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A. The University of Alabama at Birmingham - The University of Alabama at Birmingham, one of three autonomous institutions within The University of Alabama System, is the only four-year, public university in the state's largest metropolitan area. The physical plant of the University spans more than 80 blocks in the city center with over 250 buildings providing over 13 million feet of assignable space. For fiscal year 2011-2012 (most recent available), the University's budget was over \$2.5 billion and its economic impact on the Birmingham area is over \$4.6 billion. In 2011 UAB received over \$461.5 million in extramural grants and contracts. As of the fall of 2011 the University employed 18,984 people, had a faculty of 2,289 (40 percent of whom are female), and had a student enrollment of 17,575 at the undergraduate through doctoral levels. The graduate student population is 43 percent female and 22% are among minority ethnicities. UAB is comprised of eleven academic colleges and schools in the health sciences and academic areas. The UAB Health Center includes the Schools of Medicine, Dentistry, Nursing, Optometry, Public Health, Health Professions, the Graduate School, and the Lister Hill Library of the Health Sciences. The University's academic campus consists of the College of Arts and Sciences, the Schools of Business, Education and Engineering, the Graduate School, and the Mervyn Sterne Library. The university has 140 endowed chairs/professorships. The Institution has been ranked among the top quarter of all U.S. colleges and universities by *The Princeton Review*, and among the top 10 (currently number 5) for diversity for four consecutive years. (<http://www.uab.edu/home/>)

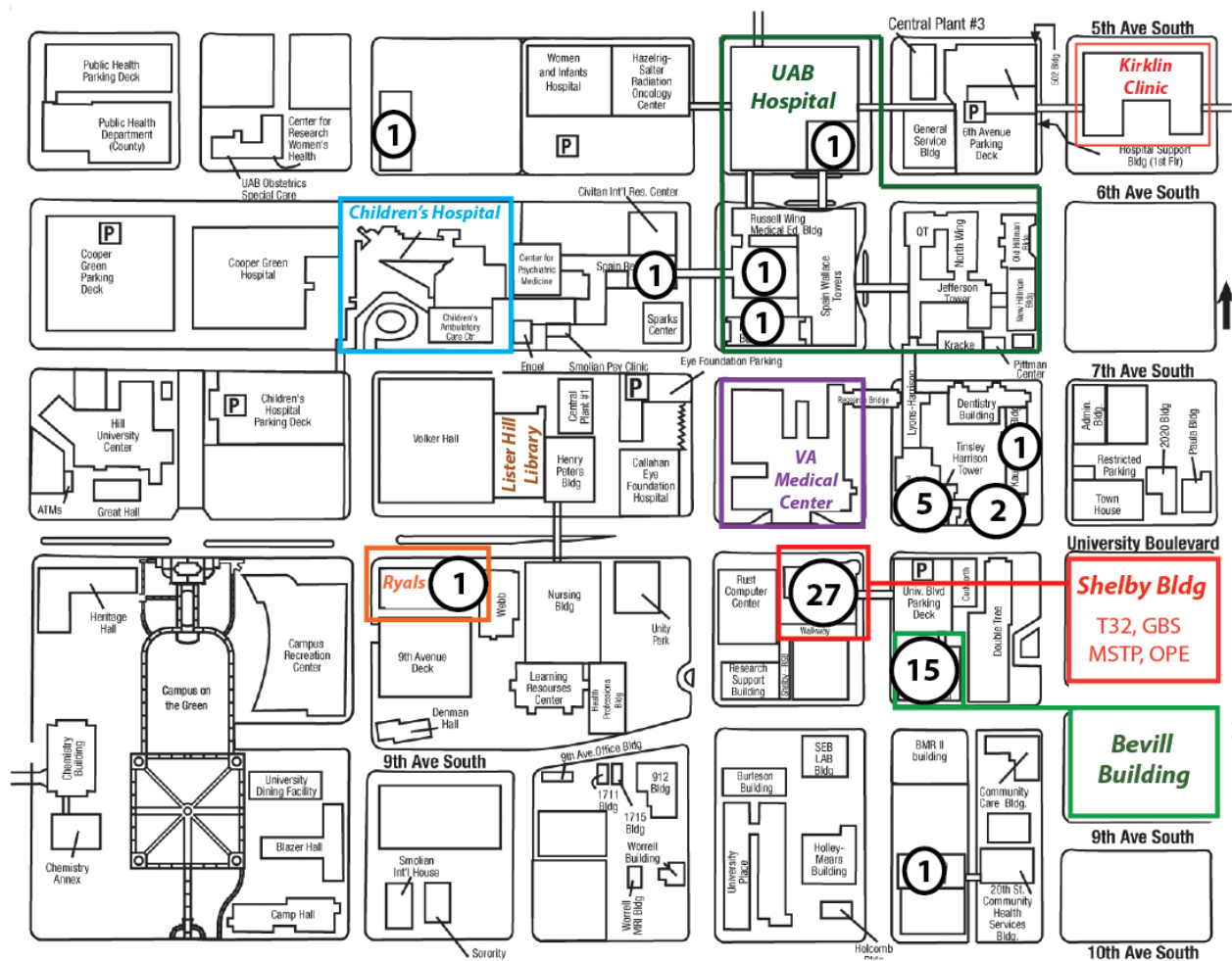


Figure 1. Partial UAB Campus Map. <http://www.uab.edu/map/>. The number of mentors' laboratories by building are identified by the bolded number within the circle or ellipse. Of the 57 mentors, 89% are located within one block of the Shelby building. Shelby also houses the offices of the T32 leadership, the Graduate Program for Biological Sciences (GBS), the Medical Scientist Training Program (MSTP), and the Office of Postdoctoral Education (OPE). The School of Public Health is housed in the Ryals building. All of the 57 mentors are located within 7 blocks of each other, as well as UAB Hospital, the Veteran's Administration Medical Center, the Kirklin Clinic and Children's Hospital; facilitating both collaboration and access to clinical materials.

1. The **University-wide Interdisciplinary Research Center Program** - A system of University-wide Interdisciplinary Research Centers (UWIRC) provides a robust infrastructure for research and training that transcends departmental structures and clinical specialties. These multidisciplinary centers are available to all UAB investigators and greatly enhance the research opportunities and career development of their trainees. The Center-associated core facilities and enrichment programs are key trainee resources. Centers require sponsorship from three or more UAB schools, substantive interdisciplinary faculty involvement; provision of research infrastructure; contribution to the intellectual environment in order to enhance faculty and student recruitment, development, and retention; a financial base to support center and core activities; internal and external review processes to ensure quality and productivity; and leadership in the integration of research and service including community outreach or partnerships. In the most recent funding cycle, UAB committed over \$5 million. (<http://www.uab.edu/opa/uwircs>).
2. The **Shelby Interdisciplinary Biomedical Research Building** - 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, increasing the amount of research space for the University by approximately 25 percent. The new facility in the heart of UAB's campus and Academic Medical Center, includes research laboratories, research support areas including a state-of-the art microscopy area, offices, administrative space for graduate programs, and conference rooms. It houses three interdisciplinary research programs, -- Autoimmunity and Immunobiology; Biomedical Engineering and Regenerative Medicine, and Neurosciences, -- and is the administrative locus for this T32 Training Program in Immunologic Diseases and Basic Immunology. This building houses the laboratories of 27 of the 57 mentors of this training program. It also houses the administrative offices of the Office of Postdoctoral Education and the Graduate Program for Biomedical Sciences. (http://peir.path.uab.edu/pathgrad/article_112.shtml). See **Figure 1**.
3. **Special facilities**
 - i. **Southeastern Biosafety Laboratory Alabama Birmingham (SEBLAB)** - In 2003-2004, the National Institutes of Health (NIH) awarded 13 contracts to build Regional Biocontainment Laboratories (RBLs). The RBLs are designed to support basic research necessary to develop drugs, diagnostics and vaccines for emerging infections and biodefense, and to provide surge capacity in the event of a public health emergency. UAB is part of a consortium funded by the National Institutes of Health (NIH) known as the Southeastern Regional Center of Excellence for Emerging Infections and Biodefense (SERCEB). This group of six universities [will work is working](#) to develop the next generation of vaccines, drugs and diagnostic tests against emerging infections such as West Nile Virus, and for defense against organisms such as smallpox that might be used in bioterrorist attacks. SEBLAB is a major asset to the research and public health communities in the region. It houses state-of-the art biosafety level 2 and level 3 laboratories as well as animal biosafety level 3 laboratories. SEBLAB's design includes flexible and secure laboratories, animal housing and procedure space, and laboratory support space. Specialized resources at SEBLAB include an aerobiology suite, imaging suite, irradiator, vaporized H₂O₂ decontamination and a decontamination chamber. In the event of a bioterrorism emergency, SEBLAB can provide surge capacity for diagnostics and other necessary analyses to enhance state and regional public health responses. UAB researchers and other investigators in academia, not-for-profit organizations, industry and government studying biodefense and emerging infectious diseases may request the use of SEBLAB facilities. An oversight committee determines the priority usage of SEBLAB. (<http://www.uab.edu/seblab/>)
- B. **The UAB School of Dentistry** (M. Reddy, DMD, ~~Interim~~ Dean; est. 1945) – The University of Alabama School of Dentistry, a unit of the Medical Center of the University of Alabama at Birmingham, was created by an act of the state legislature in 1945, the same year that the School of Medicine moved to Birmingham from the university campus in Tuscaloosa and became a four-year school. The School of Dentistry admitted its first class of students in October 1948. Since that time it has gained a national reputation for excellence. In addition to its first professional degree (D.M.D.) program, the school offers accredited postdoctoral programs in twelve areas of study. The development of "four-handed dentistry" and the

expanded utilization of trained auxiliary personnel were pioneered at this institution..

(<http://www.dental.uab.edu/index.html>)

1. The **Department of Pediatric Dentistry** (N. Childers, DMD PhD, Chair) - the Department of Pediatric Dentistry houses 8 full-time and 8 part-time faculty members, as well as 12 adjunct faculty. It offers an Advanced Educational Program in Pediatric Dentistry, which is designed to provide the educational background and atmosphere necessary for training future clinical and academic leaders in Pediatric Dentistry. Advanced education provides students with an in-depth understanding of, and clinical expertise in, the practice of dentistry for children and others with developmental disabilities. Pediatric dentistry is a specialty of an age group rather than a specific technique; therefore, extensive knowledge concerning normal growth and development, behavior management, and all phases of prevention-oriented dentistry in healthy and compromised patients is required. In 2012, the Department had \$2 million dollars in annual federal and non-federal extramural grant awards.
(<http://www.dental.uab.edu/departments-and-programs/pediatric-dentistry.html>)

C. The UAB School of Medicine (R. Watts, MD, Dean; est. 1945) - Located at the University of Alabama at Birmingham, one of the South's premier research universities, the School of Medicine is dedicated to the education of physicians and scientists in all of the disciplines of medicine and biomedical investigation. The school provides medical education and internship opportunities for students throughout the world. Its comprehensive approach to teaching future physicians covers all facets of medicine, including medical education, research, and patient care -- delivered in one of the most technologically advanced medical facilities in the country. (<http://www.medicine.uab.edu/>)

1. The **Department of Cell, Developmental & Integrative Biology** (E. Benveniste, PhD, Chair) - The UAB Department of Cell, Developmental & Integrative Biology was formed in February 2012 by a merger of the Departments of Cell Biology and Physiology & Biophysics. It is one of now seven Joint Health Science departments in the UAB Schools of Medicine and Dentistry. As of 2012, the Department has 45 primary faculty members. The major goals of the department are to sustain excellence in research and graduate training, as well as to provide outstanding professional teaching to medical, dental and optometry students. In 2011, the Department had more than \$12.5 million dollars in annual federal and non-federal extramural grant awards. (<http://www.uab.edu/medicine/cdib/>)
2. The **Department of Dermatology** (C. Elmetts, MD, Chair) - The UAB Department of Dermatology's primary goal is to care for patients with dermatologic disease, and to train physician specialists and conduct breakthrough basic, translational and clinical research relating to dermatology. The Department of Dermatology has made impressive gains over the past five years in the development and expansion of its basic and clinical research capabilities. There are 18 faculty members of which seven are actively engaged in NIH-funded research. Annual government funding in 2011 was over \$2.5 million. The Department has major research programs in immunodermatology (including vaccine development, allergic contact hypersensitivity, Langerhans cell immunobiology, and photoimmunology) and chemoprevention. (<http://medicine.uab.edu/dermatology>)
3. The **Department of Genetics** (B. Korf, MD PhD, Chair) - The Department of Genetics is both a basic science (Joint Health Sciences) and a clinical department. It is comprised of an interdisciplinary group of faculty focused on performing basic laboratory and clinical research, providing inpatient and outpatient consultation services, and offering state-of-the-art genetic diagnostic testing. The Department of Genetics is dedicated to the generation of new knowledge about genetics and genomics, translation of that knowledge to clinical practice, and integration of genetics into all aspects of medical care. The department provides comprehensive and innovative clinical services in all areas of genetic medicine from prenatal through adult genetics and cancer genetics. It also provides state-of-the-art genetic diagnostic testing in cytogenetics, biochemical genetics, and molecular genetics. Research programs focus on the mechanisms, diagnosis, and treatment of both rare and common genetic disorders as well as bioinformatics and systems biology. In 2011, the Department of Genetics had 23 faculty members and held over \$3.4 million dollars in extramural funding.
(<http://medicine.uab.edu/genetics/>)

4. The **Department of Medicine** (A. Agarwal, MD, Interim Chair to 08/31/12; S. Landefeld, MD, Chair effective 09/01/12) - The UAB Department of Medicine strives for excellence in its teaching, research and patient care. In this way, it is committed to providing outstanding clinical service to its patients and to the community, to providing exceptional medical education for medical students, residents, and other health professionals, and to providing innovative research to expand the frontiers of biomedical knowledge and clinical practice. To attain this, the Department promotes life-long learning among faculty, staff, and students and integration of our missions so that each supports and, in turn, benefits from the others. Underlying this mission statement is the belief that biomedical research is the academic center's defining characteristic. The Department of Medicine's 2011 NIH funding, exclusive of contracts, was nearly \$58 million, ranking #19 nationally. The Department's (including affiliated) faculty are distributed among eleven divisions. Mentors of this T32 training program represent six of these divisions (Clinical Immunology and Rheumatology; Endocrinology, Diabetes and Metabolism; Gastroenterology and Hepatology; Hematology/Oncology; Infectious Diseases; and Pulmonary, Allergy and Critical Care Medicine). All academic units have active, extramurally-funded research programs. (<http://www.dom.uab.edu/>)
5. The **Department of Microbiology** (F. Lund, PhD, Chair) - The 35 faculty of the Department of Microbiology carry out multi-disciplinary research programs in immunology, microbial genetics, pathogenesis, and virology. In 2011, the Department of Microbiology held more than \$15 million in extramural grant support. It is one of seven Joint Health Science Departments at UAB. Departmental dedication to excellence in research, teaching, and training is evidenced not only by its funding support, but also by its ability to attract outstanding postdoctoral fellows and graduate students. The Department of Microbiology trains approximately 35 postdoctoral and seventy graduate students at any given time, and takes pride in launching its trainees into successful and productive careers. (<http://www.microbio.uab.edu/>)
6. The **Department of Pathology** (K. Roth, MD PhD, Chair) - The UAB Department of Pathology provides extensive clinical services and teaching while maintaining large and productive research programs. In 2012, the Department had over \$20 million per year in extramural research funding (approximately \$12 million per year from the NIH. Its clinical services, including inpatient, outpatient and outreach, completes over 6 million procedures per year. The UAB Department of Pathology employs 72 full-time faculty of which 60 are involved with disease research in AIDS, cancer biology, cardiovascular disease, diabetes, gene therapy, immunopathology, infectious diseases, matrix biology, metabolic bone diseases, neuropathology, and obesity. (<http://pathuab.infomedia.com/>)
7. The **Department of Pediatrics** (S. Stagno, MD, Chair) - The 170 faculty members of the Department of Pediatrics provide a full spectrum of medical expertise, from primary care to subspecialty services. The research enterprise is substantial. With \$24 million per year in extramural funding. The commitment to education and training have brought further national recognition to the department. The department's vision is to be among the leaders in improving child health through research and innovation and promoting the well-being of children. Over the last decade, the department has experienced enormous growth, and with the support of the UAB Health System, the School of Medicine, and the Children's Health System, it is strengthening the academic medical center to meet the pediatric challenges of the 21st century. (<http://medicine.uab.edu/Peds/>)
8. The **Department of Physical Medicine and Rehabilitation** (Amie Jackson, MD, Chair) - The UAB Department of Physical Medicine and Rehabilitation (PM&R) is one of the Southeast's foremost providers of comprehensive rehabilitation care and provides services at two campus locations, Spain Rehabilitation Center (SRC) and UAB Highlands. The Department is dedicated to providing individualized care to help maximize each patient's recovery from illness or injury and continue to pursue his or her life goals. The Department of PM&R had 20 faculty members and held over \$2.8 million in grant funding in 2011. (<http://medicine.uab.edu/physicalmedicine/>)
9. The **Department of Surgery** (K. Bland, MD, Chair) – The UAB Department of Surgery has earned a national and international reputation for its unique blending of advanced medicine, excellent patient

care and research. In fact, some of its innovative surgical programs are among the largest in the country. Concern for its patients drives its highly skilled physicians to specialize in a broad range of surgery specialties, from cardiothoracic surgery to urological surgery, and more. This same concern also compels the faculty of the Department of Surgery to investigate new treatments and technologies and to research the surgical treatment of various disorders and diseases. In 2011, the Department had 135 faculty members and almost \$15 million dollars in extramural funding.

(<http://medicine.uab.edu/surgery/>)

D. The UAB School of Public Health (M. Michael, MD, Dean; est. 1981) – Recognizing that public health challenges are global, involving diseases that must be understood at the cellular level and addressed at the community level, the UAB School of Public Health (SOPH) focus on creating a community of outstanding scholars and professionals leading innovation in public health, recognized for improving the health of the citizens of Alabama and the world. These challenges require the development of new interventions, the implementation of new models, and the emergence of new systems. They demand educated professionals, well versed in the multiple disciplines of public health, to forge the best solutions. Located in the heart of the largest academic health center in the Southeast, the SOPH is embracing these challenges, creating a uniquely innovative public health curriculum and foster a dynamic and timely research agenda critical to the health of the nation. The diversity of disciplines, interests, faculty and students encourages an unparalleled intellectual vitality within a university heralded for its research capabilities. (<http://www.soph.uab.edu/>)

1. The **Department of Epidemiology** (D. Arnett, PhD MSPH, Chair) - The UAB Department of Epidemiology is one of five Departments of the UAB School of Public Health. As of 2012, the Department had 23 primary faculty members and over \$15 million dollars in extramural funding. The major goals of the Department of Epidemiology are to sustain excellence in research and graduate training. Areas of research interest include the epidemiology and genetics of immunologic diseases, AIDS, infectious diseases, and cardiovascular diseases at both the national and international levels. The Department of Epidemiology has ongoing collaborations for research and training in Bangladesh, India, China, Russia, Zambia, Pakistan, Mongolia, Rwanda, Uganda, and Mali. (<http://www.soph.uab.edu/epi>)

E. Hudson Alpha Institute for Biotechnology (HAIB) - The HudsonAlpha Institute of Biotechnology is a non-profit, academic-style research institute dedicated to basic and applied research in genomics and genetics. The Institute, which opened in April 2008, is housed in a four-story, 270,000 square foot building that has the capacity to house up to 700-800 scientists and staff. It is in Huntsville, Alabama, on the grounds of Cummings Research Park, a half-mile from the University of Alabama at Huntsville and next to the headquarters of NASA and a large number of engineering and computer science firms. The building houses well-equipped state-of-the-art laboratories, numerous small- and medium-sized conference rooms, as well as a library, auditorium and conference center. The Institute is comprised of nine large laboratories with space for 15 to 18 Faculty Investigators, and is situated in the North Wing of the building and comprises almost half of the square footage. The remaining half, in the South Wing, houses the HudsonAlpha Genome Sequencing Center (formerly the Stanford Human Genome Center) and 16 biotechnology companies, all of which are involved in research, development or production related to genomics. A laboratory classroom for high school and college students, as well as teachers, is used to support an extensive education outreach program that is led by scientist/educator Dr. Neil Lamb, and is outfitted for distance education programs that originate from the Institute. High-definition video conferencing is placed throughout the building to connect our scientists and educators with colleagues, teachers and students in other locations. (<http://www.hudsonalpha.org/>)

F. Southern Research - Southern Research is a not-for-profit, 501(c)(3) organization conducting basic and applied research in Alabama, Maryland, and North Carolina in the areas of drug discovery, preclinical drug development, advanced engineering, and environmental protection. Southern Research is a self-sustaining contract research organization and an incorporated affiliate of The University of Alabama at Birmingham (UAB). We are brought together because of a shared belief in the power and potential of collaborative research. Southern Research and UAB have long-standing relationships in areas such as materials engineering, high-performance computing, breast cancer research, glial biology, cystic fibrosis research,

and gene therapy. Through an extensive drug discovery and development program, Southern Research provides scientific expertise and a comprehensive suite of highly specialized capabilities which enable its clients to effectively and efficiently navigate the increasingly important and complex drug discovery and development continuum, from initial targeting and lead identification through the completion of preclinical research and into the early phases of clinical trials. As a leading contract research organization, Southern Research provides preclinical drug development services to pharmaceutical and biotechnology companies on an outsourced basis. Southern Research provides services in all phases of the early-stage drug discovery and development process and provides clients with comprehensive services and support to assist them in streamlining their custom drug discovery and development programs.

(<http://www.southernresearch.org/>)

G. UAB Clinical and Translational Research Facilities

1. **Clinical care facilities** - Partnering with UAB and the School of Medicine to provide avenues for clinical care and training for medical professionals, the entities listed below are part of a broad and diverse medical network on the UAB campus. UAB is the only medical center in Alabama listed in the *U.S. News & World Report* "Best Hospitals" issue for 22 straight years (every year from the issue's inception). Among the specialty rankings, Rheumatology has been UAB's highest ranked program for many years, presently #12 in the nation.
 - i. **The Kirklin Clinic (TKC)** - The Kirklin Clinic® opened in 1992 as a premier outpatient facility to provide examination and treatment rooms for physicians representing almost every specialty in adult medicine. The five-story facility covers a full city block with 454,000 square feet, more than 30 distinct clinical units of multidisciplinary teams, and an adjacent covered parking deck that accommodates 1,450 vehicles. The Kirklin Clinic® at Acton Road provides a wide array of patient care services south of Birmingham, established in the suburban community. (<http://www.health.uab.edu/11263/TKC/>)
 - ii. **UAB University Hospital** - Established in 1945 as the teaching hospital for the School of Medicine, UAB University Hospital is licensed for over 900 beds and is dedicated to top quality patient care. The 885,000 square-foot, 11-story North Pavilion opened in 2004 and has 37 operating suites, 3 medical surgical units, 4 intensive care units (trauma and burn, surgical, neuroscience, and cardiovascular), and a 44,000 square-foot Emergency Department. (<http://www.uabmedicine.org>)
 - iii. **Children's Hospital** - In addition to the health system components listed above, three independent hospitals surround UAB's main campus in Birmingham, and UAB physicians may collaborate and share information with their specialists on some diagnoses and treatments. In some cases, knowledge and skill are combined for joint programs in certain medical specialties. Established in 1911, The Children's Hospital of Alabama, part of the Children's Health System, provides pediatric care while serving as the primary site for pediatric education at UAB. The 12760,000 square foot, 12-story Benjamin Russell Hospital expansion opened this summer of 2012. The number of beds has expanded from 275 to 332, plus 48 NICU bassinets. This private, not-for-profit hospital is home to a vast array of specialists and has one of the largest pediatric outpatient centers in the United States. (<http://www.chsys.org/>)
 - iv. **Birmingham VA Medical Center** - Partnering with UAB since 1975, the Birmingham Veterans Affairs Medical Center is an acute care facility with 138 beds currently in operation. The facility has strong programs in both medicine and surgery and serves as the primary referral center for the state. (<http://www.birmingham.va.gov/>)
2. **The University-wide Interdisciplinary Research Centers**
 - i. The **Center for Clinical and Translational Science (CCTS)** - The UAB CCTS helps to accelerate the pace of moving fundamental scientific discoveries into practical applications that enhance health. The CCTS is increasing interaction between UAB researchers and the community, and among researchers at UAB and other premier health centers to provide cutting-edge medical treatments to patients. Funding is provided by the NIH National Center for Research Resources as part of its Clinical and Translational Science Award Program. (<http://www.ccts.uab.edu/>)

3. Core Facilities

- i. **Clinical Research Unit** (Burt Nabors, MD, Jeffrey Edberg, PhD, Co-Directors) – the Clinical Research Unit of the CCTS is enhancing UAB's research culture by providing a highly efficient and flexible resource that participates in study development, implementation, and outreach and is sustainable through a comprehensive cost-recovery mechanism. The CRU is committed to providing investigators and their research team with a research environment and broad range of services guided by good clinical practice, which contributes to the conduct of excellence in clinical and translational research. The CRU equips the investigator with essential tools and critical resources and provides a highly efficient and flexible infrastructure that is sustainable through a comprehensive cost-recovery system. (<http://www.ccts.uab.edu/pages/pcir.aspx>)
- ii. **Facility for Access to Clinical Enrollment Services** (Mona Fouad, MD, MPH, Director) – Mindful of the precise research population needed for research studies and clinical trials, the Facility for Access to Clinical Enrollment Services (FACES) gives access to an experienced team of recruiters that includes project planners, coordinators, telephone interviewers, data managers, analysts and community outreach personnel. FACES offers a comprehensive recruitment and retention service that helps develop plans for funded projects to identify potential participants, reaching that population and providing assistance to conduct community outreach activities to enhance recruitment and retention success. The Service has been involved in over 80 studies since its inception. (<http://www.uabfaces.com/>)
- iii. **Methodology Core** (David Redden, PhD, Director) - The mission of the NIAMS MCRC Methodology Core is to establish the infrastructure for a broad spectrum of clinical and translational research using state-of-the-art tools in statistics, epidemiology, outcomes, health services, and behavioral research. The Core also provides assistance as it pertains to data collection, management, and computational needs of existing projects, as well as promotion of new investigation. To achieve this, the Core seeks to evaluate new evaluative, analytical, and translational methods of research. It also maintains a commitment to the continued education of new and established clinical researchers in the most recent advances of methodology. (<http://www.uab.edu/medicine/camac/research-resources/shared-facilities/cores/63-methodology-core>)
- iv. **Sample Processing and Analytic Nexus** (Jeffrey Edberg, PhD, Directors) - The SPAN of the CCTS has two coordinated facilities for processing research samples and for preparing patient specimens for genetic studies with specimen banking. The facility is available to work with the CRU patient facilities to facilitate “bedside-to-bench” research. Processing activities available from the Core include preparation of specimens (including sample handling in a laminar flow hood), sample centrifugation, preparation of aliquots, labeling and short term storage. Specimen processing in the genetics study lab, located in the Shelby building, also provides services including preparation of mononuclear cells (MNC), EBV-immortalized lymphoblastoid cell lines, buffy coats, Cryopreservation of cell lines and fresh MNC, DNA extractions, banking of DNA/cell lines, access to SNP genotyping technology together with the Heflin Genomics Core (Pyrosequencing, TaqMan, SNPlex assays), and consultation in study design and genotyping approaches. (<http://www.ccts.uab.edu/pages/SPAN-TTNM.aspx>)
- v. **Tissue Procurement Shared Facility** (William E. Grizzle, MD, PhD, Director) - The Tissue Procurement Shared Facility (TPSF) operates as a prospective service to collect, from UAB associated hospitals, normal, malignant, benign, and diseased fresh human tissues and fluids which are then preserved appropriate to protocol. This preservation can include fresh storage in media or saline, snap-frozen storage in liquid nitrogen, freezing in OCT for frozen section preparation, or preservation in a fixative of choice. The TPSF can also provide procurement of control tissues including uninvolved tissues or matched tissues from patients with benign disease processes. The histology laboratory can provide paraffin blocks and/or stained or unstained slides. In addition, investigators can obtain access to rare tissues through the national Cooperative Human Tissue Network (CHTN). All samples are identified by control numbers to protect patient confidentiality. A copy of the surgical pathology report from which all patient identifiers have been

removed will be provided to the researcher. If requested, the TPSF will attempt to obtain additional information such as follow-up, clinic-pathologic, and demographic features. The facility is regulated by the UAB Institutional Review Board (IRB) regarding human use approval for use of human tissues. (http://www3.ccc.uab.edu/index.php?option=com_content&view=article&id=165%3Atissue-procurement&catid=35&Itemid=90)

H. UAB Fundamental Science Core Facilities

1. Core Facilities

- i. **Analytical Genomics and Transgenics Core** (Robert A. Kesterson, PhD, Director; Jeff Edberg, PhD, and Devin Absher, PhD, Co-Directors) - The overall goal of the Analytical Genomics and Transgenics Core (AGTC) is to provide state-of-the-art services to facilitate the development and use of appropriate genetic animal models. During the two previous funding cycles, this Core (formerly called the “Gene Targeting Core Facility” (GTFC)) served to support expertise in embryonic stem (ES) cell services as part of the UAB Transgenic Mouse Facility. In response to user needs, the Core has expanded services to more specifically assist with the creation of mouse models relevant to immunologic disease beyond just ES services to 1) generate novel genetically engineered models of broad utility to multiple investigators, and 2) establish educational and outreach programs to forge active collaborations between the Core and investigators, especially in areas related to genomics. Formal educational resources for learning modern and emerging genetic and genomic technologies via workshops, seminars, lectures, and symposia hosted at UAB and our partner institution, Hudson Alpha Institute for Biotechnology (HAIB) are an extension of the core's evolution. The overarching objective and downstream output of the Core is to produce mouse models of human disease and of human genetic variants contributing to disease in order to provide a mammalian system to study the pathophysiology of immunologic diseases, as well as to test the efficacy of potential treatment interventions. (<http://www.uab.edu/medicine/camac/research-resources/shared-facilities/cores/analytical-genomics-and-transgenics-core>)
- ii. **Analytic Imaging and Immunoreagent Core** (Kent T. Keyser, Director; Mary A Accavitti-Loper, PhD, and Casey Weaver, MD, Co-Directors). The Analytical Imaging and Immunoreagent Core (AIIC) supports immunology investigators' research programs with state-of-the-art imaging capabilities and the ability to generate essential immunoreagents. The AIIC develops, tests, and distributes novel immunoreagents; provides investigators with assistance in experimental design, image acquisition, and image analyses with conventional imaging techniques and with new capabilities that include the super high-resolution imaging of Stimulated Emission Depletion (STED) and live cell imaging. The AIIC will collaborate with investigators to identify and develop new methodologies and instrumentation to support immunology research in an ongoing manner. This effort will include the evaluation and implementation of new immunoreagent production methodologies and new imaging techniques such as fluorescence lifetime measurements. The AIIC provides consultation concerning choice and production of immunoreagents and one-on-one training in the use of imaging instrumentation. The AIIC sponsors annual symposia and workshops, and uses the individualized Design of Experiment and Analysis Sessions (IDEAs) to consult with individual or small groups of investigators about experimental design. These activities serve both to educate and to enrich the scientific environment, and identify new ways that the AIIC can support the research programs of immunology investigators. (<http://www.uab.edu/medicine/camac/research-resources/shared-facilities/cores/analytic-imaging-and-immunoreagent-core>)
- iii. **Comprehensive Flow Cytometry Core** (John D. Mountz, MD, PhD, Director; Olaf Kutsch, PhD, and Troy Randall, PhD, Co-Directors) - The Analytic and Preparative Core Facility (APFC) provides resources, educational opportunities, and technical expertise for ongoing disease research. It assists with the design and execution of experiments using flow cytometry and cell sorting. The Core also educates users through informal tutorials, formal courses, and web-based information on existing and new technologies. The Core has a constant commitment to optimize the efficiency and efficacy of protocols and strategies, as well as the development of new applications in response to user need and field advancement. In addition to technical support, the core offers informal and formal seminars, as well as personal consultation, to address topics ranging from experimental design to data analysis. The Core also aim to develop new and enhance existing protocols and

technologies in response to user needs. (<http://www.uab.edu/medicine/camac/research-resources/shared-facilities/cores/comprehensive-flow-cytometry-core>)

- iv. **Heflin Genomics Core Laboratory** (Molly Bray, PhD, Michael Crowley, PhD, Co-Directors) – The Genomics Core Laboratory comprises a comprehensive resource for molecular analysis designed to facilitate and enhance the research of UAB investigators. It provides whole genome and targeted gene expression analysis, high- and low-throughput whole genome and custom genotyping, whole genome methylation analysis, and targeted sequencing analysis to university investigators as well as individuals outside of the UAB system. The facility has recently been expanded to include the iScan and BeadXpress systems from Illumina in order to complement the existing Affymetrix GeneChip system, which is comprised of the Affymetrix 3000 7G scanner with an autoloader, two FS450 fluidics stations and two Hyb 640 hybridization ovens. The laboratory also includes an ABI 3730 system for targeted DNA sequencing, along with Bio-Rad Experion and Agilent 2100 Bioanalyzer systems for the determination of RNA/DNA quality prior to processing and for quality control during chip processing. The facility has the capacity to perform whole genome genotyping, copy number variation analysis, and gene expression microarrays on multiple systems in order to accommodate the needs of investigators who may have committed to working with one platform or another in previous studies. In addition, we can perform microRNA profiling and whole genome methylation profiling using a Chromatin-IP protocol followed by hybridization on the human or mouse promoter chip (ChIP-Chip) (<http://www.heflingenetics.uab.edu/GenomicCore.html>)
- v. **Mass Spectrometry / Proteomics Shared Facility** (James A. Mobley, PhD, Director) - The Shared Facility is organized into four modules (1) Bioanalytical Separation and Sample Preparation, (2) Proteomics, (3) Small Molecule Analytics, and (4) Data Analysis and Bioinformatics that are supported by a team of scientists who are experts in mass spectrometry, bioanalytical chemistry, statistics, systems biology, and information handling. The goal of the MSP Shared Facility is to provide state-of-the-art capabilities and training in mass spectrometry, proteomics, and bioanalytic technologies to support the research needs at UAB. Dr. Mobley directs the shared facility. He provides initial consultation with new users, with continuing assistance in developing appropriate experimental design and use of technology, and data analysis and interpretation. He also ensures that the shared facility provides cutting edge mass spectrometry and proteomics support for pilot and extramurally supported projects. In consultation with the oversight committee and the Co-Director, he oversees utilization of space, instrumentation, and expertise to meet current needs and to anticipate technological advances necessary for future needs. (<http://www.uab.edu/bmsf/>)
- vi. **Multidisciplinary Molecular Interactions Core** (Randall S. Davis, MD, PhD, Director) The Multidisciplinary Molecular Interactions Core provides use of a Biacore T100 biosensor that is capable of determining the binding kinetics, specificities, and thermodynamics of biomolecular interactions. The Biacore T100 uses surface plasmon resonance (SPR) technology to precisely monitor label-free binding activity between proteins, peptides, nucleic acids, carbohydrates, lipids or small drugs (200-1000 Daltons) in real-time. The SPR-based biosensors can be used in determination of active concentration as well as characterization of molecular interactions in terms of both affinity and chemical kinetics. Located conveniently in the Shelby Interdisciplinary Biomedical Research Building, the MMIC provides access to state-of-the-art technology and represents an essential application in ligand-receptor life science disciplines including fundamental immunology and autoimmunity research.
- vii. **Small Animal Imaging Facility** (Kurt R. Zinn, DVM, PhD, Director) – The facility was established to enable UAB researchers to apply non-invasive, molecular imaging technologies in animal models. Imaging is accomplished with a range of imaging modalities, including gamma camera imaging, X-ray CT, PET/CT bioluminescence, fluorescence, magnetic resonance (MR) imaging, and ultrasound imaging. It is expected that the successful application of small animal imaging will speed efforts to translate basic research to human clinical trials. A Radiation Chemistry Laboratory was established in 2009 to enable production of radioactive compounds on site for various researchers. The goals of the facility include the following: 1) to apply imaging to evaluate the health status of animal models, including the function of organ systems; 2) to detect and monitor cancer progression during

therapeutic intervention; 3) to evaluate targeting of gene therapy vectors for various applications; 4) to evaluate targeting of peptide, proteins, and unique molecular conjugates; 5) to develop imaging approaches for autoimmune disease research; and 6) to develop new instrumentation and imaging systems for increasing the sensitivity and specificity for molecular imaging.

(<http://www.uab.edu/medicine/camac/research-resources/shared-facilities/cores/small-animal-imaging-facility>)

viii. **Additional core facilities are described at**

(http://www.uab.edu/home/images/research/documents/core_day_booklet_nov10.pdf)

I. UAB Informatics and Computing

1. **Molecular and Genetic Bioinformatics Facility** (Elliot J. Lefkowitz, PhD, Director) - The Molecular and Genetic Bioinformatics Facility (MGBF) comprises a total of over 1,350 sq. ft. of space in the Bevill Biomedical Research Building (BBRB), affiliated with the Shelby building by a covered bridge.. All Offices are equipped with multiple gigabit and 100 megabit switched fast Ethernet connections to the building and campus network backbone. The campus network backbone consists of gigabit fiber connections linking each campus building to the campus computing center. UAB maintains OC-3 connections to the commodity Internet (I1). UAB is also a member of the Internet 2 (I2) consortium and maintains OC-12 connectivity to the Abilene network through Georgia Tech in Atlanta. I2 connectivity provides fast links to most major research universities in the country along with a number of government institutions including the National Center for Biotechnology Information (NCBI). The MGBF maintains two computer server rooms, which contain multiple 20 and 30 amp 115 volt electrical feeds, as well as 30 amp, 220 volt outlets. Uninterruptible Power Supplies with battery backups are used between each of the electrical feeds and the server power supplies for every electrical connection. Each server room contains its own Foundry Gigabit switch servicing all network connections. Each server is connected to an Avocent A2000R KVM over IP switch that allows for remote monitoring and control of all servers over a TCP/IP internet connection. The UAB MGBF maintains a Sun quad-processor E450 Solaris server with 4 Gb of RAM and over 600Gb of disk storage, and a Sun quad-processor V880 Solaris Server with 8 Gb of RAM and over 200Gb of storage to support the various programs, databases, and analytical tools available to all UAB investigators. The MGBF provides UAB with the Genetics Computer Group's (now Accelrys) Wisconsin package of sequence analysis software tools. Our site-license for Accelrys includes access to the command-line, Xwindows-based (SeqLab), and web browser-based (SeqWeb) interfaces to these sequence analysis programs. Dr. Lefkowitz also maintains over 20 other servers and workstations to support facility personnel including Dell PC servers, workstations, and laptops; Macintosh workstations; and Linux servers. All servers and workstations use either gigabit or 100 Mb cards for connection to the campus network. In addition, a Dell/EMC AX100 Storage Area Network with over 3 Terabytes of disk storage is used for file storage. Finally, the MGBF facility maintains a Dell PowerVault 132T tape library with two Quantum SDLT 320 drives for tape backups of all server, workstation, and database data. For computationally intensive problems, including large database searches, several Linux-based computer clusters are available on campus that are available to support the needs of facility users. These include a 64 node, 128 processor cluster in the School of Engineering, and a 32 node, 64 processor cluster in the Department of Computer and Information Sciences. (<http://www.genome.uab.edu/>)
2. **Division of Bioinformatics, Department of Pathology** (J. Almeida PhD, Director) - In January 2011, UAB established the Division of Informatics with the recruitment of Jonas Almeida, Ph.D., from M.D. Anderson Cancer Center in Houston. Informatics—the use of computational statistical tools for the management of information—is a construct that combines computational research and tool development to integrate biomolecular and clinical data and advance personalized medicine. The informatics division is housed within the UAB Department of Pathology, which allows it better access and integration with the clinical realm. However, students who work in the division range from M.D./Ph.D.s to engineering and computer science majors. As of 2012, the Division had 4.5 primary faculty members. (<http://uab.mathbiol.org/informatics>)
3. **High Performance Computing** (B. Soni, PhD, Director) - The High Performance Computing capacity at UAB, largely available through the Computer Science Department and the School of Public Health, is

an important additional resource for intensive computing needs. Fields of specialization that reflect the interests of the faculty include design and analysis of algorithms, software development techniques, compilers, distributed computing, programming languages, database systems, artificial intelligence, computer graphics and vision, neural networks, large-scale simulation, biomedical computing applications, and bioinformatics. The department's research facilities include many Sun and Silicon Graphics workstations, file servers, five networked PC clusters, and a Beowulf cluster. All faculty members have access to the Alabama Supercomputer Center (<http://www.asc.edu>) which is located in the Alabama Supercomputer Authority's 24,000 ft² building in Huntsville, Alabama. The center houses the Cray SV1 supercomputer. A StorageTek 4400 Automated Cartridge System provides a 2.4 terabyte long-term data storage capacity. Scientific workstations provide visualization and interactive graphics capabilities at the center and on the research campuses across the state. Several software packages are installed and maintained. Access is provided by dial-up facilities at network node points and at the center. Statistical software available on the analysis server includes SAS version 8 and S+. In addition, through a grant on which we collaborate with the University of Alaska (P20RR016430), we have access to supercomputers at the Arctic Region Supercomputing Center (<http://www.arsc.edu/>) including two Cray systems, if necessary. Currently, across the Beowulf clusters, IBM BG supercomputer, SGI Altix supercomputer, DMC, and other HPC resources, a total of 4,228 processors are in place and available to UAB investigators. For parallel programming, there are three Beowulf-style clusters: (1) a 128-node Linux Beowulf cluster with each node configured with two Intel EM64T 3.6 GHz processors and up to 6 GB of memory, (2) a 64-node Linux Beowulf cluster with each node configured with two Pentium 4 Xeon 2.4 GHz processors and up to 4 GB of memory, and (3) a Linux Beowulf cluster with 192 cores (based on Intel quad-core E5450 processors), 120 cores (based on AMD Opteron 242 processors), and 43 TB of disk storage. We also have access to an IBM Blue Gene supercomputer, purchased through a joint collaboration and investment of \$750,000 by a number of groups across UAB. This will allow us to tackle parallel programming on a larger scale than the Beowulf-style clusters described above have allowed in the past. It is configured with 2,048 processors, 1 TB of RAM, and 13 TB of disk storage. The hardware and software will be maintained by the system administrators of the Mechanical Engineering department, chaired by Dr. Bharat Soni. This same team currently manages the Beowulf clusters and we expect that their expertise in managing these kinds of parallel computers will be a critical part of our continued success in high performance computing.

J. UAB Graduate and Post-Graduate Training

1. **UAB Graduate School** - The Graduate School, established in 1970, offers competitive annual recruitment funding awards to PhD entry programs to be used for enhancement of recruitment practices, including recruitment advertising, website upgrades, support of head-start summer programs, participation in diversity recruiting events, interview visit support and others. The Graduate School also hosts the annual Opportunity Zone recruitment event for regional undergraduates, collaborates with the UAB Office of Undergraduate Research to sponsor an annual Undergraduate Research Day and summer research intern events, and liaises with various departmental honors programs as well as the university-wide Science and Technology Honors Program. It also hosts the UAB McNair Scholars Program and the NIH-funded UAB PREP post baccalaureate program, and provides recruitment and ongoing mentoring programs for minority graduate students. (<http://www.uab.edu/gradschool>)
 - i. **Graduate Program in Biological Sciences** (S. Rich, PhD, Director) - The Graduate Biomedical Sciences (GBS) community at UAB encompasses approximately 475 graduate students and 350 faculty. They participate in multiple interdisciplinary thematic programs that integrate more than 25 departments and 20 research Centers in the School of Medicine, partner Schools throughout the university and Southern Research, an affiliated drug discovery and development institute. UAB is consistently among the top 25 institutions in the US for NIH research funding. It provides its graduate students the flexibility, guidance, resources and training to become highly competitive for outstanding postdoctoral and professional positions. UAB offers eight interdisciplinary training pathways in the Graduate Biomedical Sciences, including Biochemistry & Structural Biology, Cancer Biology, Cell, Molecular and Developmental Biology, Genetics and Genomic Sciences, Immunology, Microbiology, Neuroscience, and Pathobiology & Molecular Medicine. (<http://www.uab.edu/gbs/>)

2. **Office of Postdoctoral Education** (L. Schwiebert, PhD, Director) - The UAB Office of Postdoctoral Education (OPE) was established in 1999 and was one of the first Postdoctoral offices in the country. Since its inception, the OPE has been instrumental in establishing and maintaining competitive terms, benefits and training programs for all postdoctoral fellows. It works closely with the University's academic administration, the UAB Council on Postdoctoral Education and the UAB Postdoctoral Association to address the needs and concerns of postdoctoral fellows in a timely and professional manner. The goal of the OPE is to provide postdoctoral fellows with the opportunities and skills they need to be successful in their chosen careers. The possibilities for academic and research-related careers are ever changing; as such, we strive to prepare postdoctoral fellows for these possibilities. In doing so, the OPE is dedicated to making UAB the first choice among postdoctoral fellows as a place to work, live and succeed. (<http://www.postdocs.uab.edu/>)