

Allergy and Immunology

Division Photo



First Row: A. Assa'ad, K. Risma, M. Lierl, M. Rothenberg, C. Blanchard, S. Hogan; **Second Row:** P. Abonia, T. Fischer, A. Mishra, Y.H. Wang, N. Zimmermann

Division Data Summary

Research and Training Details

Number of Faculty	11
Number of Joint Appointment Faculty	2
Number of Research Fellows	7
Number of Research Students	5
Number of Support Personnel	7
Direct Annual Grant Support	\$2,451,303
Direct Annual Industry Support	\$211,571
Peer Reviewed Publications	38

Clinical Activities and Training

Number of Clinical Staff	12
Number of Clinical Fellows	1
Number of Other Students	2
Inpatient Encounters	243
Outpatient Encounters	6,495

Faculty Members

Marc E. Rothenberg, MD, PhD, Professor ; *Division Director*

Research Interests: Elucidating the mechanisms of allergic responses especially in mucosal tissues such as the lung and the gastrointestinal tract

J. Pablo Abonia, MD, Research Assistant Professor

Research Interests: The role of mast cells in eosinophilic esophagitis

Amal H. Assa'ad, MD, Professor Clinical ; *Clinical Director*

Research Interests: The occult effect of allergic sensitization to foods on the bronchial hyper-responsiveness seen in asthmatic and the genetic basis of food allergy

Robert Ausdenmoore, MD, Adjunct Professor Clinical

Research Interests: To study food allergy; eosinophilic esophagitis; asthma

Thomas J. Fischer, MD, Adjunct Professor Clinical

Research Interests: The pharmacologic management of asthma, immune deficiency diseases

Simon P. Hogan, PhD, Assistant Professor

Research Interests: To study allergies, food allergies, eosinophil biology & gastrointestinal inflammation

Michelle B. Lierl, MD, Adjunct Associate Professor

Research Interests: To reduce environmental tobacco smoke exposure in children with asthma

Anil Mishra, PhD, Research Assistant Professor

Research Interests: Understanding the mechanism of aeroallergen-induced allergic responses in the lung and lower gastrointestinal tract

Kimberly A. Risma, MD, PhD, Research Assistant Professor

Research Interests: The molecular and cellular bases of primary disorders of immune deficiency and dysregulation, especially as it relates to lymphocyte cytotoxicity

Manoj Warriar, MD, Research Instructor

Research Interests: To understand the molecular pathogenesis involved in food allergy related disorders.

Nives Zimmermann, MD, Research Assistant Professor

Research Interests: The molecular understanding of eosinophil survival in allergic inflammation and asthma

Joint Appointment Faculty Members

Gurjit Khurana Hershey, MD, PhD, Professor

Asthma Research

Genetics of allergy and asthma; cytokines; and signaling pathways

Alexandra Filipovich, MD, Professor

Hematology/Oncology Diagnostic Laboratory

Primary immunodeficiencies; BMT for primary immunodeficiencies; Hemophagocytic lymphocytosis; Post-BMT immune reconstruction

Clinical Staff Members

- **Kalra Harpinder, MD**

Trainees

- **Carine Blanchard, PhD**, Laboratoire de Gastroenterologie INSERM U45 Lyon, France
- **Julie Caldwell, PhD**, University of Cincinnati, Ohio
- **Eun Jin Lim, PhD**, University of Kentucky, Kentucky
- **Kelly Metz, MD**, University of Cincinnati, Ohio
- **Ariel Munitz, PhD**, Hebrew University of Jerusalem, Israel
- **Miguel Stein, MD**, University of Chile Medical School, Chile
- **Zeenath Unnisa, PhD**, Osmania University, Hyderabad, India
- **Li Zuo, MD**, Zunyi Medical College, China
- **Katherine Groschwitz, ,** Xavier University, Ohio
- **Hongyan Zhu, ,** Hubei College of Traditional Medicine, China
- **Amanda Beichler, ,** Ohio Northern University, Ohio
- **Tom Lu, ,** University of Cincinnati, Ohio
- **Leah Kottyan, ,** Huntingdon College, Alabama

Significant Accomplishments in FY08

The Cincinnati Center for Eosinophilic Disorders (CCED)

The Cincinnati Center for Eosinophilic Disorders (CCED), a joint effort between the Divisions of Allergy and Immunology

and Gastroenterology, Hepatology and Nutrition, has had a year of tremendous growth both in staffing and in clinical services. There was a 7% growth in the number of new families that came to the CCED, and indeed, the CCED drew patients from around the world with 80% of the 380 patients seen coming from outside the Children's Hospital catchment area. This multidisciplinary, collaborative center utilizes eosinophilic specialists from the Divisions of Allergy, Gastroenterology, Nutrition, Social Work, and Psychology, and Otolaryngology who see these patients and their families in their initial week-long evaluation.

Sean Jameson, as the Program Coordinator, along with Bridget Buckmeier, the Lead Research Coordinator, managed the growth of six new CCED staff, taking the group to ten full-time members. The CCED successfully recruited Dr. James Franciosi, a pediatric gastroenterologist trained at Children's Hospital of Philadelphia, who has expertise in eosinophilic gastrointestinal disorders; this allows expansion of the CCED's capabilities. The CCED has enhanced the services provided to its families with the development of The Eddy project (a patient traveling journal) that is tracked on our website, as well as the development of a weekly "patient education day" for new and existing patients. The CCED has developed the framework for a local family support group which begins in 2008.

During the past fiscal year, the CCED published 17 articles on eosinophils. A recent publication (Clinical Gastroenterology and Hepatology, Collins, M., et al. 2008) reported the clinical, pathologic, and molecular characterization of familial Eosinophilic Esophagitis (EE) in 59 members of 26 families. Further, the initial results on the effect of a new biological therapy (Anti-IL-5) for eosinophilic disorders revealed positive findings which has prompted the pharmaceutical industry to conduct large scale clinical trials. This resulted in a recent publication (New England Journal of Medicine, Rothenberg, M. et al. 2008) on the treatment of patients with Hypereosinophilic Syndrome with Mepolizumab. The group continues to work on two investigator initiated studies in which Dr. Marc Rothenberg, CCED Director, holds the Investigational New Drug (IND) file with the Food and Drug Administration; these studies concern mepolizumab and fluticasone). In addition, the CCED has expanded its comprehensive longitudinal database to >1900 patients, including detailed phenotypic data and biologic samples. This database supports a variety of research projects focused on genetics, natural history, molecular pathogenesis, and outcomes research.

Food Allergy Program

Our outstanding Food Allergy Program in the Division of Allergy and Immunology is comprised of experienced faculty, nurses and nutritionists. The number of patients seen in the outpatient clinics, with a diagnosis of food allergy, has dramatically increased 10-fold over the past five years from 161 individual patient visits in 2003 to an anticipated 1,686 in 2008.

This dramatic rise in patients not only reflects the food allergy epidemic locally but also the attraction of national and international patients to our center. Amal Assa'ad, MD, Director of the Food Allergy Clinic, is internationally recognized, recently speaking at the International Food Allergy Symposium of the World Allergy Organization in Bangkok. Dr. Assa'ad has led a team of national experts writing a manual for the gold standard diagnostic procedure in food allergy entitled "The Oral Food Challenge". The procedure of oral food challenge is performed routinely at the Food Allergy Clinic, and provides the basis for diagnosing food allergy in many children as well as a method of removing an unfounded diagnosis of food allergy from even more children.

The leading research efforts of our Food Allergy Program were recognized by two new NIH awards in 2008; Dr. Simon Hogan for "The Interleukin-9 in Experimental Intestinal Anaphylaxis" (award period 2008-2011 for \$1,500,000) and Dr. Carine Blanchard for "TSG6 in IgE Mediated Food Allergy" (award period 2008-2010 for \$375,000).

Significant Publications in FY08

Rothenberg ME, Klion AD, Roufosse FE, Kahn JE, Weller PF, Simon HU, Schwartz LB, Rosenwasser LJ, Ring J, Griffin EF, Haig AE, Frewer PI, Parkin JM, Gleich GJ; Mepolizumab HES Study Group. Treatment of patients with the hypereosinophilic syndrome with mepolizumab. N Engl J Med 2008; 358:1215-28.

The long-term use of an investigational antibody-based medication, mepolizumab, designed to target a type of white blood cell, has resulted in steroid-sparing treatment for patients with the devastating blood disorder, hypereosinophilic syndrome (HES), that can lead to heart failure and death, according to a Phase III study published in the March 20 The New England Journal of Medicine. The current standard treatment for the majority of HES patients is the chronic, systemic use of corticosteroids, such as prednisone, which can have considerable side effects. The study found that mepolizumab enabled study patients to significantly reduce their doses of steroids and, often, even withdraw from steroid use.

Munitz A, Brandt EB, Mingler M, Finkelman FD, Rothenberg ME. Distinct roles for IL-13 and IL-4 via IL-13

receptor alpha1 and the type II IL-4 receptor in asthma pathogenesis. Proc Natl Acad Sci U S A 2008; 105:7240-5.

The specific IL-4 and IL-13 receptor in the lung has been identified.

Mishra A, Wang M, Pemmaraju VR, Collins MH, Fulkerson PC, Abonia JP, Blanchard C, Putnam PE, Rothenberg ME. Esophageal remodeling develops as a consequence of tissue specific IL-5-induced eosinophilia. Gastroenterology 2008; 134:204-14.

The development of eosinophil remodeling is shown to be IL-5 and eosinophil dependant.

Forbes EE, Groschwitz K, Abonia JP, Brandt EB, Cohen E, Blanchard C, Ahrens R, Seidu L, McKenzie A, Strait R, Finkelman FD, Foster PS, Matthaei KI, Rothenberg ME, Hogan SP. IL-9- and mast cell-mediated intestinal permeability predisposes to oral antigen hypersensitivity. J Exp Med 2008; 205:897-913.

A novel pathway for food allergic responses is identified.

Division Highlights

Experimental Modeling of Allergic Diseases

The Division of Allergy and Immunology research program focuses on defining the molecular basis underlying the development and exacerbation of diseases including asthma, food allergy and eosinophilic gastrointestinal diseases, and hypereosinophilic syndrome (chronic eosinophilic leukemia). The group has developed an array of innovative experimental animal (murine) models of allergic diseases to define the contribution of cytokines, receptors, chemokines, inflammatory cells including eosinophils, CD4+ T-cells and mast cells in the pathophysiological manifestations of allergic diseases. For example, Dr. Simon Hogan's laboratory recently reported a novel mouse model of oral antigen hypersensitivity allowing him to define an essential role for mast cells and the cytokine interleukin-9 in gastrointestinal allergy. (Forbes, E. E. et al. IL-9- and mast cell-mediated intestinal permeability predisposes to oral antigen hypersensitivity. J. Exp. Med. 31 March 2008 [doi:10.1084/jem.20071046])

Division Collaboration

Collaboration with Adherence Psychology; Behavioral Medicine & Clinical Psychology; Gastroenterology, Hepatology and Nutrition; Pathology; Pediatric Otolaryngology

Collaborating Faculty: Dennis Drotar, PhD; Kevin Hommel, PhD; Phillip Putnam, MD; James Franciosi, MD; Margaret Collins, MD; Alessandro deAlarcon, MD

The Cincinnati Center for Eosinophilic Disorders (CCED) is a multidisciplinary, collaborative center utilizes eosinophilic specialists from the Divisions of Allergy, Gastroenterology, Nutrition, Social Work, and Psychology, and Otolaryngology who see these patients and their families in their initial week-long evaluation. (Rothenberg, Albonia, Risma)

Collaboration with Immunobiology ; Pathology; Personalized and Predictive Medicine

Collaborating Faculty: Marsha Wills-Karp, PhD; Fred D. Finkelman, MD; David Witte, MD; Keith Stringer, MD; Gurjit K. Khurana Hershey, MD, PhD

Program Project Grant to elucidate the mechanisms by which Interleukin-13 (IL-13) is produced and by which it induces the pathophysiological features of asthma. (Rothenberg)

Collaboration with University of Cincinnati, Molecular Genetics

Collaborating Faculty: Andrew B. Herr, PhD

University Research Council Interdisciplinary Grant entitled "Biophysical Consequences of Missense Mutations in Perforin". (Risma)

Mentions in Consumer Media

- [These Benefactors Do Homework As Charities Fawn](#) Wall Street Journal , Newspaper
- [Plainville Boy Suffering from Extreme Allergy](#) News Channel 8's Jocelyn Maminta , Television
- [The Order of Health](#) Prevention , Magazine
- [High Season for Allergies](#) The Windsor Star , Newspaper
- [Food Allergy Sufferers Must be on Alert at Fairs](#) The Detroit News , Newspaper

- [Tri-State Under Fourth Smog Alert Of 2007](#) WCPO Channel 9 News , Television
- [Subway Sued Over Fatal Allergic Reaction](#) WCPO Channel 9 News , Television
- [Ron & Kristina Turnis Interview](#) Telegraph Herald , Web Site
- [Breastfeeding is One Way to Reduce Food Allergy Risk](#) HealthDay News , Web Site
- [Halloween and Food Allergy Safety](#) Today's Dietitian , Magazine
- [Food Allergens Show up in Unexpected Places](#) HealthDay News/ABC News , Web Site
- [Food Allergies Stir a Mother to Action](#) The New York Times , Newspaper
- [New Drug Eases Asthma Symptoms](#) HealthDay News , Web Site

Division Publications

1. Forbes EE, Groschwitz K, Abonia JP, Brandt EB, Cohen E, Blanchard C, Ahrens R, Seidu L, McKenzie A, Strait R, Finkelman FD, Foster PS, Matthaehi KI, Rothenberg ME, Hogan SP. [IL-9- and mast cell-mediated intestinal permeability predisposes to oral antigen hypersensitivity](#). *J Exp Med*. 2008; 205: 897-913.
2. Gupta J, Grube E, Erickson MB, Stevenson MD, Lucky AW, Sheth AP, Assa'ad AH, Khurana Hershey GK. [Intrinsically defective skin barrier function in children with atopic dermatitis correlates with disease severity](#). *J Allergy Clin Immunol*. 2008; 121: 725-730 e2.
3. Blanchard C, Mingler MK, Vicario M, Abonia JP, Wu YY, Lu TX, Collins MH, Putnam PE, Wells SI, Rothenberg ME. [IL-13 involvement in eosinophilic esophagitis: transcriptome analysis and reversibility with glucocorticoids](#). *J Allergy Clin Immunol*. 2007; 120: 1292-300.
4. Bullock JZ, Villanueva JM, Blanchard C, Filipovich AH, Putnam PE, Collins MH, Risma KA, Akers RM, Kirby CL, Buckmeier BK, Assa'ad AH, Hogan SP, Rothenberg ME. [Interplay of adaptive th2 immunity with eotaxin-3/c-C chemokine receptor 3 in eosinophilic esophagitis](#). *J Pediatr Gastroenterol Nutr*. 2007; 45: 22-31.
5. Collins MH, Blanchard C, Abonia JP, Kirby C, Akers R, Wang N, Putnam PE, Jameson SC, Assa'ad AH, Konikoff MR, Stringer KF, Rothenberg ME. [Clinical, pathologic, and molecular characterization of familial eosinophilic esophagitis compared with sporadic cases](#). *Clin Gastroenterol Hepatol*. 2008; 6: 621-9.
6. Filipovich AH. [Hemophagocytic lymphohistiocytosis and other hemophagocytic disorders](#). *Immunol Allergy Clin North Am*. 2008; 28: 293-313, viii.
7. Filipovich AH. [Diagnosis and manifestations of chronic graft-versus-host disease](#). *Best Pract Res Clin Haematol*. 2008; 21: 251-7.
8. Friedlander SL, Dooms KT, Seroogy CM, Voss CY, Agger WA, Zhang K, Bleesing J, Filipovich AH. [Adolescent presentation of x-linked lymphoproliferative disease](#). *Ann Allergy Asthma Immunol*. 2008; 100: 398-400.
9. Hansen MD, Filipovich AH, Davies SM, Mehta P, Bleesing J, Jodele S, Hayashi R, Barnes Y, Shenoy S. [Allogeneic hematopoietic cell transplantation \(HCT\) in Hurler's syndrome using a reduced intensity preparative regimen](#). *Bone Marrow Transplant*. 2008; 41: 349-53.
10. Hazen MM, Woodward AL, Hofmann I, Degar BA, Grom A, Filipovich AH, Binstadt BA. [Mutations of the hemophagocytic lymphohistiocytosis-associated gene UNC13D in a patient with systemic juvenile idiopathic arthritis](#). *Arthritis Rheum*. 2008; 58: 567-70.
11. Horne A, Trottestam H, Arico M, Egeler RM, Filipovich AH, Gadner H, Imashuku S, Ladisch S, Webb D, Janka G, Henter JL. [Frequency and spectrum of central nervous system involvement in 193 children with haemophagocytic lymphohistiocytosis](#). *Br J Haematol*. 2008; 140: 327-35.
12. Marsh RA, Lucky AW, Walsh TJ, Pacheco MC, Rinaldi MG, Mailler-Savage E, Puel A, Casanova JL, Bleesing JJ, Filippi MD, Williams DA, Daines MO, Filipovich AH. [Cutaneous infection with *Metarhizium anisopliae* in a patient with hypohidrotic ectodermal dysplasia and immune deficiency](#). *Pediatr Infect Dis J*. 2008; 27: 283-4.
13. Nicolaou SA, Szigligeti P, Neumeier L, Lee SM, Duncan HJ, Kant SK, Mongey AB, Filipovich AH, Conforti L. [Altered dynamics of Kv1.3 channel compartmentalization in the immunological synapse in systemic lupus erythematosus](#). *J Immunol*. 2007; 179: 346-56.
14. Stein ML, Villanueva JM, Buckmeier BK, Yamada Y, Filipovich AH, Assa'ad AH, Rothenberg ME. [Anti-IL-5 \(mepolizumab\) therapy reduces eosinophil activation ex vivo and increases IL-5 and IL-5 receptor levels](#). *J Allergy Clin Immunol*. 2008; 121: 1473-83, 1483 e1-4.
15. Fulkerson PC, Rothenberg ME. [Origin, regulation and physiological function of intestinal eosinophils](#). *Best Pract Res Clin Gastroenterol*. 2008; 22: 411-23.
16. Khoudoun M, Lewis CC, Yang JQ, Orekov T, Potter C, Wynn T, Mentink-Kane M, Hershey GK, Wills-Karp M, Finkelman FD. [Differences in expression, affinity, and function of soluble \(s\)IL-4Ralpha and sIL-13Ralpha2 suggest opposite effects on allergic responses](#). *J Immunol*. 2007; 179: 6429-38.

17. Hogan SP. [Recent advances in eosinophil biology](#). *Int Arch Allergy Immunol*. 2007; 143 Suppl 1: 3-14.
18. Hogan SP, Rosenberg HF, Moqbel R, Phipps S, Foster PS, Lacy P, Kay AB, Rothenberg ME. [Eosinophils: biological properties and role in health and disease](#). *Clin Exp Allergy*. 2008; 38: 709-50.
19. Hogan SP, Rothenberg ME. [Dietary allergenic proteins and intestinal immunity: a shift from oral tolerance to sensitization](#). *Clin Exp Allergy*. 2008; 38: 229-32.
20. Iossifova Y, Reponen T, Daines M, Levin L, Khurana Hershey GK. **Comparison of two analytical methods for detecting (1-3)-B-D-glucan in pure fungal cultures and in home dust samples**. *Open Allergy J*. 2008; 1: 26-34.
21. Smith AM, Bernstein DI, LeMasters GK, Huey NL, Ericksen M, Villareal M, Lockey J, Khurana Hershey GK. [Environmental tobacco smoke and interleukin 4 polymorphism \(C-589T\) gene: environment interaction increases risk of wheezing in African-American infants](#). *J Pediatr*. 2008; 152: 709-15, 715 e1.
22. Stevenson MD, Sellins S, Grube E, Schroer K, Gupta J, Wang N, Khurana Hershey GK. [Aeroallergen sensitization in healthy children: racial and socioeconomic correlates](#). *J Pediatr*. 2007; 151: 187-91.
23. Tabata Y, Khurana Hershey GK. [IL-13 receptor isoforms: breaking through the complexity](#). *Curr Allergy Asthma Rep*. 2007; 7: 338-45.
24. Mishra A, Wang M, Pemmaraju VR, Collins MH, Fulkerson PC, Abonia JP, Blanchard C, Putnam PE, Rothenberg ME. [Esophageal remodeling develops as a consequence of tissue specific IL-5-induced eosinophilia](#). *Gastroenterology*. 2008; 134: 204-14.
25. Mishra A, Wang M, Schlotman J, Nikolaidis NM, DeBrosse CW, Karow ML, Rothenberg ME. [Resistin-like molecule-beta is an allergen-induced cytokine with inflammatory and remodeling activity in the murine lung](#). *Am J Physiol Lung Cell Mol Physiol*. 2007; 293: L305-13.
26. Trizzino A, zur Stadt U, Ueda I, Risma K, Janka G, Ishii E, Beutel K, Sumegi J, Cannella S, Pende D, Mian A, Henter JI, Griffiths G, Santoro A, Filipovich A, Arico M. [Genotype-phenotype study of familial haemophagocytic lymphohistiocytosis due to perforin mutations](#). *J Med Genet*. 2008; 45: 15-21.
27. Zhang K, Johnson JA, Biroshak J, Villanueva J, Lee SM, Bleesing JJ, Risma KA, Wenstrup RJ, Filipovich AH. [Familial haemophagocytic lymphohistiocytosis in patients who are heterozygous for the A91V perforin variation is often associated with other genetic defects](#). *Int J Immunogenet*. 2007; 34: 231-3.
28. Blanchard C, Rothenberg ME. [Basic pathogenesis of eosinophilic esophagitis](#). *Gastrointest Endosc Clin N Am*. 2008; 18: 133-43; x.
29. Brandt EB, Mingler MK, Stevenson MD, Wang N, Khurana Hershey GK, Whitsett JA, Rothenberg ME. [Surfactant protein D alters allergic lung responses in mice and human subjects](#). *J Allergy Clin Immunol*. 2008; 121: 1140-1147 e2.
30. Furuta GT, Liacouras CA, Collins MH, Gupta SK, Justinich C, Putnam PE, Bonis P, Hassall E, Straumann A, Rothenberg ME. [Eosinophilic esophagitis in children and adults: a systematic review and consensus recommendations for diagnosis and treatment](#). *Gastroenterology*. 2007; 133: 1342-63.
31. Herbert DR, Orekov T, Perkins C, Rothenberg ME, Finkelman FD. [IL-4R{alpha} Expression by Bone Marrow-Derived Cells Is Necessary and Sufficient for Host Protection against Acute Schistosomiasis](#). *J Immunol*. 2008; 180: 4948-55.
32. Munitz A, Brandt EB, Mingler M, Finkelman FD, Rothenberg ME. [Distinct roles for IL-13 and IL-4 via IL-13 receptor alpha1 and the type II IL-4 receptor in asthma pathogenesis](#). *Proc Natl Acad Sci U S A*. 2008; 105: 7240-5.
33. Munitz A, McBride ML, Bernstein JS, Rothenberg ME. [A dual activation and inhibition role for the paired immunoglobulin-like receptor B in eosinophils](#). *Blood*. 2008; 111: 5694-703.
34. Rothenberg ME. "Eosinophilic syndromes." *Cecil medicine*. Philadelphia: Saunders/Elsevier; 2007: 1277-1280.
35. Rothenberg ME, Cohen MB. [An eosinophil hypothesis for functional dyspepsia](#). *Clin Gastroenterol Hepatol*. 2007; 5: 1147-8.
36. Rothenberg ME, Klion AD, Roufosse FE, Kahn JE, Weller PF, Simon HU, Schwartz LB, Rosenwasser LJ, Ring J, Griffin EF, Haig AE, Frewer PI, Parkin JM, Gleich GJ. [Treatment of patients with the hypereosinophilic syndrome with mepolizumab](#). *N Engl J Med*. 2008; 358: 1215-28.
37. Zuo L, Rothenberg ME. [Gastrointestinal eosinophilia](#). *Immunol Allergy Clin North Am*. 2007; 27: 443-55.
38. Warrier MR, Hershey GK. [Asthma genetics: personalizing medicine](#). *J Asthma*. 2008; 45: 257-64.

Grants, Contracts, and Industry Agreements

Grant and Contract Awards

Annual Direct / Project Period Direct

Blanchard, C

Periostin Expression in Inflammatory Contexts

American Heart Association - Ohio

07/01/06 - 06/30/08

\$44,000 / \$86,000

Filaggrin Expression is Decreased in Pediatric Eosinophilic Esophagitis Patients

Thrasher Research Fund

02/01/07 - 01/31/09

\$13,000 / \$25,000

Digestive Health Center: Bench to Bedside Research in Pediatric Digestive Disease

Digestive Health Center

P30DK078392

06/01/08 - 05/31/09

\$25,000 / \$25,000

TSG6 in IgE-mediated Food Allergy

National Institutes of Health

R21 AI 079874

06/18/08 - 05/31/10

\$125,000 / \$250,000

Hogan, S**Mast Cell PAF-Dependent Intravascular Leakage in Food-induced Anaphylaxis**

American Heart Association - Ohio

0765196B

07/01/07 - 06/30/09

\$55,000 / \$110,000

Eosinophils and Pediatric Inflammatory Bowel Disease

Crohn's and Colitis Foundation of America

01/01/07 - 12/31/09

\$90,000 / \$179,480

Interleukin-9 in Experimental Intestinal Anaphylaxis

National Institutes of Health

R01 AI 073553

04/01/08 - 03/31/12

\$250,000 / \$1,000,000

Mishra, A**Mechanistic Analysis Of Eosinophilic Esophagitis**

National Institutes of Health

R01 DK 067255

04/01/05 - 03/31/10

\$152,392 / \$820,000

Munitz, A**Machiah Fellowship**

Machiah Foundation

07/01/06 - 06/30/08

\$50,000 / \$100,000

Risma, K**The Pathophysiologic Basis of Perforin Misfolding in Cytotoxic Granules**

American Academy of Allergy, Asthma and Immunology

07/01/07 - 06/30/09

\$50,000 / \$100,000

Mechanisms of Altered Lymphocyte Cytotoxicity

Doris Duke Charitable Foundation

08/01/06 - 07/31/09

\$125,000 / \$375,000

Rothenberg, M**Regulation Of Gastrointestinal Eosinophils**

National Institutes of Health

R01 AI 045898

01/15/04 - 12/31/08

\$186,033 / \$960,000

The Hypereosinophilic Syndromes And Mepolizumab

National Institutes of Health (University of Utah)

R01 AI 061097

06/15/04 - 05/31/08

\$8,054 / \$91,456

Interleukin-13 in Experimental Asthma - Breeding and Genotyping Core

National Heart, Lung and Blood Institute

P01 HL076383

07/01/04 - 06/30/09

\$109,971 / \$679,922

Interleukin-13 in Experimental Asthma - Component 3

National Heart, Lung and Blood Institute

P01 HL076383

07/01/04 - 06/30/09

\$273,182 / \$1,327,285

Epithelial Genes in Allergic Inflammation

National Institutes of Health U19 AI070235	09/15/06 - 08/31/11	\$190, 620 / \$516,080
Molecular Analysis of Eosinophilic Esophagitis		
Food Allergy and Anaphylaxis Network	02/01/07 - 01/31/09	\$69,444 / \$138,888
Novel Genetic and Therapeutic Approaches Focusing on Siglec-8 for the Diagnosis and Treatment of Human Idiopathic Eosinophilic Disorders		
The Dana Foundation	10/01/07 - 09/30/10	\$100,000 / \$300,000
Strauss/Rothenberg		
Pediatric Center For Gene Expression & Development		
National Institutes of Health K12 HD 028827	12/01/06 - 11/30/11	\$400,000 / \$2,000,000
Warrier, M		
AAAAI Young Faculty Support Award		
American Academy of Allergy, Asthma and Immunology	01/01/08 - 12/31/08	\$50,000 / \$50,000
Zimmermann, N		
The Role of Arginine Transport in the Development of Inflammatory Homeostasis in the Lung		
March of Dimes - National 6-FY06-345	06/01/06 - 05/31/09	\$84,607 / \$248,503
Current Year Direct		\$2,451,303
Industry Contracts		
Assa'ad, A		
GlaxoSmithKline		\$ 129,661
Rothenberg, M		
GlaxoSmithKline		\$ 1,060
Merck & Company, Inc		\$ 80,850
Current Year Direct Receipts		\$211,571
		Total \$2,662,874