** *Nat Rev Immunol*. 2014; 14:69-80.
6. Divanovic S, Dalli J, Jorge-Nebert LF, Flick LM, Galvez-Peralta M, Boespflug ND, Stankiewicz TE, Fitzgerald JM, Somarathna M, Karp CL, Serhan CN, Nebert DW. **Contributions of the three CYP1 monooxygenases to pro-inflammatory and inflammation-resolution lipid mediator pathways.** *J Immunol*. 2013; 191:3347-57.
7. Fernandez CA, Stewart E, Panetta JC, Wilkinson MR, Morrison AR, Finkelman FD, Sandlund JT, Pui CH, Jeha S, Relling MV, Campbell PK. **Successful challenges using native E. coli asparaginase after hypersensitivity reactions to PEGylated E. coli asparaginase.** *Cancer Chemother Pharmacol*. 2014; 73:1307-13.
8. Finkelman FD. **On sharing unique reagents.** *J Allergy Clin Immunol*. 2013; 132:245-6.
9. Goyama S, Schibler J, Cunningham L, Zhang Y, Rao Y, Nishimoto N, Nakagawa M, Olsson A, Wunderlich M, Link KA, Mizukawa B, Grimes HL, Kurokawa M, Liu PP, Huang G, Mulloy JC. **Transcription factor RUNX1 promotes survival of acute myeloid leukemia cells.** *J Clin Invest*. 2013; 123:3876-88.
10. Guo F, Li J, Zhang S, Du W, Amarachintha S, Sipple J, Phelan J, Grimes HL, Zheng Y, Pang Q. **mTOR kinase inhibitor sensitizes T-cell lymphoblastic leukemia for chemotherapy-induced DNA damage via suppressing FANCD2 expression.** *Leukemia*. 2014; 28:203-6.
11. Harley IT, Stankiewicz TE, Giles DA, Softic S, Flick LM, Cappelletti M, Sheridan R, Xanthakos SA, Steinbrecher KA, Sartor RB, Kohli R, Karp CL, Divanovic S. **IL-17 signaling accelerates the progression of nonalcoholic fatty liver disease in mice.** *Hepatology*. 2014; 59:1830-9.
12. Hess C, Winkler A, Lorenz AK, Holeciska V, Blanchard V, Eiglmeier S, Schoen AL, Bitterling J, Stoeck AD, Petzold D, Schommartz T, Mertes MM, Schoen CT, Tiburzy B, Hermann A, Kohl J, Manz RA, Madaio MP, Berger M, Wardemann H, Ehlers M. **T cell-independent B cell activation induces immunosuppressive sialylated IgG antibodies.** *J Clin Invest*. 2013; 123:3788-96.
13. Iwata H, Bieber K, Tiburzy B, Chrobok N, Kalies K, Shimizu A, Leineweber S, Ishiko A, Vorobyev A, Zillikens D, Kohl J, Westermann J, Seeger K, Manz R, Ludwig RJ. **B cells, dendritic cells, and macrophages are required to induce an autoreactive CD4 helper T cell response in experimental epidermolysis bullosa acquisita.** *J Immunol*. 2013; 191:2978-88.
14. Johnson TS, Terrell CE, Millen SH, Katz JD, Hildeman DA, Jordan MB. **Etoposide selectively ablates activated T cells to control the immunoregulatory disorder hemophagocytic lymphohistiocytosis.** *J Immunol*. 2014; 192:84-91.
15. Kachapati K, Bednar KJ, Adams DE, Wu Y, Mittler RS, Jordan MB, Hinerman JM, Herr AB, Ridgway WM. **Recombinant soluble CD137 prevents type one diabetes in nonobese diabetic mice.** *J Autoimmun*. 2013; 47:94-103.
16. Kallapur SG, Presicce P, Rueda CM, Jobe AH, Chougnnet CA. **Fetal immune response to chorioamnionitis.** *Semin Reprod Med*. 2014; 32:56-67.
17. Kallapur SG, Presicce P, Senthamaraiannan P, Alvarez M, Tarantal AF, Miller LM, Jobe AH, Chougnnet

- CA. **Intra-amniotic IL-1 β induces fetal inflammation in rhesus monkeys and alters the regulatory T cell/IL-17 balance.** *J Immunol.* 2013; 191:1102-9.
18. Karsten CM, Laumonnier Y, Kohl J. **Functional analysis of C5a effector responses in vitro and in vivo.** *Methods Mol Biol.* 2014; 1100:291-304.
19. Kemper C, Kohl J. **Novel roles for complement receptors in T cell regulation and beyond.** *Mol Immunol.* 2013; 56:181-90.
20. Khandelwal P, Lawrence J, Filipovich AH, Davies SM, Bleesing JJ, Jordan MB, Mehta P, Jodele S, Grimley MS, Kumar A, Myers K, Marsh RA. **The successful use of alemtuzumab for treatment of steroid-refractory acute graft-versus-host disease in pediatric patients.** *Pediatr Transplant.* 2014; 18:94-102.
21. Khodoun MV, Kucuk ZY, Strait RT, Krishnamurthy D, Janek K, Clay CD, Morris SC, Finkelman FD. **Rapid desensitization of mice with anti-Fc γ R1b/Fc γ R1II mAb safely prevents IgG-mediated anaphylaxis.** *J Allergy Clin Immunol.* 2013; 132:1375-87.
22. Lewkowich IP, Lajoie S, Stoffers SL, Suzuki Y, Richgels PK, Dienger K, Sproles AA, Yagita H, Hamid Q, Wills-Karp M. **PD-L2 modulates asthma severity by directly decreasing dendritic cell IL-12 production.** *Mucosal Immunol.* 2013; 6:728-39.
23. Lindorfer MA, Kohl J, Taylor RP. (2013) **Interactions between the complement system and Fc γ receptors.** Antibody Fc linking adaptive and innate immunity. Amsterdam ; Burlington, Elsevier Science. 49-74.
24. Lloyd C, Lewkowich I, Wills-Karp M, Saglani S. **Mouse Models of Allergic Airways Disease.** In: NF Adkinson, BS Bochner, AW Burkset al, eds. *Middleton's allergy : principles and practice.* Philadelphia, PA: Elsevier; 2013:842-860.
25. Ludwig RJ, Kalies K, Kohl J, Zillikens D, Schmidt E. **Emerging treatments for pemphigoid diseases.** *Trends Mol Med.* 2013; 19:501-12.
26. Marsh RA, Kim MO, Liu C, Bellman D, Hart L, Grimley M, Kumar A, Jodele S, Myers KC, Chandra S, Leemhuis T, Mehta PA, Bleesing JJ, Davies SM, Jordan MB, Filipovich AH. **An intermediate alemtuzumab schedule reduces the incidence of mixed chimerism following reduced-intensity conditioning hematopoietic cell transplantation for hemophagocytic lymphohistiocytosis.** *Biol Blood Marrow Transplant.* 2013; 19:1625-31.
27. Martin CE, Broecker F, Oberli MA, Komor J, Mattner J, Anish C, Seeberger PH. **Immunological evaluation of a synthetic Clostridium difficile oligosaccharide conjugate vaccine candidate and identification of a minimal epitope.** *J Am Chem Soc.* 2013; 135:9713-22.
28. Mattner J. **Natural killer T (NKT) cells in autoimmune hepatitis.** *Curr Opin Immunol.* 2013; 25:697-703.
29. McBerry C, Dias A, Shryock N, Lampe K, Gutierrez FR, Boon L, De'Broski RH, Aliberti J. **PD-1 modulates steady-state and infection-induced IL-10 production in vivo.** *Eur J Immunol.* 2014; 44:469-79.
30. McNally JP, Elfers EE, Terrell CE, Grunblatt E, Hildeman DA, Jordan MB, Katz JD. **Eliminating encephalitogenic T cells without undermining protective immunity.** *J Immunol.* 2014; 192:73-83.
31. Moreno-Fernandez ME, Joedicke JJ, Chougnet CA. **Regulatory T Cells Diminish HIV Infection in Dendritic Cells - Conventional CD4(+) T Cell Clusters.** *Front Immunol.* 2014; 5:199.
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33. Nierkens S, Tel J, Janssen E, Adema GJ. **Antigen cross-presentation by dendritic cell subsets: one general or all sergeants?** *Trends Immunol.* 2013; 34:361-70.
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35. Phelan JD, Zweidler-McKay PA, Grimes HL. **Gfi1 Inhibition and the Future of ALL Management.** *The Journal of OncoPathology*. 2013; 1:27-30.
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48. Ulusoy C, Kim E, Tuzun E, Huda R, Yilmaz V, Poulas K, Trakas N, Skriapa L, Niarchos A, Strait RT, Finkelman FD, Turan S, Zisimopoulou P, Tzartos S, Saruhan-Direskeneli G, Christadoss P. **Preferential production of IgG1, IL-4 and IL-10 in MuSK-immunized mice.** *Clin Immunol*. 2014; 151:155-63.
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50. Yeo EJ, Cassetta L, Qian BZ, Lewkowich I, Li JF, Stefater JA, 3rd, Smith AN, Wiechmann LS, Wang Y, Pollard JW, Lang RA. **Myeloid WNT7b mediates the angiogenic switch and metastasis in breast**

Faculty, Staff, and Trainees

Faculty Members

Harinder Singh, PhD, Professor

Leadership Director, Division of Immunobiology; Director, The Center for Systems Immunology

Research Interests Analysis of transcriptional and signaling networks that orchestrate the development and functioning of immune cells

Julio Aliberti, PhD, Associate Professor

Research Interests Induction and regulation of immune responses to intracellular pathogens

Claire A. Chougnet, PhD, 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.

Fred Finkelman, MD, Professor

Research Interests Allergy/Asthma, Intestinal Parasites

H. Leighton Grimes, PhD, Associate Professor

Leadership Director Cancer Pathology Program

Research Interests Leukemia/Lymphoma

David A. Hildeman, PhD, Professor

Leadership Director, Immunology 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, Adjunct

Research Interests Autoimmune Liver Diseases

Yrina Rochman, PhD, Instructor

Research Interests Regulation of memory CD4 T cell functions

Marsha Wills-Karp, PhD, Adjunct

Research Interests Immunopathogenesis of asthma

Trainees

- **Maha Almanan, BS**, GSY-2, University of Khartoum, Khartoum, Sudan
- **Konstantinos Biliouris, PhD**, PGY-1, University of Minnesota, Minneapolis, Minnesota
- **Monica Cappelletti, PhD**, PGY-3, University of Milan, Milan, Italy
- **Kaitlin Carroll, BS**, GSY-1, Beloit College, Beloit, Wisconsin
- **Shan Chandrakasan, MD**, PGY-3, Children's Hospital of Michigan, Detroit, Michigan
- **Virendra Chaudhri, PhD**, PGY-4, ICGEB (International Centre for Genetic Engineering & Biotechnology), New Delhi, India
- **Jordan Downey, BS**, GSY-5, Hendrix College, Conway, Arkansas
- **Mehari Endale Mengistu, PhD**, PGY-3, Kyungpook National University, Daegu, Korea
- **Maria Fields, BS**, GSY-5, Universidad de Antioquia, Medellin, Antioquia, Colombia
- **Daniel Giles, BS**, GSY-3, Case Western Reserve University, Cleveland, Ohio
- **Naina Gour, BS**, GSY-5, University of Delhi, Delhi, India
- **Vishnu Gudimetla, BS**, GSY-1, The Ohio State University, Columbus, Ohio
- **Courtney Jackson, BA**, GSY-1, University at Buffalo - SUNY, Buffalo, New York
- **Jared Klarquist, BA**, GSY-3, Dartmouth College, Hanover, New Hampshire
- **Durga Krishnamurthy, PhD**, PGY-1, Medical University of Vienna, Vienna, Austria
- **Kun-Po Li, MS**, GSY-3, Graduate Institute of Immunology, National Taiwan University, Taiwan
- **Jaclyn McAlees, PhD**, PGY-5, The Ohio State University, Columbus, Ohio
- **Jonathan McNally, BS**, GSY-5, St. Mary's College, St. Mary's City, Maryland
- **Sara Meyer, PhD**, PGY-5, University of Cincinnati, Cincinnati, Ohio
- **Scott Millen, PhD**, PGY-3, University of Cincinnati, Cincinnati, Ohio
- **Edward Muench, MEng**, GSY-2, University of Louisville, Louisville, Kentucky
- **Omar Niss, MD**, PGY-7, University of Nebraska Medical Center
- **Andre Olsson, PhD**, PGY-8, Lund University, Lund, Sweden
- **Jana Raynor, BS**, GSY-6, North Georgia College and State University, Dahlonega, Georgia
- **Cesar Rueda Rios, PhD**, PGY-3, Universidad de Antioquia, Medellin, Antioquia, Colombia
- **Hesham Shehata, BA**, GSY-4, Transylvania University, Lexington, Kentucky
- **Sadiq Silbak, BS**, GSY-1, University of Cincinnati, Cincinnati, Ohio
- **Sara Stoffers, MS**, GSY-3, University of Cincinnati, Cincinnati, Ohio
- **Zhiguo Wu, PhD**, PGY-1, Wuhan University, Wuhan, China
- **Heping Xu, PhD**, PGY-1, Tsinghua University, Beijing, China

Division Collaboration

A rapid spontaneous model of cytogenetically normal AML (H. Leighton Grimes, PhD; Harinder Singh, PhD)

Experimental Hematology & Cancer Biology » Daniel Starczynowski, PhD and Gang Huang, PhD

Analysis of gene regulatory networks orchestrating B cell activation and their terminal differentiation into plasma cells (Harinder Singh, PhD)

Biomedical Informatics » Bruce Aronow, PhD

Center for Autoimmune Genomics and Etiology (CAGE) » Matthew Weirauch, PhD

Allergy and Immunology » Artem Barski, PhD

Antibody-mediated protection against antibody-mediated disease (Fred Finkelman, MD)

Emergency Medicine » Richard Strait, MD

Assessing the role of StarD7 in allergic disease (Ian Lewkowich, PhD)

Section of Neonatology, Perinatal and Pulmonary Biology » Timothy Weaver, PhD

Asthma pathogenesis and therapy in mouse models (Fred Finkelman, MD)

Asthma Research » Gurjit Khurana Hershey, MD, PhD

BAFF axis is essential regulator of diet-induced obesity (Senad Divanovic, PhD)

Biostatistics and Epidemiology » Jessica Woo, PhD

Biomarkers of immunologic function and preterm respiratory outcomes (Claire Chougnet, PhD)

Neonatology » Alan Jobe, MD, PhD, Jim Greenberg, MD, and Paul Kingma, MD

Biostatistics and Epidemiology » Ardythe Morrow, PhD and Jareen Meinen-Derr, PhD

Pulmonary Medicine » William Hardie, MD

Cdc42 regulation of brown adipose function promotes increased insulin sensitivity and protection from diet-induced obesity (Senad Divanovic, PhD)

Experimental Hematology and Cancer Biology » Yi Zheng, PhD

Characterization of immune regulatory defects in XIAP deficiency (Michael Jordan, MD)

Bone Marrow Transplantation and Immune Deficiency » Rebecca Marsh, MD

Cincinnati Center for Excellence in Molecular Hematology (Claire Chougnet, PhD)

Experimental Hematology & Cancer Biology » Jose Cancelas Perez, MD, PhD and Yi Zheng, PhD

Citrulline and intracellular microbial killing mechanisms (Julio Aliberti, PhD)

Infectious Diseases » Joseph Qualls, PhD

Cnr2 deficiency confers resistance to inflammation-induced preterm birth in mice (Senad Divanovic, PhD)

Reproductive Sciences » SK Dey, PhD

Defining the role of MyD88/Trif in ileocecal resection (Kasper Hoebe, PhD)

Pediatric General and Thoracic Surgery » Michael Helmrath, MD

Design of therapeutic antibodies (Fred Finkelman, MD)

Rheumatology » Alexey Porollo, PhD

Discovery and characterization of new primary immune deficiencies (Michael Jordan, MD)

Bone Marrow Transplantation and Immune Deficiency » Rebecca Marsh, MD

Dysfunction in biliary atresia (Claire Chougnet, PhD)

Gastroenterology, Hepatology & Nutrition » Jorge Bezerra, MD, Alexander Miethke, MD, and Greg Tiao, MD

Environmental regulation of obesity and NAFLD immunopathogenesis (Senad Divanovic, PhD)

Allergy and Immunology » Simon Hogan, PhD

Pathology and Laboratory Medicine » Shiva Kumar Shanmukhappa, DVM

Food allergy (Fred Finkelman, MD)

Allergy and Immunology » Simon Hogan, PhD

Forward genetic analysis of immune-mediated liver disease using ENU mutagenesis (Kasper Hoebe, PhD)

Gastroenterology, Hepatology & Nutrition » Jorge Bezerra, MD

Function of NKT cells in eosinophilic esophagitis (Jochen Mattner, MD)

Allergy and Immunology » Anil Mishra, PhD

Gene correction strategies for Hemophagocytic lymphohistiocytosis (Michael Jordan, MD)

Experimental Hematology and Cancer Biology » Punam Malik, MD

Allergy and Immunology » Kimberly Risma, MD, PhD

Genetic dissection of human dendritic cell development (Edith Janssen, PhD)

Asthma Research » Hong Ji, PhD

Homeostasis and Function of Regulatory T cells in aging (Claire Chougnet, PhD; David Hildeman, PhD)

Infectious Diseases » Rhonda Cardin, PhD

Host immune responses to sepsis (David Hildeman, PhD)

Critical Care Medicine » Hector Wong, MD

Host-microbe cross talk and pregnancy outcomes (Claire Chougnet, PhD)

Section of Neonatology, Perinatal and Pulmonary Biology » Alan Jobe, MD, PhD and Sukas Kallapur, MD

Human IgG-mediated anaphylaxis (Fred Finkelman, MD)

Gastroenterology, Hepatology and Nutrition » Lee Denson, MD

Immune profiling in Hemophagocytic Lymphohistiocytosis (Michael Jordan, MD)

Bone Marrow Transplantation and Immune Deficiency » Rebecca Marsh, MD

Immunopathogenesis of NAFLD (Senad Divanovic, PhD)

Gastroenterology, Hepatology and Nutrition » Jorge Bezerra, MD

Pathology and Laboratory Medicine » Shiva Kumar Shanmukhappa, DVM

Liver-specific deletion of augments liver regeneration (ALR) induces accelerated steatohepatitis in mice (Senad Divanovic, PhD)

Gastroenterology, Hepatology and Nutrition » Chandrashekhar R. Gandhi, PhD

Maternal temperament, stress, and inflammation in preterm birth (Claire Chouhnet, PhD)

Center for Prevention of Preterm Birth » Louis Muglia, MD, PhD

Mechanisms of IL-17A mediated enhancement of IL-13 driven allergic asthma (Ian Lewkowich, PhD)

Asthma Research » Melinda Butsch Kovacic, PhD, Umasundari Sivaprasad, PhD, and Gurjit Khurana Hershey, MD, PhD

Modeling acute myeloid leukemia in mice and using xenografts for therapy (H. Leighton Grimes, PhD)

Experimental Hematology and Cancer Biology » James Mulloy, PhD

Modeling development and progression of NAFLD (Senad Divanovic, PhD; Kasper Hoebe, PhD)

Pathology and Laboratory Medicine » Rachel Sheridan, MD

Modeling food allergy in C57BL/6 mice (Senad Divanovic, PhD)

Allergy and Immunology » Simon Hogan, PhD

Novel methods to promote stem cell engraftment (Michael Jordan, MD)

Experimental Hematology and Cancer Biology » Punam Malik, MD

NSGS Tg mice as a humanized model for in vivo infectious diseases (Julio Aliberti, PhD)

Experimental Hematology and Cancer Biology » James Mulloy, PhD

Regulation of eosinophil development (H. Leighton Grimes, PhD)

Allergy and Immunology » Patricia Fulkerson, MD, PhD

Regulation of neutrophil development and genetic disorders of granulopoiesis (H. Leighton Grimes, PhD; Harinder Singh, PhD)

Experimental Hematology and Cancer Biology » Jose Cancelas Perez, MD, PhD

Bone Marrow Transplantation » Kasiani Myers, MD

Biomedical Informatics » Bruce Aronow, PhD

Regulatory of Eosinophil production by TLRs (Kasper Hoebe, PhD)

Allergy and Immunology » Patricia Fulkerson, MD, PhD

Role of Acox-1 in development and progression of NAFLD (Senad Divanovic, PhD)

Pathology » Rachel Sheridan, MD

Role of coagulation factors in development and progression of obesity and obesity-associated NAFLD (Senad Divanovic, PhD)

Experimental Hematology and Cancer Biology » Matthew Flick, PhD

Role of dendritic cells in development and progression of systemic lupus erythematosus (Edith Janssen, PhD)

Center for Autoimmune Genomics and Etiology (CAGE) » Nan Shen, MD

Role of IFNAR signaling in development and progression of obesity and obesity-associated sequelae (Senad Divanovic, PhD)

Experimental Hematology & Cancer Biology » Damien Raynaud, PhD

Role of NKT cells in immune-mediated liver disease (Jochen Mattner, MD)

Gastroenterology, Hepatology and Nutrition » Jorge Bezerra, MD

The biology of cytotoxicity: Genotype/phenotype correlations (Michael Jordan, MD)

Allergy and Immunology » Kimberly Risma, MD, PhD

The effect of the hemostatic system on T cell responses and tumor development (Edith Janssen, PhD)

Hematology » Joseph Palumbo, MD

The identification of ENU germline mutants with heart defects (Kasper Hoebe, PhD)

Molecular Cardiovascular Biology » Jeffery Molkentin, PhD

The role of C5a in the inflammatory response of Gaucher disease (Joerg Koehl, MD)

Human Genetics » Manoj Pandey, PhD

The role of complement in food allergy (Joerg Koehl, MD)

Allergy and Immunology » Simon Hogan, PhD

The type IFN axis is essential for inflammation-induced preterm birth (Senad Divanovic, PhD)

Infectious Diseases » Sing Sing Way, MD, PhD

Use of humanized mice in studies of suppression of allergy (Fred Finkelman, MD)

Experimental Hematology and Cancer Biology » James Mulloy, PhD

Grants, Contracts, and Industry Agreements

Grant and Contract Awards	Annual Direct
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CHOUGNET, C / HILDEMAN, D (MPI)

Homeostasis and Function of Regulatory T Cells in Aging

National Institutes of Health

R01 AG 033057

08/01/12-04/30/17

\$293,644

Host-Microbe Cross-Talk and Pregnancy Outcomes

Burroughs Wellcome Foundation (University of Cincinnati)

06/01/13-3/31/17

\$150,000

CHOUGNET, C / JOBE, A (MPI)

Biomarkers of Immunologic Function ad Preterm Respiratory Outcomes		
National Institutes of Health		
U01 HL 101800	05/01/10-04/30/15	\$375,863
CHOUGNET, C / MUGLIA, L (MPI)		
Maternal Temperment, Stress and Inflammation in Preterm Birth		
National Institutes of Health		
R01 HD 078127	09/01/13-08/31/17	\$505,993
DIVANOVIC, S		
Immunopathogenesis of Non-Alcoholic Fatty Liver Disease		
National Institutes of Health		
R01 DK 099222	09/05/13-07/31/18	\$217,500
FINKELMAN, F		
Allergenicity Resulting from Functional Mimicry of the TLR Complex		
National Institutes of Health		
R01 AI 088372	03/01/10-02/28/15	\$286,689
Effectiveness of i.t. DARPinS		
Janssen Research & Development, LLC		
	10/28/13-10/27/14	\$14,437
GRIMES, L		
MicroRNA in Acute Myeloid Leukemia		
National Institutes of Health		
R01 CA 159845	07/01/11-04/30/16	\$201,275
RNA Therapeutics for Leukemia		
The Leukemia and Lymphoma Society		
	10/01/12-09/30/15	\$180,018
HOEBE, K		
T-Cell Specific Lysosome Dysfunction as a Primary Cause of IBD in Gimap5sph/sph Mice		
Crohn's & Colitis Foundation of America		
	07/01/12-06/30/15	\$105,300
Testin of 2'-fucosyllactose to Reduce Intestinal Inflammation		
Glycosyn		
SRA 131201	12/10/13-12/09/14	\$40,683
The CFF Research Development Program (P&F Study)		
Cystic Fibrosis Foundation		
	07/01/12-06/30/14	\$65,000
JORDAN, M		
CD8 T Cell Mediated Disruption of Blood Brain Barrier Tight Junction		
National Institutes of Health(Mayo Clinic)		

R01 NS 060881	09/04/10-07/31/14	\$17,709
Exploiting the DNA Damage Response to Selectively Sculpt the T Cell Repertoire		
American Society of Hematology		
	03/01/14-02/28/15	\$100,000
Hybrid ImmunoTherapy (ATG/Dexamethasone/Etoposide) for Hemphagocytic Lymphohistiocytosis		
National Institutes of Health		
R34 HL 107801	03/15/12-02/28/15	\$150,000
KATZ, J		
Dissecting Dendritic Cell Function in Autoimmune Diabetes		
National Institutes of Health		
R01 DK 078179	08/01/09-07/31/14	\$205,711
KATZ, J / HILDEMAN, D (MPI)		
Control of diabetes by manipulation of Bc12 family member		
National Institutes of Health		
R01DK081175	07/01/11-06/30/15	\$209,888
KIEJDAN, A		
Summer Fellowship Program		
St. Baldrick's Foundation		
	04/01/14-08/31/14	\$5,000
KRISHNAMURTHY, D		
Induction of Food Allergy in Mice by Allergen Inhalation		
Department of Defense(Cincinnati Foundation Biomedical Research Education)		
W81XWH-13-1-0497	09/30/13-09/29/16	\$137,902
LEWKOWICH, I		
Mechanisms of IL-17A Mediated Exacerbation of IL-13-Driven Allergic Asthma		
American Lung Association		
	07/01/13-06/30/15	\$40,000
Mechanisms of IL-17A-Mediated Enhancement of Asthma Severity		
National Institutes of Health		
R01 HL 122300	05/01/14-02/28/19	\$250,000
Combined Th17 and Th2 Blockade in Treatment of Severe Allergic Asthma		
Janssen Research & Development LLC		
SRA 13010	07/03/13-07/02/14	\$47,097
MEYER, S		
Innovative Targeted Therapy for Treatment of Acute Myeloid Leukemia		
Cancer Free Kids		
	07/01/13-06/30/14	\$40,000

	Current Year Direct	\$3,714,416
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	Total	\$3,714,416
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Additional Information

Immunology Graduate Program

The Immunology 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. To appeal to a wider web audience, the Program changed its name from the Immunobiology Graduate Program to the Immunology Graduate Program (ImmGP) in 2014. The program is managed 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 MS program.

The ImmGP provides broadly based instruction in immunology, along with rigorous research training that emphasizes cutting-edge approaches to understanding the function of the immune system in health and disease. To this end, the program currently has 50 faculty members from 5 departments and 15 divisions within the University of Cincinnati College of Medicine and CCHMC. We currently have a total of 51 outstanding students (38 PhD students and 13 MS students) from around the country and abroad. This academic year we celebrated the graduation of 6 PhD students and one MS student. (Graduates are bolded on the below student lists) 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. Also, due to a superb external review spearheaded by the UC's 2019 program, the Immunology 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 aspects of 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. Thus far, five students were awarded research grants and two students took advantage of travel awards, one traveling to Germany and the other to California. After 7 years of continued growth, the program is now focused on maintaining its current size, planning on a target class size of 6-8 students per year.

In the spring of 2013, the ImmGP 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 ImmGP anticipates having between 2-4 doctoral students from our program to participate in the IRTG per year. Over the last year, 2 students and 3 post-doctoral fellows from Germany spent time in Faculty Labs as part of the IRTG.

Doctoral Students

Admission Year	Student	Mentor
2008	Bo Liu	Yui-Hsi Wang
2008	Jana Raynor	David Hildeman
2008	Samuel Vaughn	John Harley
2009	Nick Boespflug	Chris Karp
2009	Jordan Downey	Marsha Wills-Karp
2009	Maria Fields	Claire Chougnet
2009	Naina Gour	Marsha Wills-Karp
2009	Jonathan McNally	Jonathan Katz
2009	Harini Raghu	Matthew Flick
2009	Akash Verma	George Deepe
2010	Kyle Bednar	William Ridgway
2010	Roger Fecher	George Deepe
2010	Wenting Huang	William Ridgway
2010	Jennifer Leddon	Timothy Cripe
2010	Ke Liu	John Harley
2010	Hesham Shehata	Claire Chougnet
2011	Rahul D'Mello	Marc Rothenberg
2011	Dan Giles	Senad Divanovic
2011	Mike Horwath	George Deepe
2011	Jared Klarquist	Edith Janssen
2011	Kun-Po Li	David Hildeman
2011	Sara Stoffers	Ian Lewkowich
2012	Maha Almanan	David Hildeman
2012	Laura Brungs	Sue Thompson

2012	Benjamin Davis	Marc Rothenberg
2012	Jeremy Kinder	Sing Sing Way
2012	Xioaming Lu	John Harley
2012	Shannon Rapovy	Joe Qualls
2012	Carolyn Rydyznski	Steve Waggoner
2012	Kristi Weage	Sean Moore
2013	Paige Bolcas	Neeru Hershey
2013	Kaitlin Carroll	Jonathan Katz
2013	Jonathan Fletcher	Nancy Ratner
2013	Courtney Jackson	Claire Chougnet
2013	Zubin Patel	John Harley
2013	Andrew Patterson	
2013	Jared Travers	Marc Rothenberg

Master Students

Admission Year	Student	Faculty Mentor
2010	Olivia Ballard	Ardythe Morrow
2011	Kristina Bielewicz	Non-Thesis MS
2011	Lindsay Dunn	Non-Thesis MS
2011	Yuan Li	John Harley
2011	Yi Ting Tsai	Simon Hogan
2012	Upasana Parthasarathy	Andrew Herr
2012	Samet Oksuz	Artem Barski
2013	Chesney Castleberry	Jonathan Katz
2013	Angelika Gasilina	Non-Thesis MS
2013	Mariam George	George Deepe
2013	Vishnu Gudimetla	Fred Finkelman
2013	Reshmi Indulga	Non-Thesis MS
2013	Christopher McKnight	Fred Finkelman
2013	Sadiq Silbak	Jonathan Katz

Student Honors

Kyle Bednar (2010)

- Cincinnati's Diabetes and Obesity Conference, First Place Poster
- University of Cincinnati's Research Week Poster Session, Gallery of Excellence Award
- Immunology Graduate Program – Student Research Award
- University of Cincinnati's 34th Graduate Student Research Forum, Honorable Mention
- Cincinnati Children's Hospital Medical Center - Immunology Retreat, Second Place Poster

Ben Davis (2012)

- American College of Allergy, Asthma, and Immunology Fellow-In- Training Travel Grant
- T32 Pulmonary and Cardiovascular Developmental Training Grant, Cincinnati Children's

Dan Giles (2011)

- UC Center for Environmental Genetics New Investigator Scholar Award
- Cincinnati Diabetes and Obesity Conference – Poster Award (2nd Place)
- Immunology Graduate Program – Travel Award
- Immunology Graduate Program – Student Research Award

Mike Horwath (2011)

- University of Cincinnati GSGA Research fellowship

Jeremy Kinder (2012)

- Albert J. Ryan Fellowship. University of Cincinnati College of Medicine
- Exemplary Poster Presentation in Life Sciences and Medicine. University of Cincinnati Graduate Research Forum

Xiaoming Lu (2013)

- Trainee Abstract Award, The American Association of Immunologist 2014 Annual Meeting, Pittsburgh, PA

Jonathan McNally (2009)

- Immunology Graduate Program – Student Research Award
- 1st place poster presentation, Ohio River Valley Cytometry Association annual meeting 2013

Carolyn Rydyznski (2012)

- American Association of Immunologists Trainee Abstract Award, Received a travel award to attend and present work at AAI annual meeting.
- Immunology Graduate Program – Travel Award

Hesham Shehata (2010)

- Immunology Graduate Program – Student Research Award

Student Publications

Kyle Bednar (2010)

Kachapati K, Bednar KJ, Adams DE, Wu Y, Mittler RS, Jordan MB, Hinerman JM, Herr AB, Ridgway WM. Recombinant soluble CD137 prevents type one diabetes in nonobese diabetic mice. *J Autoimmun.* 2013 Dec;47:94-103. PMID:24145149

Dan Giles (2011)

Harley ITW, Stankiewicz TE, Giles DA, Softic S, Flick LM, Cappelletti M, Sheridan R, Xanthakos SA, Steinbrecher KA, Sartor RB, Kohli R, Karp CL, Divanovic S. IL-17 Signaling Accelerates the Progression of Non-alcoholic Fatty Liver Disease in Mice. *Hepatology.* 2014 May;59(5):1830-9. PMID:24115079

Wenting Huang, W (2010)

Huang W, Kachapati k, Adams D, Wu Y, Leung P, Yang G, Zhang W, Ansari A, Flavell RA, Gershwin ME, Ridgway W. Murine autoimmune cholangitis requires two hits: cytotoxic KLRG1+ CD8 effector cells and defective T regulatory cells *J Autoimmun.* 2014. PMID: 24556277

Jeremy Kinder (2012)

Xin L, Jiang TT, Chaturvedi V, Kinder JM, Ertelt JM, Rowe JH, Steinbrecher KA, Way SS. Commensal microbes drive intestinal inflammation by IL-17-producing CD4+ T cells through ICOSL and OX40L costimulation in the absence of B7-1 and B7-2. *PNAS* Jul 22: 111(29), 10672-7

Jiang TT, Chaturvedi V, Ertelt JM, Kinder JM, Clark DR, Valent AM, Xin L, Way SS. 2014. Regulatory T cells: new keys to further unlocking the enigma of fetal tolerance and pregnancy complications. *J Immunol* Jun 1: 192(11), 4949-56

Xin L, Ertelt JM, Rowe JH, Jiang TT, Kinder JM, Chaturvedi V, Elahi S, Way SS. 2014. Cutting Edge: Committed Th1 CD4+ T cell differentiation blocks pregnancy-induced Foxp3 Expression with antigen-specific fetal loss. *J Immunol* Apr 1: 192(7), 2970-4

Kinder JM, Jiang TT, Clark DR, Chaturvedi V, Xin L, Ertelt JM, Way SS. 2014. Pregnancy-induced maternal regulatory T cells, bona fide memory or maintenance by antigenic reminder from fetal cell microchimerism? *Chimerism* Feb 19: 5(1), 1-4

Elahi S, Ertelt JM, Kinder JM, Jiang TT, Zhang X, Xin L, Chaturvedi V, Strong BS, Qualls JE, Steinbrecher KA, Kalfa TA, Shaaban AF, Way SS. 2013. Immunosuppressive CD71+ erythroid cells compromise neonatal host defense against infection. *Nature* Dec 5: 504(7478), 158-62

Jonathan McNally 2009

McNally JP, Elfers EE, Terrell CE, Grunblatt E, Hildeman DA, Jordan MB, Katz JD. Eliminating Encephalitogenic T cells without undermining protective immunity. *J. Immunol.* 2014 Jan 1;192 (1):73-83 PMID: 24277699

Zubin Patel (2013)

Patel ZH, Kottyan LC, Lazaro S, et al. The struggle to find reliable results in exome sequencing data: filtering out Mendelian errors. *Front Genet.* 2014 Feb 12;5:16. *Front Genet.* 2014 Feb 12;5:16. PMID: 24575121

Harini Raghu (2009)

Raghu, H., Jone, A., Cruz, C., Rewerts, C. L., Frederick, M. D., Thornton, S., Degen, J. L. and Flick, M. J. (2014), Plasminogen Is a Joint-Specific Positive or Negative Determinant of Arthritis Pathogenesis in Mice. *Arth Rheum*, 66: 15041516. PMID:24574269

Akash Verma (2009)

Verma, A., Kroetz, D.N., Tweedle, J.L., and Deepe, G.S. "Type II cytokines impair host defense against an intracellular fungal pathogen by amplifying macrophage generation of IL-33". *Mucosal Immunol.* 2014 Aug PMID: 25118166

Kristi Weage (2012)

Weage KJ *, Guedes MM, Denson LA, McNeal MM, Bernstein DI, Moore SR. Protein-energy malnutrition alters IgA responses to rotavirus vaccination and infection but does not impair vaccine efficacy in mice" Maier EA*, *Vaccine.* 2013 Dec 17;32(1):48-53. PMID:24200975

Alum publications resulting from graduate work

Nicholas Boespflug (2009)

Divanovic S, Dalli J, Jorge-Nebert LF, Flick LM, Gálvez-Peralta M, Boespflug ND, Stankiewicz TE, Fitzgerald JM, Somarathna M, Karp CL, Serhan CN, Nebert DW. Contributions of the three CYP1 monooxygenases to pro-inflammatory and inflammation-resolution lipid mediator pathways. *J Immunol.* 2013 Sep 15;191(6):3347-57. PMID: 23956430

Boespflug ND, Kumar S, McAlees JW, Phelan JD, Grimes HL, Hoebe K, Hai T, Filippi MD, Karp CL. ATF3 is a novel regulator of mouse neutrophil migration. *Blood.* 2014 Mar 27;123(13):2084-93. PMID: 24470589

Isaac Harley (2008)

Guthridge JM, Lu R, Sun H, Sun C, Wiley GB, Dominguez N, Macwana SR, Lessard CJ, Kim-Howard X, Cobb BL, Kaufman KM, Kelly JA, Langefeld CD, Adler AJ, Harley IT, Merrill JT, Gilkeson GS, Kamen DL, Niewold TB, Brown EE, Edberg JC, Petri MA, Ramsey-Goldman R, Reveille JD, Vilá LM, Kimberly RP, Freedman BI, Stevens AM, Boackle SA, Criswell LA, Vyse TJ, Behrens TW, Jacob CO, Alarcón-Riquelme ME, Sivils KL, Choi J, Joo YB, Bang SY, Lee HS, Bae SC, Shen N, Qian X, Tsao BP, Scofield RH, Harley JB, Webb CF, Wakeland EK, James JA, Nath SK, Graham RR, Gaffney PM. Two functional lupus-associated BLK promoter variants control cell-type- and developmental-stage-specific transcription. *Am J Hum Genet.* 2014 Apr 3;94(4):586-98. PMID: 24702955

Harley IT, Stankiewicz TE, Giles DA, Softic S, Flick LM, Cappelletti M, Sheridan R, Xanthakos SA, Steinbrecher KA, Sartor RB, Kohli R, Karp CL, Divanovic S. IL-17 signaling accelerates the progression of nonalcoholic fatty liver disease in mice. *Hepatology.* 2014 May;59(5):1830-9. PMID: 24115079

Sema Kurtulus (2008)

Kurtulus, S., A. Sholl, J. Toe, J. Raynor, P. Tripathi, K-P. Li, M. Pellegrini, and D.A. Hildeman. Bim controls IL-15 availability and limits engagement of multiple BH-3 only proteins. *Cell Death Differ.* 2014 Aug 15. PMID: 25124553

Kurtulus S, Hildeman D. Assessment of CD4(+) and CD8 (+) T cell responses using MHC class I and II tetramers. *Methods Mol Biol.* 2013;979:71-9. PMID:23397390

Cortez McBerry 2007

McBerry C, Dias A, Shryock N, Lampe K, Gutierrez FR, Boon L, De'Broski RH, Aliberti J. PD-1 modulates steady-state and infection-induced IL-10 production in vivo. *Eur J Immunol.* 2014 Feb;44(2):469-79. PMID: 24165808

Jim Phelan (2006)

Boespflug ND, Kumar S, McAlees JW, Phelan JD, Grimes HL, Hoebe K, Hai T, Filippi MD, Karp CL. ATF3 is a novel regulator of mouse neutrophil migration. *Blood*. 2014 Mar 27;123(13):2084-93. PMID: 24470589

Velu CS, Chaubey A, Phelan JD, Horman SR, Wunderlich M, Guzman ML, Jegga AG, Zeleznik-Le NJ, Chen J, Mulloy JC, Cancelas JA, Jordan CT, Aronow BJ, Marcucci G, Bhat B, Gebelein B, Grimes HL. Therapeutic antagonists of microRNAs deplete leukemia-initiating cell activity. *J Clin Invest*. 2014 Jan 2;124(1):222-36. PMID: 24334453

Guo F, Li J, Zhang S, Du W, Amarachintha S, Sipple J, Phelan J, Grimes HL, Zheng Y, Pang Q. mTOR kinase inhibitor sensitizes T-cell lymphoblastic leukemia for chemotherapy-induced DNA damage via suppressing FANCD2 expression. *Leukemia*. 2014 Jan;28(1):203-6. PMID: 23852546

Amanda Waddell (2006)

Lampinen M, **Waddell A**, Ahrens R, Carlson M, Hogan SP. CD14+CD33+ myeloid cell-CCL11-eosinophil signature in ulcerative colitis. *J Leukoc Biol*. 2013 Nov;94(5):1061-70. PMID: 23904440

Student Oral Presentations

Kyle Bednar (2010) - TLR4 Agonistic Monoclonal Antibody Reverses New Onset Type 1 Diabetes , American Association of Immunologists Annual Meeting, Pittsburgh, PA

Roger Fecher (2010) Oral and poster presentations: Myeloid HIF-1 α is required for protection against the fungal pathogen *H. capsulatum*, Presented at American Association of Immunologists Annual Meeting

Ke Liu (2010). Sex bias in autoimmune diseases: increased risk of 47,XXX in Systemic lupus Erythematosus (SLE) and Sjögren's syndrome (SS) supports the gene dose hypothesis. The American College of Rheumatology 2013 Annual Meeting, San Diego, CA.

Xiaoming Lu (2012) Genetic variant at ETS1 locus increases lupus risk and affects Stat1 binding. The American Association of Immunologists 2014 Annual Meeting, Pittsburgh, PA, USA.

Carolyn Rydznski (2012) Natural killer cells suppress humoral immunity and the development of neutralizing antibodies. American Association of Immunologists Annual Meeting, Pittsburgh, PA.

Hesham Shehata (2010) Involvement of IL-33 in the Pathogenesis of Eosinophilic Esophagitis. IRTG retreat, Neumunster, Germany

Student Poster Presentations

Kyle Bednar (2010) -

- TLR4 Agonistic Monoclonal Antibody Reverses New Onset Type 1 Diabetes , American Association of Immunologists Annual Meeting, Pittsburgh, PA
- Post-Doctoral Recruitment Symposium – 1 of 15 – Graduate Students Invited to Present a Poster TLR4 Agonistic Monoclonal Antibody Reverses New Onset Type 1 Diabetes

Roger Fecher (2010)

- Normoxic induction of HIF-1 α in macrophages by the fungal pathogen *H. capsulatum*. Presented at Keystone Sensing and Signaling in Hypoxia
- Myeloid HIF-1 α is required for protection against the fungal pathogen *H. capsulatum*. Presented at American

Wenting Huang (2010)

- Murine autoimmune cholangitis requires two hits: Cytotoxic KLRG1⁺ CD8 effector cells and defective T regulatory cells. The American Association of Immunologists Annual Meeting, Pittsburgh, PA

Jeremy Kinder (2012)

- Annual Graduate Research Forum, University of Cincinnati, Feb 2014, Cincinnati, OH. Exemplary Poster Presentation in Life Sciences and Medicine

Kun-Po Li (2011)

- Defects in Pro-Apoptotic Genes, Bim or Bax/Bak, Cause Accumulation of TCRhi DN4 Cells in Thymus. The American Association of Immunologists Annual Meeting 2014. May 2014. Pittsburgh, PA.

Ke Liu (2010)

- X Chromosome Dose and Sex Bias in Autoimmune Diseases: Increased 47,XXX in Systemic Lupus Erythematosus and Sjögren's Syndrome. The American Association of Immunologists 2014 Annual Meeting, Pittsburgh, PA. 2014-April

Carolyn Rydznski (2012)

- Natural killer cells suppress humoral immunity and the development of neutralizing antibodies. American Association of Immunologists Annual Meeting, Pittsburgh, PA.

Hesham Shehata(2010)

- Skewed homeostasis of natural killer cells in aging decreases their capacity to eliminate target cells. American Association of Immunologists, Pittsburgh, PA

Jared Travers (2013)

- Involvement of IL-33 in the Pathogenesis of Eosinophilic Esophagitis. Presented at Cincinnati Children's Hospital Medical Center Digestive Health Center Annual Scientific Symposium.

Kristina Weage (2012)

- Undernutrition and Augmented Levels of LPS in the Colon Additively Impair Small Intestinal Barrier Function in Weanling Mice. CCHMC Digestive Health Center Annual Scientific Retreat 2014, Cincinnati, OH, February 2014.
- Undernutrition and Augmented Levels of LPS in the Colon Additively Impair Small Intestinal Barrier Function in Weanling Mice. Poster Presentation, Digestive Disease Week, Chicago, IL, May 2014.