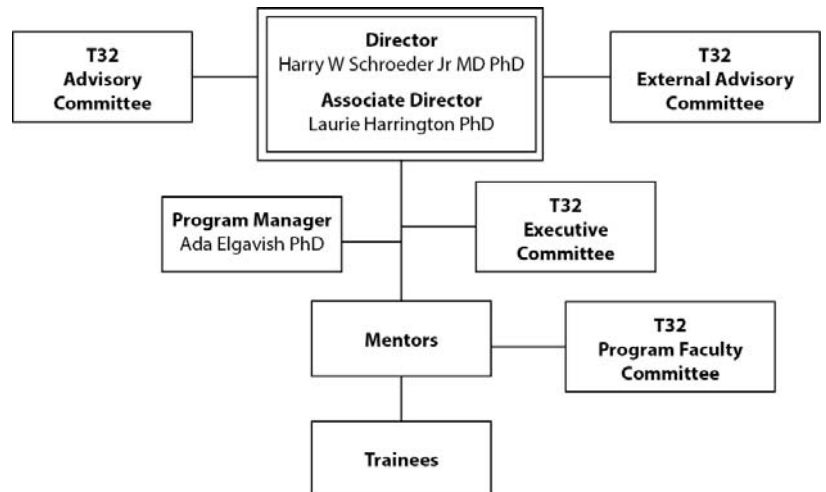


3. PROGRAM PLAN

3A. Program Administration

Program Director. The Program Director, Harry W Schroeder, Jr, MD PhD, is Director of the UAB Program in Immunology, Professor of Medicine in Clinical Immunology and Rheumatology and Professor of Microbiology and Genetics. He is a basic and clinical immunologist and geneticist with expertise in immunoglobulin repertoire development and function and in the genetics and treatment of primary immune disorders that manifest in the adult. He is an active investigator in the study of the role of antigen receptor repertoires in the pathogenesis or manifestations of diseases of immune function and responses to infection. Diseases and responses to infection currently under study include common variable immunodeficiency, systemic lupus erythematosus, HIV, influenza virus, and *Streptococcus pneumoniae*. He has served on and chaired the Hyper-ID Scientific Review Group (SSS-J) Study Section, and has served or chaired various review groups for NIAID, NIDDK, NASA, the VA and the Arthritis Foundation. He is a former Councilor for the Clinical Immunology Society, for the Henry Kunkel Society and for the Southern Society of Clinical Investigation. He has served on the Editorial Boards of *The Journal of Immunology* and is currently serving on the Boards of the American Journal of Clinical Immunology, *Frontiers in B cell Biology*, and *Immunogenetics*. Of the nine graduate students he has mentored who have completed their terminal degree, seven are still involved in academia or research including one full Professor, one Associate Professor, two Assistant Professors (or equivalent), two Research Associates, one post-doctoral fellow, and one student in an academic administrative position. The remaining student is involved in a private company. Of the 18 trainees who have completed post-graduate training, two held PhDs alone, five held MD PhDs, and eleven held MDs. Of the two with PhDs, one holds the rank of Professor and the other of Vice President for Product Development. Of the five with MD PhDs, one is a Chair of Medicine, one is a Division Director, two are Assistant Professors or equivalent, and one is a Research Associate at the NIH. Of the remaining eleven, one is a Vice Chair of Anesthesiology, one is an Assistant Professor, one is an Instructor, one is pursuing further clinical training, with the remainder in private practice. Dr. Schroeder will allocate 10% of his time, supported by the School of Medicine, to this T32.



Program Associate Director. The Program Associate Director, Laurie Harrington, PhD, is herself a graduate of this training program grant under the mentorship of Casey Weaver, MD. Following a highly productive training period in Dr. Rafi Ahmed's laboratory examining CD8 T cell responses to viral infections, she shifted her research efforts in Dr. Weaver's laboratory to focus on the significance of protective CD4 T cell responses. In a landmark study, she was the first to identify the Th17 lineage of effector CD4 T cells as a distinct subset from the previously characterized Th1 and Th2 effector CD4 T cell subsets. Her current area of interest is the role of CD4 T cells in mouse models of autoimmune chronic inflammation (colitis and experimental autoimmune encephalomyelitis models). Currently, she is the Ph.D. mentor to four pre-doctoral students. She was appointed Associate Director of this T32 training grant in 2008.

Administrative Structure and Responsibilities

T32 Executive Committee (EC). Dr. Schroeder is joined by Program Associate Director, Dr. Laurie Harrington, by a former Director of this training grant, Dr. John Volanakis, and by Drs. Louis Justement, Susan Michalek, Troy Randall and Casey Weaver to comprise the T32 Executive Committee, or EC. Each brings substantial experience and expertise, both in research and in research training, especially as it applies to the study of immunology. The responsibilities of the Executive Committee include (a) guiding the program in applicant selection, (b) reviewing the individualized training programs for each trainee, including didactic course work, (c) participating in the interdisciplinary program experience, (d) reviewing applications from

prospective mentors, (e) guiding the mentoring of mentors, and (f) evaluating progress on the individual mentored research project.

T32 Program Faculty Committee (PFC). The PFC is comprised of the mentors of the trainees who are either currently supported by this training grant or have recently completed their training. The PFC, which is chaired by the Program Director and Associate Director, meets twice a year to review the success of the program faculty in mentoring its trainees and to evaluate opportunities for improved effectiveness. This Committee assists trainees in establishing scientific contacts and networking, both during the training period and in anticipation of career development and advancement.

T32 Advisory Committee (AC). In addition to active discussion about policies and performance of the training program among the Program Faculty, an internal training program Advisory Committee will meet annually to review progress and make recommendations to the Director, the Associate Director, and the Executive Committee. This committee is chaired by Dr. Robert R. Rich, Dean Emeritus of the School of Medicine, and comprised of Dr. T. Prescott Atkinson, Director of the Allergy and Immunology Fellowship Program; Dr. S. Louis Bridges, Director of the Division of Clinical Immunology and Rheumatology; Dr. David Chaplin, Chair of the GBS Steering and Oversight Committee; Dr. Robin Lorenz, Director of the MD/PhD Program; Dr. Rakesh Patel, Director of the HHMI Med-into-Grad program; and Dr. Lisa Schwiebert, Director of the Office of Postdoctoral Education. This Advisory Committee will receive an annual report from the Program Director which outlines the recruitment and placement of trainees and the development of their research and training progress. The AC advises the Executive Committee by reviewing strategies for applicant recruitment, the process of applicant selection, the overall goals of the training program including the balance of didactic enrichment and supplementation for each trainee, and the composition of the training faculty. The TPIAC is also responsible for evaluating the interaction of this training program with other training programs on campus and for advising the Program Directors with regard to new initiatives. The committee reviews the scientific progress in the training program and makes recommendations as necessary to the mentors, the trainees and the Program Directors.

T32 External Advisory Committee (EAC). In the last training program cycle, the AC recommended that the Program Director and the Executive Committee create a separate External Advisory Committee. The instructions for this application specifically prohibit reporting the membership of this newly constituted EAC. However, the three members of the EAC have provided written evaluations of the current program that have been made available to the T32 Advisory Committee and to all Program Faculty.

Specific Administrative Responsibilities. Dr. Harry W Schroeder Jr, Program Director, is responsible for the overall direction of this training program. He is assisted on a regular basis by Dr. Laurie Harrington, the Program Associate Director, and by members of the Executive Committee and Program Faculty. In addition to Harrington, he works with Dr. Laura Hughes (Director of the Rheumatology Fellowship Program) and Dr. T. Prescott Atkinson (Director of the Allergy and Immunology Fellowship Program) in the recruitment of medically trained applicants for this training program, with Drs. Daniel Bullard (Genetics and Genomic Sciences Graduate Theme), Dr. Peter Burrows (Immunology Graduate Theme), Dr. Janet Yother (Microbiology Graduate Theme), Dr. Michelle Fanucchi (Pathobiology and Molecular Medicine Graduate Theme), and Dr. Robin Lorenz (MSTP) in the recruitment of pre-doctoral students interested in immunology to UAB. Dr. Schroeder calls meetings of the Executive Committee, of the Program Faculty Committee, and of the Advisory Committees. He prepares the annual report for the T32 Advisory Committee and works with his administrative staff to fulfill all reporting responsibilities of the program. Dr. Ada Elgavish, who is the administrative Program Manager of the Program in Immunology, is responsible for assistance in the administration of the training program, in the coordination of meetings both for trainees and for program faculty, and in the preparation of the annual reports. Additional assistance is provided by Dr. Carol Ballinger and Ms. Judy Thomas in financial management.

3B. Program Faculty

Description of the Faculty. Table 2 lists the training faculty members, their Departmental and Divisional affiliation and their general area of research interest. Reflecting the organization of the thematic workgroups within the [Program in Immunology](#), the faculty represents strong investigative interests in the fields of allergy,

autoimmunity, bioinformatics, cancer immunology, developmental immunology, host defense, immunodeficiency, immunodermatology, immunogenetics, inflammation, mucosal immunology, neuroimmunology, structural immunology, transplantation, and clinical research and translational sciences; as well as a strong interest and record of training. Recognizing the importance of maintaining a cohesive training program in the context of an interdisciplinary faculty, the Program Director and Executive Committee emphasize that the activities of the Program in Immunology provide an effective mechanism for coordination.

The role of the Program Faculty is (a) to assist in the recruitment of pre-doctoral students and postdoctoral fellows, (b) to discuss their research at the Spring "Research Days" designed for both pre- and postdoctoral trainees, (c) to make their laboratories and research teams available for rotations, (d) to serve as a mentor and preceptor for research projects, (e) to provide timely feedback about progress to the Program Director and Executive Committee, and (f) to assist trainees in planning for their future career. Table 1 summarizes the critical mass of faculty and trainees by scientific discipline available to this training program. The research interests, extramural grant support, training grant participation, training records of the Program Faculty are provided in Tables 2-5A/B, respectively.

The Program Faculty includes senior investigators with well-established research programs as well as highly effective younger investigators (e.g., Drs. Deshane, Harrington, Hatton, Hel, Kabarowski, and Tse). The Program Director and Executive Committee believe that participation of younger faculty members in this training program is important for the development of both faculty and trainees. Given the exigencies of the current economic climate, research funding has become ever more competitive, and it is an unfortunate fact that a well-funded investigator can become bereft of funding, and a poorly funded investigator can achieve funding almost overnight. This training program appreciates that training requires resources that sub-optimally funded mentors cannot provide, but that the experience such established investigators can contribute can greatly enrich the training process. To that end, we have divided the program faculty into two groups, **CORE** (those with optimal funding) and **CONTENT** (those with suboptimal funding). We actively encourage both core and content faculty to engage in co-mentorship of the trainees, but **only core faculty members are permitted to serve as the primary mentors**. Using these criteria, we number 40 core and 17 content faculty. These categories are fluid, and both categories are re-evaluated on a yearly basis. We appreciate that core faculty with trainees can also suffer diminished funding while in the process of training. However, each individual department or division has pledged to help support the trainees' training even when the primary mentor suffers loss of funding. With this institutional support, over the last thirty-five years of this training program no trainee supported by this institutional training grant has been unable to complete his or her training as a consequence of the vagaries of the funding cycle.

Given current page limitations, the following descriptions of the 57 faculty members are necessarily brief.

Core Faculty

Jonas S. Almeida, PhD (Pathology/Informatics). Funding: DOD, NIH/NCRR, NIH/NIGMS, ONR

Computational infrastructure for integrative bioinformatics – The focus is to articulate the computational statistics aspects of data analysis with the data representation and management of its acquisition.

Scott R. Barnum, PhD (Microbiology). Funding: NIH/NHLBI, NIH/NCI, NIH/ NINDS

The role of complement in immunologic diseases that affect nervous tissue – The focus is the development and progression in the murine model of experimental cerebral malaria (ECM). Other neuro-inflammatory disorders under study include experimental autoimmune encephalomyelitis (EAE), bacterial meningitis, traumatic brain injury, stroke and experimental autoimmune uveitis.

Ety (Tika) Benveniste (Cell Biology). Funding: NIH/ NINDS, NIH/NCI, NIH/NIDDK

Interactions between cells of the immune system and the central nervous system - The focus is the role of soluble mediators such as interferons, cytokines and chemokines on autoimmune and neurodegenerative diseases such as Multiple Sclerosis (MS) and HIV-1 associated neurocognitive disorders. Her laboratory has expertise in neuroimmunology, T-cell biology, macrophage biology, signaling cascades and cytokine biology.

S. Louis Bridges, Jr., MD, PhD (Medicine/Clin Immunol Rheum). Funding: NIH / NIAMS

Immunogenetics and pathogenesis of rheumatoid arthritis –Resources include leadership of the CLEAR Registry, which will provide comprehensive clinical, socioeconomic, and radiographic data, as well as DNA,

RNA, and serum on 1,000 African American patients and 500 controls for the scientific community.

David E. Briles, PhD (Microbiology). Funding: NIH/ NIAID, PATH Foundation, Sanofi Pasteur Ltd

Host defense against *Streptococcus pneumoniae* - The focus is the identification of novel antigens that can elicit protection against pneumococcal infection. Studied antigens include teichoic acid, PspA, PspC, PcpA, pneumolysin, NanA and PotD; several which have led to phase I clinical studies.

William J. Britt, MD (Pediatrics/Infect Dis). Funding Source: NIH/NIAID, NINDS, NIDCD & NICHD

Host defense to perinatal viral infections – The focus is host responses to CMV in the brain using both human samples and mouse models. A second area of interest is the definition of the cytoplasmic phase of virus assembly and the identification of cellular compartments that are modified during virus assembly.

Elizabeth E. Brown, MPH, PhD (Epidemiology). Funding Sources: NIH / NIAMS, NCI, NIAID

Genomics of B-cell mediated clinical phenotypes - The focus is pathways involved in B cell activation and homeostasis, immune complement clearance and deposition, chronic immune perturbation, cytokine signaling as modifiers of disease, mucosal immunity and immune senescence.

James F. Collawn, PhD (Cell Biology). Funding: NIH/NIDDK, Cystic Fibrosis Foundation

Antigen presentation and processing, helper T cell function. The focus is the study of mechanisms of peptide processing and delivery as a means to better understand how helper T cell responses are regulated and how they might be manipulated to control autoimmune diseases.

Randall S. Davis, MD (Medicine/ Hematol Oncol). Source: NIH/NIAID-NCI, American Cancer Soc.

Mechanisms leading to lymphoproliferative disorders – A current focus is the investigation of a multigene family of Fc receptor-like (FCRL) molecules with tyrosine-based regulatory potential that are expressed by subpopulations of lymphocytes in normal and diseased states.

Tara M. DeSilva, PhD (Physical Medicine and Rehabilitation). Funding: Multiple Sclerosis Foundation, UA-HSF General Endowment Fund Scholar Award

Inflammatory disorders of nervous tissue – A current focus is the role of inflammation in demyelination syndromes and the signaling mechanisms that permit remyelination in multiple sclerosis.

Charles O. Elson, III, MD (Medicine/Gastroenterol). Funding: NIH / NIDDK

Mucosal Immunology & Inflammation - The focus is the regulation of mucosal immune responses and how deregulation of the normal homeostasis, including changes in the microbiota, contribute to chronic intestinal inflammation. Inflammatory bowel disorders are of particular interest.

Stuart J. Frank, MD (Medicine/ Endocrinol Diabetes Metabol). Funding: NIH/NIDDK, Department of Veterans Affairs, NIH/NCRR

T-cell receptor signaling –The focus is on the comparative study of growth hormone (GH) signaling and its crosstalk with other factors, including prolactin, insulin-like growth factor-1, and epidermal growth factor, as a model for T cell receptor signaling.

Paul A. Goepfert, MD (Medicine/ Infec Dis). Funding: NIH/NIAID

T cell immune responses in HIV-1 infection – The focus is the analysis of T cell immune responses in HIV-1 infection with the goal of determining correlates of protection that may be important for vaccine design.

Laurie Harrington, PhD (Cell Biology). Funding: NIH / NIAID, NIDDK

Effector CD4 T cell subsets in chronic inflammatory disorders – The focus is on the roles of and lineage relationships between effector CD4 T cell subsets during chronic inflammatory disorders and autoimmunity. Mouse models include EAE and colitis. The roles of specific transcription factors, including STAT4 and Tbet, in mediating pathogenesis are also an area of interest.

Zdenek Hel, PhD (Pathology/ Mol Cell Pathol). Funding: NIH/NIAID

Mucosal immunity and HIV-1 infection – Areas of interest include the study of mucosal immunity and IgA responses in HIV-1-infected individuals; the study of hormonal regulation of immune processes in HIV-1 infection; the use of intravaginal agents to enhance protection against infection; the role of Myeloid-Derived Suppressor Cells (MDSCs) in HIV-1 infection; and the use of B cells expressing the antigen and immunomodulatory molecules as immunization agents.

Hui-Chen Hsu, PhD (Medicine/Clin Immunol Rheumatol). Funding: NIH/NIAID, Lupus Res Institute

Mechanisms of aging and autoimmune disease – Areas of interest include the study of autoimmune BXD2 mice, which Dr. Hsu has shown to exhibit unique features, including spontaneous formation of germinal centers, increased expression of activation-induced cytidine deaminase (AID), increased pathogenic

autoantibody production, and increased number of TH17 T cells; and CD28⁺CD95⁻ CD8 T cells in aging.

Louis B. Justement, PhD (Microbiology). Funding: NIH / NIAID

Molecular mechanisms in B cell development – Areas of interest include the molecular structure and function of mouse and human Transmembrane Receptor Trem-Like Transcript 2 (TLT2) loci, originally cloned in the his laboratory. Expressed on B cells in the periphery, peritoneal and alveolar macrophages, neutrophils and macrophages, TLT2 appears to play an important role in the innate immune response and is likely to bridge components of the innate response with the adaptive response.

John F. Kearney, PhD (Microbiology). Funding: NIH / NIAID

Lymphocyte development and B cell clonal diversity – The focus is the elucidation of fundamental cellular and molecular mechanisms involved in the development of T and B lymphocytes. Particular attention is focused on the factors involved in the establishment and maintenance of the normal immune system in the creation of a diverse B cell repertoire, the identification of novel B cell subsets and B cell progenitors, and immune responses to bacterial pathogens and opportunistic organisms.

Robert P. Kimberly, MD (Medicine/Clin Immunol Rheumatol). Funding: NIH / NIAMS, NIAID

Genetics of autoimmune and immune-mediated inflammatory diseases – Diseases of interest include SLE and systemic vasculitis. The focus is the elucidation of molecular mechanisms of receptor signaling and the molecular basis for receptor polymorphisms in humans.

Christopher A. Klug, PhD (Microbiology). Funding: NIH / NCI, NHLBI, NCI

Hematopoietic stem cell biology and lymphocyte development - The major focus is the elucidation of the underlying mechanisms regulating hematopoietic stem cell (HSC) self-renewal and their subversion in pathological states. A second area of interest is the molecular events controlling cell fate decisions within the hematopoietic system, especially within the lymphoid lineages.

Hiromi Kubagawa, MD (Pathology/ Lab Med). Funding: NIH/NIAID

Fc receptors (FcRs) and immunoglobulin (Ig)-like receptors – Areas of current interest include the expression and biochemistry of human Fc α R/CD89, human Fc μ R, and mouse paired Ig-like receptors of activating (PIR-A) and inhibitory (PIR-B) isoforms.

Elliot J. Lefkowitz, PhD (Microbiology). Funding: NIH/NCRR, NIH/NIAID

Microbial genomics and evolution – The focus is to develop and utilize computational tools and bioinformatics techniques to mine sequence and other data for significant patterns characteristic of function and/or evolution.

Yi-Ping Li, PhD (Pathology/ Mol Cell Pathol). Funding: NIH/NIAMS, NIH/NIDCR

Osteoimmunology - Areas of interest include the role of Atp6i gene products and cathepsin K in the inflammation-induced bone loss associated with periodontitis, endodontic disease, and rheumatoid arthritis; as well as the activities of osteoblasts and osteoclasts that arise from hormonal or inflammatory perturbations.

Robinna Gail Lorenz, MD, PhD (Pathology/Lab Medicine). Funding: NIH/NIGMS, NIH/NIDDK, NIH/NHLBI, Juvenile Diabetes Research Foundation

Mucosal and systemic immune responses to gastrointestinal microbiota – The current focus is the study of the interrelationship between the GI microbiota, the intestinal immune response, and the development of autoimmune diseases such as inflammatory Bowel Disease and Type 1 Diabetes.

Frances E. Lund, PhD (Microbiology). Funding: NIH/NGMS, NIH/NIAID

Immune responses to pathogens, autoantigens and allergens – Two current foci include understanding the cross-talk between B and T lymphocytes and B cells and dendritic cells, and elucidating the mechanisms that control the migration of immune cells to sites of inflammation and infection.

Roslyn B. Mannon, MD (Medicine/Nephrology). Funding: NIH/NIAID, NIH/NIDDK, Amgen,

Long term kidney allograft survival - The focus is on immune and non-immune mediated mechanisms of late graft injury.

Suzanne M. Michalek, PhD (Microbiology). Funding: NIH/NIDCR

Mechanisms involved in microbial-host interaction – Focus is the development of mucosal vaccines against a number of infectious diseases including *Streptococcus mutans* (etiologic agent of tooth decay), *Porphyromonas gingivalis* (etiologic agent of periodontal disease), *Francisella tularensis*, *Bacillus anthracis* and Equine Encephalitis virus. Complementary studies focus on the mechanisms of microbial-host interaction.

John D. Mountz, MD, PhD (Medicine/Clin Immunol Rheumatol). Funding: NIH / NIAMS, NIAID, NHLBI; Daiichi Sankyo; VA Merit Review

Lymphocyte Development in Autoimmunity and Inflammation – A major focus is the recombinant inbred strain of B6 x DBA/2 (BXD2) that spontaneously produces very high levels of pathogenic autoantibodies, a hallmark of autoimmune disease. In these mice Th17 and IL-17 dependent development of germinal centers occurs, which may contribute to adoptive transfer of arthritis and glomerulonephritis. An additional area of interest is the role of IL-23 in production of spontaneous germinal centers.

Moon H. Nahm, MD (Pathology/Lab Med). Funding: NIH/NIAID

Antibodies to polysaccharide capsules of Streptococcus pneumoniae – Reference laboratory for NIH and WHO. The goal is to develop accurate ways to measure vaccine-induced antibodies to pneumococcal capsule; and to use molecular methods to critically examine diversity of pneumococcal capsule types.

Boris Pasche, MD, PhD (Medicine/ Hematol Oncol). Funding: NIH/NCI

TGF β signaling – The focus is the study of naturally occurring variants that predispose to the development of breast, colorectal, pancreatic and non-small cell lung cancer as well as scleroderma. His current funded work focuses on the identification of risk alleles within the TGF- β superfamily as they relate to breast cancer, colorectal cancer, and scleroderma.

Chander Raman, PhD (Medicine/Clin Immunol Rheumatol). Funding: NIH / NCI, NIAID, NINDS

Lymphocyte differentiation, activation, immune tolerance and autoimmunity – The focus is the understanding of the molecular mechanism/s by which lymphocyte co-receptors regulate lymphocyte activation and selection with focus on development of autoimmune diseases, particularly multiple sclerosis (MS) and systemic lupus erythematosus (SLE). His studies use both mouse models and human samples.

Troy D. Randall, PhD (Medicine/Clin Immunol Rheumatol). Funding: NIH/NIAID, NIH/NHLBI.

Immunobiology of lymphoid tissues in the lung – The focus is on the development and function of local (tertiary) lymphoid tissues in a variety of inflammatory and infectious diseases.

Harry W. Schroeder, Jr, MD, PhD (Medicine/ Clin Immunol Rheumatol). Funding: NIH/NIAID

Genetics of repertoire development and primary immune deficiency. Areas of interest include the role of abnormal diversification of the antibody or TCR repertoires in to the pathogenesis or manifestations of diseases of immune function and in responses to infection. Diseases and infectious agents currently under study include systemic lupus erythematosus, common variable immunodeficiency, HIV, influenza virus, and *Streptococcus pneumoniae*.

Anath Shalev, MD (Medicine/ Endocrinol Diabetes Metabol). Funding: NIH/NIDDK, American Diabetes Association, Juvenile Diabetes Research Foundation

Pathobiology of diabetes mellitus. Her laboratory has pioneered the role of thioredoxin-interacting protein (TXNIP) in pancreatic beta cell biology, diabetic complications and as a novel therapeutic target for diabetes and continues to work on the molecular biology of TXNIP signaling and beta cell apoptosis.

Phillip D. Smith, MD (Medicine/Gastroenterol Hepatol). Funding: NIH/NIAID, NIH/NIDDK, VA Merit Review Award

Mucosal immune responses to infectious agents and inflammatory stimuli – The focus is the interaction between primary human intestinal cells, including epithelial cells, macrophages, lymphocytes and dendritic cells; and the microorganisms that infect the mucosa or gain access to the host through the mucosa, including HIV-1, cytomegalovirus, norovirus and *H. pylori*. The goal is to develop novel therapeutic agents and vaccine strategies for mucosal diseases.

Lesley E. Smythies, PhD (Medicine/Gastroenterol Hepatol). Funding: NIH/NIAID, NIH/NIDDK, Crohn's and Colitis Foundation of America

Mucosal antigen presenting cells and immune responses to infectious agents – The focus is the human mucosal immune response, especially that of mucosal antigen presenting cells (macrophages and dendritic cells) to infectious agents, including HIV-1, *H. pylori*, CMV, and *S. mansoni*. Recent studies have concentrated on intestinal extracellular (stromal) immune matrix regulation of primary human mucosal macrophages and dendritic cells in these infections and in Crohn's disease.

Chad Steele, PhD (Medicine/ Pulmonary, Allergy & Critical Care). Funding: NIH/NIAID, NIH/NHLBI

Immune response against fungal pathogens of the lung – Organisms of interest include *Aspergillus fumigatus* and *Pneumocystis murina*. A common theme is the role of innate immunity. Current studies focus on how Src-family tyrosine kinases modulate the activation status of alveolar macrophages and how the Dectin-1

beta-glucan receptor controls an “innate IL-17” pathway critical for anti-fungal immunity.

Hubert Tse, PhD (Microbiology). Funding: American Diabetes Association

T cell responses to reactive oxygen species and pro-inflammatory cytokines - The focus is elucidation of the the signals necessary for efficient T cell activation in Type 1 diabetes. Additional areas of interest include the innate immune response of macrophages to *M. avium* infection.

Casey Weaver, MD (Pathology/ Anatomic Pathol). Funding: NIH/NIAID, NIH/NIDDK, Crohn’s and Colitis Foundation of America

Immune regulation by CD4 T cells - The focus is elucidation of the mechanisms by which CD4 T cells control adaptive immunity. A major area of interest is the mechanisms that induce development of the Th17 effector lineage; characterization of mechanisms by which dysregulation of CD4 T cells leads to inflammatory bowel disease; delineation of the adhesion pathways that control effector T cell trafficking; and characterization of the genetic elements that regulate cytokine gene expression in Th1 and Th17 cells.

Allan J. Zajac, PhD (Microbiology). Funding: NIH/NIAID

Regulation of T Cell Activity During Chronic Infections – The focus is the mechanisms that underlie the initiation of anti-viral CD8 T-cell responses, their resolution of viral infections, and the mechanisms that result in the establishment of persistent infections. The goal is to devise rational strategies for reactivating anti-viral CD8 T cell responses in persistent infections.

Content Faculty

T. Prescott Atkinson, MD, PhD (Pediatrics/ Allergy & Immunology). Funding: NIH/NIAID (NCE)

Mycoplasmas in the pathogenesis of asthma and arthritis – A second major area of interest is the development of rational strategies to determine the molecular basis for unidentified immunodeficiencies. Such patients often provide valuable insights into critical steps in the function of the human immune system.

Daniel C. Bullard, PhD (Genetics). Funding: NIH / NIAID, NIAMS & NIDA; Lupus Research Inst.; Daiichi Sankyo, Rigel, Inc.

Adhesion Molecules in the Pathogenesis of Autoimmune Diseases – The focus is on genetic approaches in mice to the study of selectins, integrins, and members of the immunoglobulin superfamily and their role in pro- and anti-inflammatory states

Peter D. Burrows, PhD (Microbiology). Funding: NIH/ NIAID

Antibody production, class switching, repertoire diversification, and B cell development – The focus is molecular mechanisms for antibody class switching and diversification of the VH repertoire, early and late B cell development, and the role of Fc receptor-like proteins (FCRL) on the surface and in the cytoplasm of B lineage cells.

David D. Chaplin, MD, PhD (Microbiology). Funding: NIH/NIAMS, UAB CCTS

Airway inflammation and secondary lymphoid tissue structure and function - Current areas of interest are macrophage activation, role of lymphotoxin in splenic development and function, and free radical-producing myeloid-derived regulatory cells in airway hyperresponsiveness.

Randy Q. Cron, MD, PhD (Pediatrics/Ped Rheumatol). Funding: Novartis, NIH / NIAMS

CD154 (CD40 ligand) dysregulation in lupus – The focus is the identification of *cis*- and *trans*-acting elements that contribute to the dysregulated expression of CD154 in SLE and other autoimmune disorders. Clinical research interests include macrophage activation syndrome and temporomandibular joint arthritis in children with chronic arthritis.

Jessy Deshane, PhD (Medicine/ Pulmonary, Allergy & Critical Care). Funding: FAMRI, UAB Skin Disease Research Center Pilot Award

Myeloid-derived regulatory cells in chronic airway inflammatory diseases – Research foci include elucidation of the free radical and cytokine/chemokine mediated mechanisms that underlie the differentiation and function of myeloid derived regulatory cells (MDRC) in airway inflammation, the mechanisms that regulate Treg and Th17 control of tolerance vs inflammation, and the role of environmental pollutants on MDRC.

Kohtaro Fujihashi, DDS, PhD (Pediatric Dentistry). Funding: NIH/NIA, NIH/NIDCR

Secretory IgA immunity and oral tolerance – The focus is on T cell immunoregulatory mechanisms in the induction of S-IgA immunity and oral tolerance. Fields of study include the analysis of B cells, antibody (Ab) production, $\alpha\beta$ and $\gamma\delta$ T cells, cytokines and cytokine receptors for the induction and regulation of mucosal immune responses and oral tolerance development.

James George, PhD (Surgery/Cardiothoracic Surgery). Funding: NIH/NIAID-NIDDK, NIH/NIDDK, American Heart Association

Transplantation immunobiology – Current areas of interest include the role of Heme oxygenase-1 in arterial thrombosis and the development of post-transplant vascular disease and the development of unique rodent-based animal models in kidney transplantation and acute kidney injury.

Robin D. Hatton, PhD (Pathology/ Anatomic Pathol). Funding: NIH/NIAID

Molecular immunology and epigenetics – The focus is the role of epigenetics in directing CD4+ T cell differentiation. The approach is to utilize high throughput techniques to discover alterations in chromatin structure that are involved in CD4+ T effector cell transcriptional regulation and phenotype development.

Laura B. Hughes, MD, MSPH (Medicine/ Clinical Immunology and Rheumatology). Funding: UAB Internal Funds

Genetics of rheumatoid arthritis – Areas of interest include the identification of genetic markers for susceptibility and severity in African-American subjects with rheumatoid arthritis and the identification of pharmacogenetic markers for treatment response and toxicity in subjects with rheumatoid arthritis.

Janusz Kabarowski, PhD (Microbiology). Funding: NIH/NHLBI

The role of G2A in atherosclerosis and lipoprotein metabolism – Dr. Kabarowski has made important contributions to the understanding of how this receptor modulates atherogenesis and identified its role in regulating HDL levels in hypercholesterolemic mice.

Jannet Katz, DDS, PhD (Pediatric Dentistry). Funding: NIH/NIDR, NIH/NIDCR

Immunologic mechanisms involved in microbial-host interactions. Areas of interest include the cellular events engaged following stimulation of host cells with specific microbial pathogens or their components. Pathogens under study include *Porphyromonas gingivalis* (etiologic agent of periodontal disease) and *Francisella tularensis* (etiologic agent of tularemia and category A biodefense agent).

Richard D. Lopez, MD (Medicine/ Hematol Oncol). Funding: NIH/NIAID

Cancer and transplant immunotherapy – Areas of interest include the development of animal models (preclinical) as well as human models (clinical) intended to exploit $\gamma\delta$ -T cells for cancer immunotherapy. He is engaged in early-phase human clinical trials intended to test the antitumor properties of human $\gamma\delta$ -T cells.

Peter Mannon, MD (Medicine/Gastroenterol Hepatol). Funding: UAB Internal Funds

Pathobiology and therapy of inflammatory bowel diseases – Areas of interest include the role of anti-IL-12/23 p40 antibody and G-CSF in Crohn's disease, mucosal immune cytokine abnormalities accompanying common variable immunodeficiency enteropathy, and the role of anti-IL-13 effects on interferon- β -1a (Avonex) in ulcerative colitis. The goal is to elucidate the mechanisms of primary clinical response and, more importantly, primary and secondary non-response in immunomodulation therapies.

Jiri Mestecky, MD, PhD (Microbiology). Funding: NIH/NIAID, NIH/NIDDK

Mucosal immunology – Areas of interest include structural and functions studies of mucosal antibodies, the stoichiometry of component chains of secretory IgA (S-IgA) and their glycan structures, receptor-mediated transport and catabolism, and antibody-specific as well as glycan-mediated binding of S-IgA to microorganisms. Responses to viruses (e.g., influenza, HIV) and bacteria (e.g., H. influenzae, pneumococcus) are studied, as well as the molecular basis of IgA nephropathy

Lisa Schwiebert, PhD (Cell Biology). Funding: NIH/NIDDK, NIH/NIGMS

Aerobic exercise and allergic asthma - Her laboratory was the first to demonstrate the effects of aerobic exercise on cellular and molecular responses in a mouse model of allergic asthma. These seminal findings have led to the development of a clinical trial that examines the effectiveness of aerobic exercise as an adjunct therapy for the treatment of asthma.

Laura Timares, PhD (Dermatology). Funding: NIH/NIAMS

Normal and genetically altered cutaneous antigen presenting cells, mechanisms of immune activation, tolerance and tumor immunology – Research interests include TLR-expression in human NF-derived cell lines, cutaneous DC targeting for treating canine melanoma, developing and testing the efficacy of a skin cancer vaccine using genetically-modified dendritic cells presenting mutant oncogene-related epitopes of the H-ras protein in the mouse model of DMBA carcinogenesis.

Collaborations and Interactions. The Program Faculty have been selected based on their interests in topics directly relevant to the study of immunologic diseases and basic immunology. Interactions and collaborations are facilitated by an ongoing series of weekly research-in-progress conferences, weekly seminars [the

Program in Immunology Seminar Series as well as other departmental and divisional seminar series]. These collaborations are evident in the joint mentorship of our trainees and in collaborative projects and co-authorship amongst our training faculty *and* trainees (see Table 6A/B). To quantify further, we examined all of the faculty mentor publications identified in PubMed as being published in from 2000-2011. Of these, 25% listed two or more of the faculty mentors as authors. Further, we found that 91% of the faculty mentors collaborated with at least one other mentor; 69% collaborated with three or more mentors, and 14% collaborated with nine or more different mentors during this period. To assess whether this collaboration had extended to the pre-doctoral and post-doctoral trainees, we evaluated the number of mentor co-authors in the trainees' publications. We found that 49% of the pre-doctoral trainees and 44% of the post-doctoral trainees had published with two or more of our Faculty mentors. These findings demonstrate the fruits of the prevailing spirit of collaboration at UAB, and document that our program has a strong tradition of joint mentorship of our trainees.

Since our A0 submission in September of 2011, our T32 faculty has published 198 papers, or almost 4 publications per member. Of these, 46% listed 2 or more, 9% listed 3 or more and 3% listed 4 or more of the faculty members as authors.

Mentoring of mentors. UAB undertook an institutional commitment to enhance the post-doctoral experience through the creation of the Office of Postdoctoral Education in 1999 (Appendix B). The success of this commitment was nationally recognized when for the past three years UAB has been ranked among the top universities for postdocs. Further, to re-shape the pre-doctoral program and to enhance the pre-doctoral experience, UAB recruited Dr. Susan Rich and Dean Bryan Noe to the Graduate School in 2004. Both initiatives have emphasized the importance of mentoring and mentoring skills.

The Program Director and Executive Committee recognize that nurturing the mentoring skills of our younger faculty and enhancing the skills of all faculty members is important. During the meetings of the Program Faculty, issues of effective mentoring are reviewed and discussed. Furthermore, trainees are asked to evaluate their mentors as part of the ongoing facilitation of the overall training program. Each trainee and his/her mentor are asked to create written goals including courses, conferences, and the mentored research project. These goals form the basis for evaluation of progress, both of the trainee and of the mentor / trainee relationship. As a resource for mentors, the program provides the monograph, "[Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering](#)" (National Academy Press, 1997) as well as "[A Guide to Training and Mentoring in the Intramural Research Program at NIH](#)" "[On the Right Track: A Manual for Research Mentors](#)" (Council of Graduate Schools, 2003) and "[Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty](#)" (Howard Hughes Medical Institute, 2004;). Being aware that an effective mentoring relationship is bi-directional, we also assist trainees in facilitating an effective mentoring relationship and, at times, use material developed both by UAB and by other Universities. Further resources available through the School of Medicine are listed at <http://medicine.uab.edu/research/>.

3C. Proposed Training

Overview. The overall training program is comprised of a didactic curriculum and a mentored research project. For physician-investigators, an intensive clinical experience in either allergy and clinical immunology or in rheumatology is also available. Elements appropriate to each pre-doctoral and postdoctoral trainee are selected according to their training goals and research interests. The didactic curriculum is built upon the programs in [Graduate Biomedical Sciences](#) (Appendix A1). Basic science pre-doctoral students accepted by GBS rotate through laboratories during their first graduate year with the goal of selecting a mentor and laboratory by the first quarter of the second graduate year. MSTP MD/PhD students (Appendix A4) also take part in three rotations. The first begins in June prior to entry into the first medical school year. The second and third occur during the next two summers, after which they choose a mentor and laboratory at the start of their first graduate school year. Both the GBS and the MSTP programs provide extensive training in the scientific method and expose trainees to a broad range of current approaches used in modern biomedical and translational sciences.

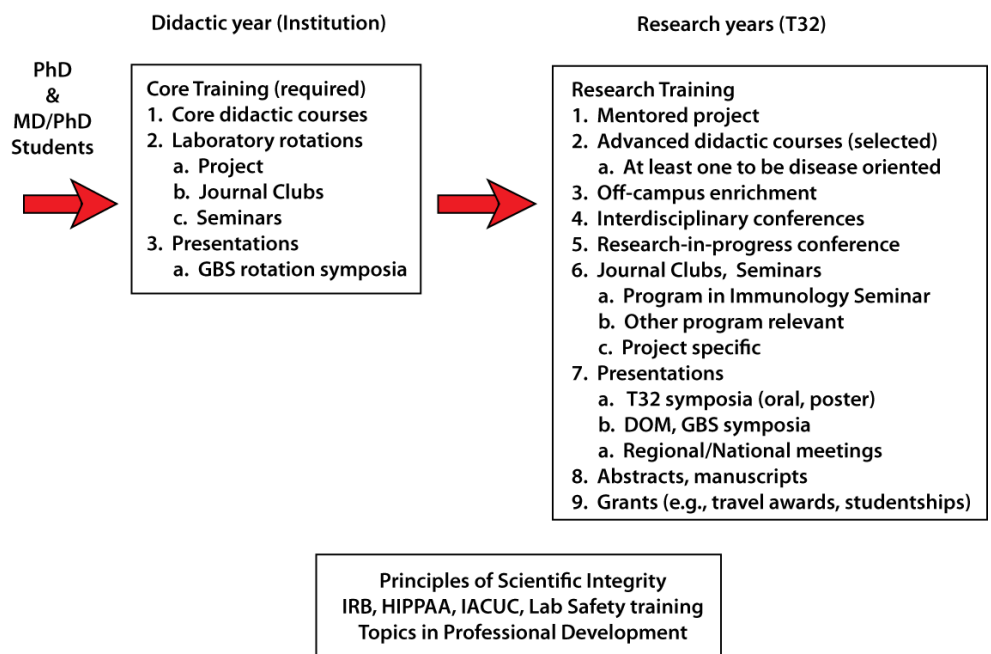
The curriculum for each of these predoctoral programs, presented in Appendix A, provides the framework for formal instruction for postdoctoral trainees wishing to expand their knowledge base in the biomedical sciences pertinent to both immunologic diseases and basic immunology research. All trainees are expected to enroll or

audit at least one advanced class focused on computational biology and one advanced course focused on the pathophysiology of disease. Classes are currently offered in the fields of primary immune deficiency disorders, disorders of mucosal immunology, disorders of innate immunology, and autoimmune disorders.

All trainees participate in the training grant specific interdisciplinary training experience comprised of biweekly luncheons with visiting Program in Immunology scholars, rotating individual opportunities to spend the day with the individual scholar, and participation in MIC 741, Topics in Professional Development (Appendix C1). This course, established in 2009 and coordinated by the Program Director and Associate Director, meets for two hours weekly in the evening after the Program in Immunology Seminar. In Year 1, the course focused on Training in Biostatistics and on weekly interactions with University Leaders, such as the Dean of the School of Medicine and the Chairs of the various Departments to which the Program Faculty belong. These leaders provided enrichment through the discussion of topics such as how to become a reviewer or editor of a journal, how to network and participate on a national level through a scientific organization, how do private foundations work and how do they fund

Pre-doctoral Student Training Program

science, etc. The response to the Biostatistics course led to the establishment of a similar course for all GBS trainees. In Year 2, the focus turned to grant preparation with trainees writing five page grants focused on hypothesis, significance, innovation and approach. After an oral presentation and questions, each grant was then thoroughly discussed by the class in the form of a study section. Trainees were then given the opportunity to rebut on the week following. The ultimate expectation is for each trainee to submit their grant proposal for external funding. In Year 3, the

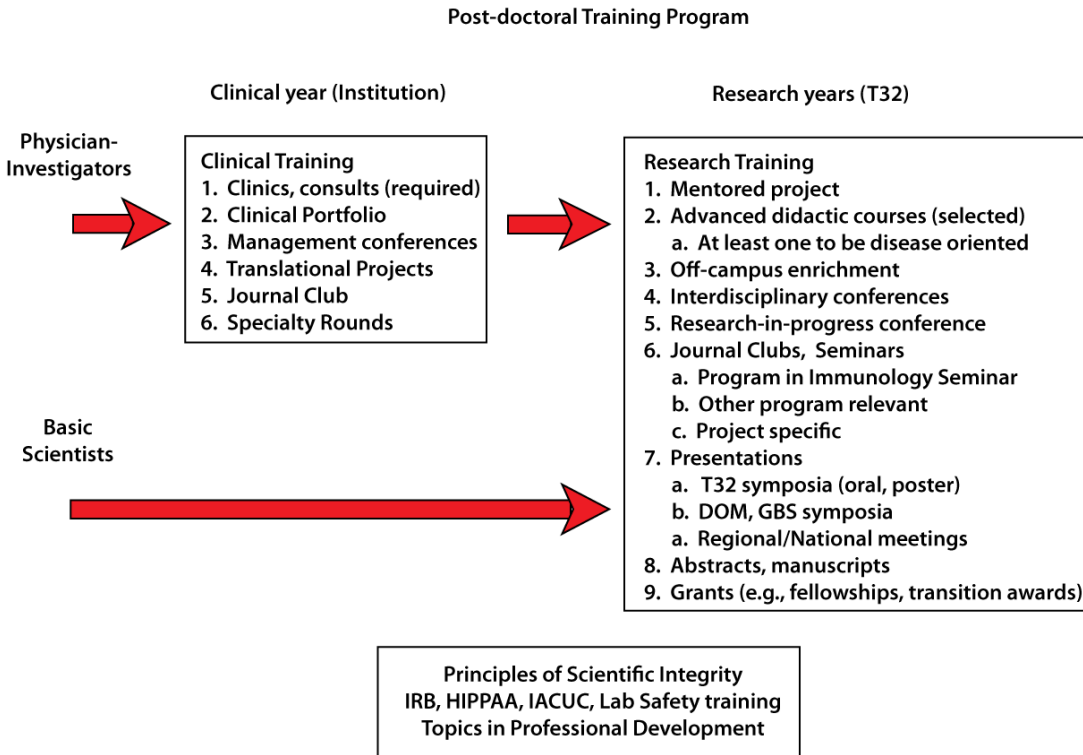


focus turned to oral presentations, with each trainee preparing a 15 minute talk, followed by question and answer period. Time was also spent gaining experience working with Adobe Illustrator, Photoshop and Acrobat. As a result of these shared activities, this training grant has achieved a special identity within the graduate program at UAB, with its students achieving a special *esprit de corps*. It has also allowed the Program Director and Associate Director to individually counsel each trainee in their research projects. This approach has strengthened the training program's ability to engage in ongoing evaluation of goals and progress in order to establish achievable benchmarks of success for advancement.

Research Instruction and Training (Predoctoral and postdoctoral trainees). Pre-doctoral students (PhD and MD/PhD) select their thesis project and laboratory(ies) based on their rotation experience with guidance from GBS advisors. Admission into the GBS is determined by the theme-based Admissions Committees and is based on GPA, GRE scores and other considerations (see Table 8A). Recruitment is facilitated by Summer Internship Programs for undergraduates considering careers in medical research. Post-doctoral Fellows, with or without clinical training, will select a mentored research project and advanced coursework that complements their mentored research project.

Didactic Coursework (Pre- and Postdoctoral trainees, required). Pre-doctoral trainees are accepted into this training program only after having completed their first year graduate courses. Post-doctoral trainees are also expected to participate in those modules of the graduate curricula pertinent to their mentored project and research interests. This occurs during the first or second research years. Both pre- and postdoctoral trainees are expected to attend at least one graduate course in biostatistics and one in computational biology. All of the trainees (pre- and postdoctoral) are required to take GRD 717, Principles of Scientific Integrity (Appendix C3), as well as a rigorous curriculum in the responsible conduct of research, with fundamental requirements in

human subjects, vertebrate animal and laboratory research (see **Section 5**).



Interdisciplinary Enrichment Program (Pre- and Postdoctoral trainees, required). To facilitate interaction among trainees and to promote interdisciplinary discussion, trainees participate in a biweekly luncheon with visiting scholars. A vigorous program of visiting scientists is well established within the Program in Immunology (Appendix D2). This series of visiting professors provides an

important opportunity for informal exchange of research ideas and questions.

Research in Progress (Pre-doctoral and postdoctoral trainees, required). Students in training participate in weekly Research in Progress meetings that are sponsored by the various individual departments and divisions that make up this T32 training program. All are invited to participate in the weekly Immunology and Immunobiology Research in Progress meetings that are held on Thursdays at noon on the 5th floor of the Shelby Building. These meetings focus on active research conducted by students and trainees in immunobiology and immunogenetics. They operate as a forum for review of data and for the gathering of suggestions to facilitate research, as well as a forum to develop skills in effective scientific communication. The broad range of interests of the attending Faculty, Fellows, and students provides an ideal interdisciplinary format.

Journal Clubs, Seminars, and Conferences (Pre-doctoral and postdoctoral trainees, required). Throughout the year, there is a robust program of seminars sponsored both by the Program in Immunology (required, Appendix C2), as well as by other Centers and Departments within the University (encouraged). These provide an important intellectual milieu for the development of trainees and faculty alike. In addition, there are a number of specific topically focused journal clubs, including Allergy and Clinical Immunology, Autoimmunity, Cellular and Molecular Immunology, Inflammation, Neuroimmunology and Mucosal Immunology. Several of these are designed to bring clinicians and investigators together. Trainees are required to participate in at least one journal club, selected with the advice and counsel of their mentor. The new School of Medicine Strategic Plan provided the Program in Immunology and the T32 with the funds to sponsor one broad-based Symposia per year, with national and regional, as well as local, speakers. The first of these, the Spring Immunology Symposium on Immunologic Diseases and Basic Immunology (Appendix D3, was held in June, 2012 and featured Drs. Max Cooper, Noel Rose, and Larry Steinman as key note speakers. Trainees are

expected to present their work (poster) in these symposia. Trainees are also encouraged to attend regional and national scientific meetings, including the American Association of Immunologists National Scientific meeting and the Federation of Clinical Immunology Societies meeting.

Research and Clinical Training Experiences (Physician Investigators). The research training program for physician scientists is preceded by an intensive clinical year, funded by institutional sources. An important goal of this training program is to develop physician scientists with interests in fundamental and in clinical research. The Program Directors and Executive Committee feel strongly that rigorous clinical training will assist physician investigators in formulating important and incisive questions in human biology. Outpatient clinic experiences in clinical immunology and in rheumatology are based at The Kirklin Clinic, the faculty practice clinic. With faculty supervision, trainees evaluate new patients and participate in longitudinal clinical experiences. Allergy and Clinical Immunology trainees also rotate through the Birmingham Veterans Administration Medical Center (BVAMC) Allergy Clinic and the Children of Alabama Hospital Allergy and Clinical Immunology Clinics. Rheumatology trainees rotate through the BVAMC Rheumatology Clinic and the Cooper Green Rheumatology Clinic. These combined experiences provide an exceptional range of diagnostic problems and management opportunities in immunologic diseases.

The in-patient clinical experience includes evaluation and management of allergy and clinical immunology and of rheumatology patients admitted to University Hospital, Birmingham VA Hospital, Children's of Alabama Hospital and Cooper Green Hospital in addition to providing consultative services to all services within each of these institutions. These consultations, as well as management of patients with a variety of diseases of immunologic origin, provide an extensive experience in both the acute presentations of immunologic diseases, as well as in the medical co-morbidities found in such patients.

Didactic Clinical Instruction. As part of the first clinical year, and ongoing throughout the training program, trainees participate in a structured curriculum, including either the fundamentals of allergy and immunology or the fundamentals of rheumatology, as well as in clinical case management conferences every other week. Clinical trainees mentor medical residents and students through ongoing review and discussion of the clinical literature pertinent to rheumatology. They present Clinical Portfolio cases to the faculty as part of case management conferences and also participate in the weekly Journal Club, combining clinical and biomedical science and designed to heighten awareness of the interaction and interdependence between clinical and mechanistic research (Appendix C4).

Clinical and Translational Research Projects. During the clinical year, Fellows are encouraged to participate in one of the many ongoing translational or clinical research projects, either by assisting with ongoing projects or defining their own projects whenever possible. While the mentored research project may spring from this research experience in the first year, physician trainees are encouraged to consider projects tailored to their own interests and drawing on the breadth of the entire Program Faculty.

Evaluation of Clinical Training. During the first year, Dr. Atkinson (Allergy/Immunology) or Dr. Hughes (Rheumatology) meet regularly with the Fellows in clinical training. As required by the American Board of Internal Medicine and the American Board of Pediatrics, regular evaluations of trainees by faculty are provided to the Clinical Training Director (Dr. Atkinson, Allergy/Immunology; or Dr. Hughes, Rheumatology). In parallel, trainees are asked to evaluate the faculty in terms of the effectiveness of their performance as teachers and role models. (Appendix C5)

Mentored Research Experience (Physician Investigators). During the first clinical year, each physician/investigator has the opportunity to become familiar with areas of research of members of the training faculty through seminars, informal discussions, and reading. Fellows visit with program faculty members in order to become familiar with available research projects. The choice of research mentor is based on the Fellows' research interests and the mutual consent of both mentor and trainee. This choice is reviewed by the Executive Committee, and the mentor and trainee are asked to develop a written set of goals for the training experience, including both the didactic curriculum and the research project. The Executive Committee believes that physician/scientists and PhD scientists, working together in the same environment, are strongly synergistic. Therefore, physician investigators are strongly encouraged to identify both a clinician/physician-scientist and a basic/PhD investigator as co-mentors. Conversely, PhD post-doctoral trainees are encouraged

to deepen their knowledge in areas of investigation pertinent to immunologic diseases through co-mentorship between a basic/PhD investigator and a clinician/physician-scientist.

Mentored Research Project (Predoctoral and postdoctoral trainees, including physician investigators)

Having selected a research project, the trainee works in the laboratory(ies) of the mentor (required) [and the co-mentor(s) (encouraged)], who assume primary responsibility for the research plan and training of the trainee. Each predoctoral or postdoctoral trainee has projects which are related to, but distinguishable from, those of his/her immediate mentor to facilitate assessment of progress and the development of an individual research program. During the laboratory experience, trainees are expected to acquire or enhance skills in biochemical, cellular and molecular techniques. Trainees are encouraged to work with one or more of the Program Faculty for discussion and the acquisition of expertise in specific approaches and technologies, a process that is facilitated by the strong collegial tradition at UAB. Each mentor's laboratory has small weekly meetings for review of experimental design, techniques and data assessment and interpretation. Trainees present their results at a Research-in-Progress seminar at which other Program Faculty members and trainees are present to participate in review of experimental results and discussion of these results in the context of current lines of investigation in the field. Research-in-Progress conferences are designed to encourage collegial discussion and to generate additional assistance and collaborations. The Topics in Professional Development course further encourages detailed discussion of research projects among all the trainees. Thus, through individual mentor/trainee meetings to review methodologies, results and to trouble shoot problems, through regular laboratory-based research meetings and through the program-wide weekly Research-in-Progress conference and the Topics in Professional Development course, there are multiple avenues for mentors and trainees to seek input to optimize both the training experience and the progress on the individual research projects.

Formal Presentation of Results. In addition to semi-formal presentation of research results, trainees are strongly encouraged to present their findings at local, regional, and national meetings. For example, the Program in Immunology and this T32 have instituted an annual Symposium at which trainees will be expected to present their projects in poster format and for the formal review of projects involving Program in Immunology faculty members. This forum provides the opportunity for trainees to organize and present their research to individuals, both within and outside of their primary field of interest. As part of this Symposium, student presentations are formally evaluated and prizes awarded for excellence on a competitive basis. The four top poster presenters are invited to present their work as a Program in Immunology Seminar. Together, these poster and platform presentations provide an excellent experience in preparation for presentation at regional and national scientific meetings including the American Association of Immunology, the American Academy of Allergy, Asthma and Immunology, the Federation of Clinical Immunology Societies, etc. As appropriate, trainees may also present their results at international meetings and will be supported for such presentations by their mentor.

Preparation of Manuscripts and Grants. All trainees are expected to publish their results in peer-reviewed journals as part of their training (Tables 6A/B). Continuous review and evaluation of the literature in their specific area is an essential element of the training experience. This is accomplished through extensive reading, laboratory-based journal clubs, and attendance at seminars and lectures. Given the vigorous research environment at UAB, there is exceptional access to advice, as well as to invited speakers, in all areas of immunologic diseases and basic immunology research. In addition to manuscripts, the trainees are expected to work with their mentors to prepare and highly encouraged to submit at least one grant seeking extramural research support. When appropriate, these grants will provide training support, thus replacing or transitioning support from this training grant to their own independent support, thereby beginning to establish a record of external funding and, for postdoctoral trainees, facilitating transition to Junior Faculty status. While it is the primary responsibility of the research co-mentors, the Program Directors and Executive Committee recognize the importance of a coordinated effort in identifying the best sources of potential funding and in planning and aiding the development of grant applications for each individual trainee. As part of this process, trainees review previous grants, submitted by Program Faculty, critique grants being written either by other trainees or by Program Faculty, and write their own grant applications as part of the Topics and Professional

Development curriculum. Over the past five years, seven trainees (Deshane, Huff, Kin, Maynard, Meares, Ramos and Williams) succeeded in receiving their own extramural funding while on this training grant.

Mentoring of Trainees for the Future. Trainees are encouraged to attend local, regional, and national scientific meetings, not only for scientific interchange but also for networking and career visibility. Trainees are encouraged to interact directly with faculty at other institutions, as well as with trainees at other institutions. The Department of Medicine, through its Research Advisory Committee, and the Office of Postdoctoral Education have regular seminar programs discussing research opportunities and expectations of individuals as they assume faculty positions. These include lectures in laboratory management and career planning. All trainees are encouraged to attend such seminars.

Individual Development Plans (IDPs, for post-doctoral trainees). Mechanisms have long been in place for career monitoring and development of pre-doctoral students. These include the combined efforts of the Department or Theme Graduate Director, the Dissertation Committee, the mentor, the Director, Associate Director and the Executive Committee of this training program. However, post-doctoral trainees have been generally more dependent on their mentor. Following the lead of the [National Postdoctoral Association](#), we have recently instituted the use of individual development plans for post-doctoral trainees. These plans provide a mechanism to help the trainees identify and clarify their professional development needs and their career objectives; and to facilitate and structure communication between the post-doctoral trainees and their mentors. The goals of the IDPs are to help each trainee identify and seek out the tools and training necessary to achieve their long-term career interests and to help the trainees and their mentors come to a common understanding of how best to maximize the benefits of their current efforts. These objectives can be separated into four basic steps for both the trainees and the mentors, as noted in Figure 2, below.

	<i>For the Post-doctoral Trainee</i>	<i>For the mentors</i>
Step 1:	Conduct a self assessment	Become familiar with the opportunities available to the trainee
Step 2:	Survey opportunities with mentor	Discuss opportunities with the trainee
Step 3:	Write an IDP, share the IDP with the mentor, and revise	Review the IDP and help revise
Step 4:	Implement the plan Revise the IDP as needed	Establish regular review of progress and help revise the IDP as needed

Figure 2. Basic steps used to establish the Individual Development Plan (IDP).

In Step 1, the post-doc is asked to assess their skills, strengths and areas that they feel need improvement. The trainee is encouraged to seek the advice of their peers as well as their mentors. Most importantly, the trainee is asked to write down their long-term career objectives. In Step 2, the trainee is asked to meet formally with his or her mentor to discuss career opportunities, identify developmental needs, and prioritize their developmental efforts. In Step 3, the trainee is asked to write a formal IDP. A sample IDP instrument is found in Appendix C5. This IDP is intended to help the trainee map out the general path they wish to take in the development of their career, and to help the trainee match skills and strengths with career choice. We anticipate that this will be a document that changes as the trainee progresses through the training program. The specific objectives include a projected date for completion of their post-doctoral education, the identification of specific skills and strengths that need to be developed during the training process, and a definition of the approaches to be taken to obtain needed skills and strengths including coursework, technical skills, teaching and mentor supervision. It is critical that the trainee prepare this mapped path with their mentor. The Director and Associate Director stand ready to help facilitate and monitor this process. In Step 4, the trainee is expected to put the plan into action, and revise as circumstances and goals change.

Table A. T32 Evaluation Matrix

Data Sources (Inputs)	Indicators (Outputs)	Programmatic Objective	Feedback	Frequency
Recruitment reports	-% accepted who matriculate -% minority applied, accepted and matriculated	-Assess program desirability -Increase minority recruitment	To Program Director (PD) /Exec Com	Annually
Individual Development Plan (IDP)	- Training goals - Mentor/mentee expectations - Research project identification - Productivity (expected) - Research project completion	Baseline for assessment of individual trainee's progress and success of mentoring.	To mentor-mentee team by PD/Assoc PDs	Annually (at the beginning of each training year)
Trainee Progress Reports	- Progress on research - Abstracts, Publications & impact - Participation in career development activities	Provide ongoing feedback on - Trainee engagement -Overall progress - Effectiveness of mentoring relationship.	To mentor-mentee team by PD/Assoc PD	Twice a year
Trainee Assessments of T32 Program	- Quality of mentoring - Barriers to success - Trainee satisfaction w/ mentor - Trainee satisfaction w/program	-Identify strengths and weaknesses in program -identify early need for intervention	To Executive Committee	Twice a year
Mentor's Evaluation of Trainee	- Trainee progress to goals and productivity - Quality of mentor's relationship with mentee - Areas of strength - Areas for improvement	Provide ongoing advice from mentor to mentee	Mentor to Trainee (each meeting)	Ongoing with annual reports to Executive Committee
Interviews of Trainee; Online evaluation	- Satisfaction with the overall program and with the mentored research experience; - Self-assessment of degree to which the program helped the Trainee meet their career goals	Identify barriers to success, patterns in program weakness in order to establish areas for improvement.	Trainee to PDs and Executive Committee	Every 6 months and when Trainee exits program
Alumni Survey and CV; Pubmed searches, etc.	- Current position/career satisfaction - Independent research funding - Publications	Long-term evaluation of program	To SC from Trainee	Annual (for 10 years)

The mentor is also required to participate in this process. In Step 1 they are requested to become familiar with potential opportunities for future career advancement that may benefit their trainee. In Step 2 they are expected to discuss the trainee's self-assessment and career goals with the trainee. In Step 3, they are expected to help the trainee prepare the individual development plan. And in Step 4, they are expected to establish a regular review of the trainee's progress. This process parallels that expected for pre-doctoral trainees through their dissertation committees, with communications to the Program Director and Associate Director and the Executive Committee, as noted in Table A, above.

Individualized trainee programs. Within the frame of the program outlined above, the specifics are individually tailored for each trainee. Several examples include:

Pre-doctoral (PhD - LaTonya Williams). LaTonya Williams was recruited to UAB in 2006 through the Cell and Molecular Biology Program for her doctoral training. She pursued the prescribed curriculum of core courses in biomedical science and electives in Immunology, and after the required rotations in the first year, she elected a project examining how specific T cell populations are associated with positive outcomes in HIV-infected individuals for her dissertation (Paul Goepfert, mentor). She joined the Immunology T32 in August of 2009 and participated in the "Topics of Professional Development" course during the Fall of 2009 and Spring of 2010. LaTonya applied for her own individual funding, and in September of 2010, she was awarded her own F31 pre-doctoral fellowship from NIAID/NIH.

Pre-doctoral (PhD – John Yi). John Yi entered graduate school at UAB in 2006 through the Cell and Molecular Biology Program. During his first year, John participated in the required core curriculum and pursued Immunology based laboratory rotations in Drs. Mountz and Zajac's laboratories. He chose to complete his PhD in Dr. Allan Zajac's laboratory, studying the impact of the cytokine IL-21 on CD8 T cell responses during acute and chronic viral infections. During his highly successful graduate training, John published manuscripts in journals such as *Science*, *Nature Immunology*, and *The Journal of Immunology*. In addition to this, he presented his data at numerous meetings, including a Keystone Symposium, FOCIS, and the International Congress of Immunology (in Japan), and he was selected to attend the RIKEN Immunology class in the summer of 2010. John was a trainee on the Immunology T32 from September 2008 through August of 2010 and during that time he participated in the "Topics of Professional Development" class. John Yi successfully defended his dissertation in November of 2010 and he is currently a postdoctoral fellow in Dr. Kent Weinhold's laboratory at Duke University studying T cell responses to HIV and melanoma.

Postdoctoral (PhD – Jessy Deshane). Dr. Jessy Deshane joined Dr. Chaplin's laboratory in 2007 for her postdoctoral studies following completion of her PhD in Biochemistry and Molecular Genetics with Dr. Anupam Agarwal at UAB. Her postdoctoral research focused on studies in a mouse model of allergic airway inflammation. Using this model she established that subsets of free radical-producing myeloid-derived regulatory cells (MDRC) are master regulators of airway inflammation. She also identified human MDRC with similar function in bronchoalveolar lavage of asthmatic patients. In 2008, she was recruited as a postdoctoral trainee on this "Immunologic Diseases and Basic Immunology" T32 training grant. Dr. Deshane's studies prompted her to begin collaborations with other investigators associated with this T32 grant who interrogate distinct aspects of lung immunology and regulatory cells, including Drs. Lisa Schwiebert and Casey Weaver. Six publications resulted from Dr. Deshane's postdoctoral studies. As a tribute to her scientific achievements, she received many accolades as a postdoctoral fellow, including being the recipient of the ST*AR award—Strategic Training in Allergy Research, American Academy of Allergy Asthma and Immunology (AAAAI) and acceptance into the International Summer Institute at RIKEN Research Center for Allergy and Immunology. While a trainee on this training grant, Dr. Deshane was successful in obtaining her own individual NRSA F32 fellowship in 2009 entitled, "Myeloid regulatory cells in allergic airway inflammation". This resulted in her recruitment as an Assistant Professor to the Division of Pulmonary Allergy and Critical Care in the Department of Medicine here at UAB in January of 2011.

Postdoctoral (PhD – Kari Dugger). Dr. Kari Dugger joined Dr. Schwiebert's laboratory in 2008 for her postdoctoral studies following completion of her PhD in Microbiology with Dr. Scott Barnum at UAB. Her postdoctoral research focused on effects of exercise on asthma-related helper T cell responses. In addition to her active postdoctoral research, Dr. Dugger was also highly involved in undergraduate education, serving as

an adjunct professor and teaching a class at Samford University. In 2009, Dr. Dugger was recruited to the "Immunologic Diseases and Basic Immunology" T32 training grant as a postdoctoral trainee and participated in the "Topics of Professional Development" class offered to trainees associated with the T32. As a result, Dr. Dugger began a mutually beneficial collaboration with a fellow trainee, Dr. Deshane, which resulted in a joint publication. Following her term on this Immunology T32, Dr. Dugger was hired as a tenure-track, Assistant Professor in the Department of Biomedical Sciences at the University of South Alabama in 2010.

3D. Training Program Evaluation

At the beginning of the research training period, mentors and trainees develop a written set of activities and goals including didactic courses, ongoing conferences and seminars, as well as the mentored research project. These goals provide the framework for periodic assessment of progress in the training relationship and, in conjunction with written feedback provided by trainees, they are reviewed at least annually with the Program Directors and the Executive Committee. Feedback from trainees attending our Topics in Professional Development course has been positive. One student stated in his evaluation, "This course acted as a mock grant writing/study section which was extremely beneficial." Feedback on other issues included: "The appropriation of extra funds for travel to scientific meetings was very helpful for me and allowed me to easily travel to a meeting where I was able to present my work and get important feedback." "The progress reports that were required of me helped me to evaluate myself and my work, and this was helpful for keeping me on track and focused," and "Also, the seminar series the Training Program helps coordinate has brought in speakers with amazing CVs and work that they have shared through talks. We, as training grant students, also have the opportunity to meet and talk with these speakers which I find has been a valuable experience" and "I found the accessibility to research under highly experienced mentorship to be the most standout [sic] and useful aspect of the experience."

Over the longer term, the overall program is evaluated using the outcomes reflected in the percent of trainees remaining in research and academic medicine and in the number of trainees pursuing interdisciplinary research related to immunologic diseases and basic immunology. For example, during years 31-35 of this training grant, the covered period, 23 pre-doctoral and 16 postdoctoral trainees have been supported, with 36 of 39 (92%) continuing as faculty members, teachers in K-12 education, administrative or research staff positions (academic staff), and/or continued training. Of the 30 mentees pursuing additional academic training, 21 are continuing various training paths at UAB. The nine remaining mentees are pursuing training at the La Jolla Institute of Allergy and Immunology, Medimmune, University of Pennsylvania, Northwestern, Tufts, Johns Hopkins, NIH, Baylor, Duke. [The three post-doctoral trainees who are engaged in other activities include one pharmacologist at FDA/CDER, one inspector for the FDA and one scientific writer.] Our trainees in this period have been 41% male and 59% female; and have included 18% under-represented minorities (15% African American, 3% Native American) (Table 11). This compares to the previous five year period where the trainees were 60% male and 40% female, and 9% under-represented minorities (6% African American and 3% Hispanic American). In the implementation of our Professional Development course, we received substantial positive feedback from our trainees that enabled us to refine our approach to the evaluation of our trainees, mentors and the training program itself. Our new approach is summarized in Table A, above.

3E. Trainee Candidates: Recruitment, Qualifications and Selection

The current and past training record of the Program Faculty is presented in Table 5A/B. Applications, qualifications, recruitment, assignments and completion records for this training program are presented in Tables 7A/B, 8A/B and 11. During the last 10 years of support, this T32 training program grant has supported 43 pre-doctoral and 31 post-doctoral trainees, including 11 under-represented minorities and 36 women. Among the 31 post-doctoral trainees over the last ten years of support, 3 have had MD degrees, 4 have had MD/PhD degrees and 24 have had PhD degrees (See Tables 9A/B for current trainee qualifications). Over the same ten year period of support, the Program Faculty have continued their commitment to training pre-doctoral PhD candidates and postdoctoral trainees in the areas of immunologic diseases and basic immunology using both human and animal model systems, and in mechanistically-oriented translational research to complement the Faculty's commitment to and capacity to pursue basic, translational and clinical research. Examples of individual trainee programs during the last five years of support are presented at the end of Sections 3C, in the Progress Report (Section 6), and in Tables 12A/12B for trainees extending back to Year 26 (2002).

Applicant Recruitment and Selection. Pre-doctoral students are drawn from the graduate thematic programs in Graduate Biomedical Sciences and in the Medical Scientist Training Program (MSTP). Applications for students in the laboratories / research settings of Program Faculty are solicited from all Program Faculty and reviewed for programmatic relevance, for performance in the core curriculum and for assessment of potential by the mentor. The Executive Committee reviews each appointment. The Core and Content Faculty actively participate in the recruitment of students to UAB and subsequently into the areas of interest outlined in this T32 application. Recognizing the opportunity to enhance recruitment to immunologic diseases and basic immunology research, especially since the new Graduate School and MSTP offices as well as the Program in Immunology are housed in the new Shelby Interdisciplinary Biomedical Sciences Building (see **Facilities Section**), the faculty mentors have developed new thematically oriented graduate courses and journal clubs embracing translational research.

Scientists interested in post-doctoral training are recruited by several complementary mechanisms: (1) the [Office of Postdoctoral Education](#) maintains an active web site, complementing the [School of Medicine's research portal](#) and a [listing of positions](#). These sites are designed to make potential postdoctoral fellows aware of the resources available at UAB and to facilitate fellow-initiated contacts. (2) The more traditional recruitment of postdoctoral fellows is investigator-driven and based on networking amongst colleagues, contacts at scientific meetings and FASEB job interviews. From within the pool of postdoctoral fellows training, or considering training, with Program Faculty, faculty-wide announcements of available training slots make faculty aware of openings. Applications for available positions, -- consisting of biosketches, recommendations of the thesis mentor and the postdoctoral mentor, a preliminary outline of the proposed training plan and an interview with at least one member of the Executive Committee, -- are reviewed and assessed by the Executive Committee. Selections are made on the basis of the candidate's potential to develop as an independent investigator as judged by publications and the mentors' evaluations.

Physicians and physician scientists wishing to obtain both clinical and research post-doctoral training are recruited nationally through the ERAS fellowship application and matching process. Applicants express interest through ERAS and applications are reviewed in a two-step process: Dr. Atkinson and Dr. Hughes, Directors of the Allergy and Immunology and the Rheumatology Programs, respectively, screen all applications and select candidates to be reviewed by the Executive Committee to determine the interview roster. ERAS applications include personal information, education history, descriptions of research experiences, test scores and letters of recommendation. All T32 eligible candidates are interviewed by at least three members of the Executive Committee. Final rankings for the ERAS match are based on group discussion and consensus of the clinical and research faculty. Recognizing that most fellowship candidates use internet-based resources to obtain background information about programs, we have developed a comprehensive web-site for the [UAB Program in Immunology](#) (Appendix D) which provides an overview of the more than 100 faculty at UAB with research, educational and clinical interests in the field of immunology, as well as to the many basic, translational and clinical opportunities in immunology at UAB. This website is updated regularly and is used to highlight visiting professors, to announce speakers and topics for immunologically oriented seminars, Rounds and Journal Club(s).

3F. Institutional Environment and Commitment to Training.

In addition to providing support for training in the first clinical year, the University, School and Medical Center have provided substantial support for the development of a research training infrastructure as exemplified in the new Graduate Biomedical Sciences programs (Appendices A1, A2, A3, A4), in the Office of Postdoctoral Education (Appendix B), the Medical Scientist Training Program (Appendix A5), the UAB Howard Hughes Medical Institute (HHMI) MED-GRAD Fellowship (HMGF) (Appendix A6) and in the activities of the Department of Medicine's Mentors' Advisory Committee. Each of these efforts provides complementary support for research career development.

The state-of-the-art Shelby Interdisciplinary Biomedical Research Building opened in March 2006. It stands 12 stories tall with 340,000 gross square feet of space. This building houses the laboratories of 27 of our 57 mentors, as well as the administrative offices of this T32 Training Program, the Graduate Program for Biomedical Sciences, the MSTP program, and the Office of Postdoctoral Education.

For postdoctoral trainees with clinical credentials (MD and MD/PhD), the Center for Clinical and Translational Science (UAB's CTSA) has provided competitive funding for pilot research grants by physician/investigators to facilitate the transition to junior faculty positions. The Department of Medicine supports at least two physician/scientists each year, again on a competitive basis, through the Frommeyer Program which also helps in the transition to junior faculty positions.