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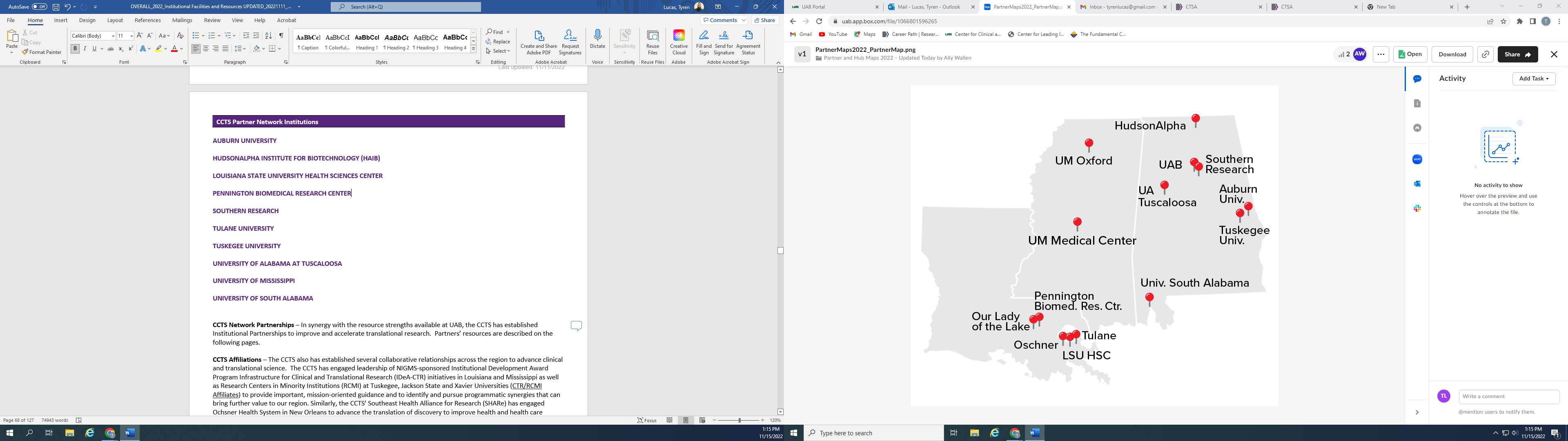
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| **INSTITUTIONAL RESOURCES** |

Building on research strengths at the University of Alabama at Birmingham (CCTS Hub), the CCTS continues to engage an 11 Institution Partner Network spread across a Southern Tri-State Region (Alabama, Mississippi, and Louisiana) to create a vibrant scientific environment to improve and accelerate translational research and workforce development. The Institutional Resources herein provide detail on the CCTS facilities and technology, followed by detailed descriptions of CCTS Partners’ resources, starting with the Hub and followed by Partners in alphabetical order.

|  |
| --- |
| Center for Clinical and Translational Science (CCTS) |

To speed the translation of research into improved human health, the CCTS and its Partner Network are committed to increasing research capacity, accelerating research processes, developing, and supporting excellence in the research workforce while providing creative and innovative approaches to major health and health care delivery challenges. The CCTS aims to fortify the advancement of translational science through community engagement and vibrant connections within the CCTS Partner Network. The CCTS offers access to a number of resources and capacities through its co-leadership of the Clinical Trials Initiative as well as the Training Academy and the Research Commons. In its commitment to team science, the CCTS embraces a Multiple Program Director/Principal Investigator (MPI) model to oversee the implementation and strategy of the Center. The **CCTS Office of the Director** is helmed by Director Orlando M Gutierrez, MD, cMPI, and Co-Director Patrice Delafontaine, MD, mPI. The office further assembles leadership in a modular strategy to draw on complementary expertise and experience to realize the vision of healthy communities throughout the region.

## CCTS PARTNER NETWORK

In synergy with the resource strengths available at the University of Alabama at Birmingham (UAB), the CCTS has established Institutional Partnerships to improve and accelerate translational research. The CCTS Partner Network crosses institutional boundaries to improve human health and health care delivery. This innovative partnership is well integrated into the fabric of the CCTS and provides the foundation for addressing health outcomes through collaborative research and training efforts. Building on some initial relationships from the Deep South Network for Translational Research, we have significantly expanded

to create new and more formal partnerships with regional institutions for mutual benefit. Regional partners are working together to facilitate and promote unique opportunities, including (but not limited to) drug discovery and development, genomics, advanced magnetic resonance imaging, population health and outcomes research. Each partner brings a unique research framework that fortifies the CCTS Partner Network as a whole and fulfills the CCTS mission of excellence. Partners include UAB (Hub), Southern Research, Auburn University, University of South Alabama, HudsonAlpha, LSU Health Services Center, University of Mississippi Medical Center, Pennington Biomedical Research Center, Tulane University, University of Alabama-Tuscaloosa, and Tuskegee University. Building on this culture of collaboration, the CCTS has expanded its relationship with other affiliate institutions to advance programmatic synergies (University of Mississippi (Oxford), Our Lady of The Lake, Ochsner Health).

## CCTS RESEARCH COMMONS

Through the Research Commons, investigators can access research-related services and resources available at UAB and our Partner Network institutions. The Commons provides individualized assistance to all investigators, from trainees to full professors. CCTS personnel facilitate scientific connections by directing investigators to appropriate capacities, facilitation of scientific interactions, and promotion of CCTS opportunities. Through peer-driven Panels, the CCTS offers a multifaceted approach to guide investigators in early phase project design, grant proposal development, evaluation and revision of unfunded grant proposals, implementation of research protocols, and interpretation and or dissemination of experimental results. The CCTS Research Commons is also the primary portal through which investigators can connect with important expertise including Biostatistics, Epidemiology and Research Design (BERD), informatics, clinical research services and other scientific capacities.

### CCTS Biostatistics, Epidemiology and Research Design (BERD)

The CCTS Biostatistics, Epidemiology and Research Design (BERD) unit is a multidisciplinary team of biostatisticians, epidemiologists, and methodologists who collaborate with CCTS researchers to provide fundamental, clinical, and translational research methodology needs. The BERD mission is to provide consultation, guidance, and expertise for study design, data management, and statistical analysis. Its goal is to gather methodological expertise as a single coordinated resource and match individual methodological skills and interests with study-specific needs to advance research. BERD achieves this goal by providing methodological training (short courses, on-line video library), study design consultation (in person clinics, online ZOOM conference), methodology review of grant applications and clinical trials (panels), and collaborations for intermural and extramurally funded research.

In support of rigorous methodology and scientific reproducibility in clinical and translational research, the CCTS BERD team collaborates with investigators at any stage, from student to senior faculty, across the CCTS Partner Network, pairing expertise with study-specific needs and providing state-of-the-art study design, data management, and statistical analysis. In addition, BERD specializes in supporting studies during the critical design and initial implementation phases, ensuring a successful launch.

The extent and intensity of BERD services vary by collaboration. These services include study design, sample size and power calculations, development of statistical analysis plans, conduct of statistical analyses, graphical representation of data and interpretation of analytic results. The BERD provides these services through walk-in clinics as well as scheduled online ZOOM calls. Responsive to investigator demand, these standing venues are available daily. During the design of studies, BERD methodologists assist researchers in addressing NIH’s four components of Rigor, Reproducibility, and Transparency. The CCTS BERD also has developed templates and guidance to help researchers meet NIH’s requirement of Data Sharing and Management Plans (implemented 2023). For independently funded clinical trials and other studies requiring sustained methodologic contributions, BERD experts participate as co-investigators, effort funded and addressed through the grant/contract, to guide standard operating procedures and to ensure accuracy and reproducibility of scientific results.

BERD provides this large array of methodological services to CCTS clinical and translational researchers across all levels of translational science. The services provided are dependent upon the nature the mechanism being developed or conducted (Pilot Design, Clinical Trial, K Awards, F-Series, R-series, Investigator Initiated Electronic Health Record Study). BERD tailors the development of the essential methodologic components including statistical analysis plan, data management plans, and sample size/power calculations to the specific aims of the study.

### CCTS Informatics

CCTS Informatics is responsible for providing a broad range of informatics collaborative opportunities and analytical services in support of basic and clinical research. These collaborative services extend from support for basic genomics and bioinformatics analyses to clinical informatics research for population health and outcomes research and health care informatics operations. Specifically, in support of the computational analysis needs of UAB investigators, CCTS Informatics formed the Informatics Consulting Service to provide consultation and collaborative assistance on the collection and analysis of data derived from basic biomedical research (Bioinformatics) to clinical, outcomes, public health, and health services research (Clinical and Health Informatics). Our expertise extends from traditional sequence and genomics analysis, microarray gene expression analysis, protein and RNA structural prediction, and the analysis of data from next generation sequencing (NGS) technologies, to the analysis of data derived from clinical research studies. We have extensive experience in the analysis of NGS data including data derived from whole genome and exome sequencing studies, genome methylation studies, RNASeq data, and microbiome and metagenomic analyses.

CCTS Informatics currently consists of 7 Bioinformaticians (5 PhD level, 1 MS, and 1 BS); 4 Clinical Informaticians (3 PhD, 1 MSHI); an Informatics Architect who designs and implements data management and analytical frameworks for the storage and processing of all our bioinformatics data; and 5 Programmer/Analysts who support the consultation, analytical, training, and educational aims of the service. CCTS Informatics participates in the Southeastern Informatics Consortium, offering consultation services and collaborative opportunities across the CCTS Partner network.

The ***Informatics Institute*** was established in the School of Medicine in 2015 to accelerate and enhance these activities within the school and coordinate with relevant activities in other schools. The Institute served the de facto home for an informatics faculty, drawn from multiple clinical and basic science departments, who collaborate with other biomedical researchers and each other, to apply informatics solutions to biomedical research and healthcare tasks to understand fundamental challenges. This understanding serves as the basis for their own research into developing new informatics methods and tools for addressing the future tasks. In 2023, the Informatics Institute formally transitioned into UAB’s ***Department of Biomedical Informatics and Data Science (DBIDS)***. Faculty and staff lead and conduct research across the biomedical informatics spectrum with expertise in bioinformatics, computational and systems biomedicine, translational informatics, clinical research informatics, and clinical informatics. Informatics contributes toward timely prevention of diseases in individuals and communities and is rapidly advancing health care and biomedical research. Their expertise facilitates medical, biomedical and translational research at UAB and around the world, through partnerships and collaborations with experimentalists and clinicians. In collaboration with CCTS Informatics, DBIDS also supports researcher access to clinical data through the Enterprise Clinical Data Warehouse and the i2b2 data repository.

#### Data Platforms and Additional Resources

i2b2 (Informatics for Integrating Biology and the Bedside): i2b2 is a scalable informatics framework designed for translational research. i2b2 was originally designed to support cohort identification, allowing users to perform an enterprise-wide search on a de-identified repository of health information to determine the existence of a set of patients meeting certain criteria. Building on this precedent and with the appropriate regulatory approvals, i2b2 can also facilitate recruitment of this cohort when the study is launched. The informatics tool is also instrumental in addressing population health questions and comparative effectiveness and outcomes research.

REDCap (Research Electronic Data Capture): REDCap is a secure web application for building and managing online surveys and databases. DBIDS supports an instance of REDCap that operates within the UAB Health System firewall, researchers a HIPAA-compliant environment for collecting and analyzing data sets that contain protected health information.

National COVID Cohort Collaborative (N3C): a large, centralized data resource available to the research community to study COVID-19 at a scale and statistical power not possible within any single institution. N3C has assembled a standardized collection of clinical, laboratory and diagnostic data from hospital electronic health records and health care plans across the country for analysis within an accessible, cloud-based data enclave.

Informatics Gateways: Scientific Gateways are collaborative, multidisciplinary panel discussions – assembling expertise in informatics, design & methodology, and clinical investigation – to help investigators explore novel research directions. In partnership with the Center for Outcomes & Effectiveness Research, the CCTS supports two Scientific Gateway models dedicated to 1) ‘omics data analysis and 2) secondary clinical data analysis.

Bioinformatics: CCTS Bioinformatics provides data and analytic support for Next Generation Sequence Analysis, Microarray analysis, Microbiome, Data storage, management, and sharing plans, Southeast SHRINE Consortium, and educational tools/programs. CCTS Informatics supports a variety of bioinformatics tools that are available to be run from Cheaha. These include statistical packages such as R and MATLAB, a variety of standalone packages supporting quality control (fastQC, Picard Tools), alignment (Abyss, Velvet, BWA, Bowtie) visualization (IGV), variant calling (GATK, SnpEff, annoVar), RNAseq (STAR) and microbiome and metagenomic analysis (QIIME2, MOTHUR, PyNAST, UniFrac, HUMAnN3, MEGAN, MetaPhlan2,). We have also developed and make available an automated pipeline for 16S microbiome data analysis, QWRAP, that is based on QIIME2 and other components (PMCID: PMC4383038). These are just a few of the tools available from Cheaha. CCTS Informatics also maintains licenses and provides investigators with access to the Ingenuity Pathway Analysis tool suite and database that provides the ability to mine genomic and other –omics data for information on pertinent biological systems, networks, and pathways.

Clinical Research Informatics: CCTS Clinical Research Informatics provides access to clinical data in the UAB Health System electronic health record to support the Enterprise Data Warehouse (EDW) Initiative, data access and exchange, subject recruitment and retention tools—cohort feasibility, subject identification (with IRB approval), clinical phenotype, design and implementation of clinical research studies and secondary data analyses, Targeting clinical trial opportunities, informatics research, data science for population insights and "big data" integration.

All of Us Researcher Workbench: A national data platform for Clinical Research Informatics, The All of Us Program opened the Researcher Workbench and is inviting researchers to apply for access to explore the initial dataset and tools. The Researcher Workbench is a secure, cloud-based platform that offers researchers an opportunity to execute rapid, hypothesis-driven research and build new methods for the future. Registered researchers can access Registered and Controlled Tier data while its powerful tools support data analysis and collaboration. Integrated help and educational resources are provided through the Workbench User Support Hub.

Electronic Medical Records & Genomics (eMERGE): The eMERGE Network is a group of research studies across the United States working together to study genetics and help doctors treat and prevent some common conditions. This group is funded by the National Institutes of Health (NIH). The eMERGE network currently includes sites across the United States including UAB.

National Patient-Centered Clinical Research Network (PCORnet): UAB is part of the National Patient-Centered Clinical Research Network, a national network using a common data model (CDM) that supports patient-centered research. With a goal to improve health outcomes by providing access to health data, research expertise, and patient insights PCORnet also aims to engage patients, caregivers, clinicians, and others in the design and conduct of research.

OneFlorida+ Clinical Research Network: The OneFlorida+ Clinical Research Network is a collaboration among researchers, clinicians and patients in Florida, Georgia and Alabama to create an enduring infrastructure for a wide range of health research, including pragmatic clinical trials, comparative effectiveness research, implementation science studies, observational research, and cohort discovery. The network’s 14 academic institutions and health systems provide care for about 16 million patients in the Southeast, creating a dynamic regional resource to facilitate health care research and improve health, health care and health policy. As a Network Partner, UAB is committed to conducting stakeholder-engaged research in partnership with health systems, clinicians, patients, payers, policymakers and communities.

Shared Health Research Information Network (SHRINE)

SHRINE is a web-based platform that connects i2b2 instances and facilitates queries of available data at multiple institutions to compile insights on large groups of well-characterized patients. Investigators may use i2b2/SHRINE to determine the aggregate number of subjects at participating institutions who meet a given set of criteria (e.g., demographics, diagnoses, medications, and selected laboratory values). This information can provide the collaborative basis for clinical study feasibility and population-based research.

TriNetX Research Network: CCTS Hub joined TriNetX, a clinical data network of healthcare providers, pharmaceutical companies, and contract research organizations that connects clinical researchers to trial opportunities based on the patient populations they wish to study. Using the i2b2 framework, which is designed to enable enterprise-wide searches of de-identified health information, researchers can determine aspects of study feasibility by identifying whether a sizable number of patients exist that meet their study criteria. The TriNetX network accomplishes this across several dozen linked institutional i2b2 instances, including those at CCTS Partners UAB and Tulane, to provide query capability into the data of potentially millions of patients.

Alabama Genomic Health Initiative (AGHI): The Alabama Genomic Health Initiative is aimed at preventing and treating disease, including certain types of cancer, heart problems, and genetic disorders. The program will also provide pharmacogenetic analysis to evaluate how participants may respond to certain medications. In collaboration with the the HudsonAlpha Institute for Biotechnology in Huntsville, UAB Medicine will provide genomic testing, interpretation, and counseling free of charge to residents in each of Alabama’s 67 counties. The AGHI also includes a major focus on research, through which data from test results will be used to advance scientific understanding of the role that genes play in health and disease. The AGHI is one of the nation’s first statewide efforts to harness the power of genomic analysis in helping identify those prone to diseases for genomic abnormalities. AGHI Leadership includes members from UAB, HudsonAlpha Institute for Biotechnology and Tuskegee University, nationally recognized institutions that are leaders in bioethics and genomic medicine.

ENACT Network: ENACT expands on the CTSA Consortium cohort discovery platform, ACT, allowing researchers and students at CTSA hubs to carry out electronic health record (EHR)-based studies on any disease or condition within a network of over 142 million patients. This innovative platform, ENACT, emerged through collaboration among members of the National Center for Advancing Translational Sciences’ (NCATS) Clinical and Translational Science Award (CTSA) consortium. The project received financial support from the National Institutes of Health (NIH) National Center for Advancing Translational Sciences.

#### Systems Pharmacology AI Research Center (SPARC)

SPARC aims to advance the use of artificial intelligence (AI), patient digital twins and systems pharmacology in drug discovery through research innovation and multi-disciplinary collaborations. SPARC, in partnership with the Heersink School of Medicine (HSOM) and the Center for Clinical and Translational Sciences (CCTS), will advance the use of AI, systems biology, and quantitative pharmacology in drug discovery through research innovation and interdisciplinary collaborations. The center will focus on developing new AI-based approaches in informatics, data science, and clinical trials across multiple fields, including genomics, precision health, and medicine while accelerating drug discoveries to address various clinical conditions.

#### UAB Foundational Ontology (UFO)

The UAB Foundational Ontology (UFO) is an enterprise terminology management system, currently under development, that brings together controlled terminologies use for capturing clinical and research data at UAB. In the UFO, terminologies are merged to support system interoperability. The UFO will also include additional classification (new classes and multiple classification), improved term naming, synonyms, and other knowledge to improve the usability and usefulness of controlled terminologies in clinical and research systems, such as i2b2 (see above).

***Systems Pharmacology AI Research Center (SPARC)***

SPARC aims to advance the use of artificial intelligence (AI), patient digital twins and systems pharmacology in drug discovery through research innovation and multi-disciplinary collaborations. SPARC, in partnership with the Heersink School of Medicine (HSOM) and the Center for Clinical and Translational Sciences (CCTS), will advance the use of AI, systems biology, and quantitative pharmacology in drug discovery through research innovation and interdisciplinary collaborations. The center will focus on developing new AI-based approaches in informatics, data science, and clinical trials across multiple fields, including genomics, precision health, and medicine while accelerating drug discoveries to address various clinical conditions.

#### Natural Language Processing and Clinical Phenotyping

One of the major initiatives of CCTS-Informatics has been to develop a Natural Language Processing (NLP) infrastructure to support the processing and analysis of unstructured clinical text and identify clinical phenotypes of interest. This NLP infrastructure is deployed within the UAB Health System and used to support the State of Alabama Cancer Registry reporting requirements by facilitating cancer case detection (Osborne et al, 2016). This NLP infrastructure processes UAB Health System clinical text nightly to detect cancer concepts as defined by the National Association of American Cancer Registries (NAACR), and then ascertains patient reportable cancer in conjunction with structured data by machine learning. We have improved cancer case detection throughput by 41% and process approximately 1,000 cases each month. We have extended this system (Osborne et al, 2018) to support cohort detection for retrospective research and actionable clinical phenotypes, including but not limited to COPD flares (Wells et al, 2018), opiate use disorder (Feldman et al, 2022) and incidental findings requiring intervention including adrenal gland “incidentalomas (Vezey et al, 2022). Our NLP infrastructure also supports de-identification of clinical text through transfer learning (Osborne et al, 2020) and our IRB permits distribution of UAB clinical text (Osborne et al, 2020 last reference) under the terms of the HIPAA Safe Harbor standard after de-identification using both machine learning and manual review.

*Development of this infrastructure through a partnership with the UAB Department of Computer and Information Sciences has also included utilization of NLP to improve the medical documentation skills of our medical students, and we are currently exploring opportunities to utilize NLP to facilitate national reporting in our transplant programs. We are also working on extending these tools to support the processing of records derived from clinical research studies to both support the research goals of the study as well as to support the entry of NLP-derived structured data directly into patient’s electronic health record.*

CCTS Informatics Facilities

CCTS Informatics personnel are located in offices in the in the Bevill Biomedical Research Building (BBRB) (500 sq. ft.), the Tinsley Harrison Tower (900 sq. ft.), and the Kaul Human Genetics Building. A small Data Center is located in BBRB (250 sq. ft.) that houses several development and backup servers. Most computational hardware is located in facilities allocated to the Research Computing unit of Central UAB-IT (see below).

CCTS Informatics Computer Equipment

The CCTS has direct use of a large collection of servers, storage systems, workstations, laptops and peripherals. Most servers have now been migrated to virtual machines supported by Central UAB-IT, though several stand-alone application and data storage systems are maintained directly by CCTS personnel in CCTS facilities. Separate servers are utilized for web sites, database systems (MySQL, SQL Server, Oracle), data entry and curation databases, application development, database development, web site development, bioinformatics analysis, backup, and failover. A combination of Windows and Linux operating systems are utilized by server systems. These systems include CCTS-supported Dell PowerEdge (PE) servers and Dell PowerVault (PV) storage systems that provide in excess of 350 TB of disk storage. These systems includes three Dell PE R710 servers, two with 192 GB RAM and 7 TB of storage and the third with 96 GB of RAM and 7 TB of storage; two PV NX3200 storage arrays, each with 48 TB of SAS disk storage; two PE R730x systems each with 72TB of SAS storage; one PV MD3400 with 96TB of SAS storage; and 4 PE 2950/2850 servers. All servers are connected to the campus network backbone using 1GE (gigabit per second ethernet) network connections to the building’s router. The building utilizes a 10GE connection to the 40GE campus backbone as described below. Additional petabyte-scale storage utilized by the CCTS is provided locally within the UAB Research Computing infrastructure. In total, CCTS activities have 1-2 PB of storage directly available for use, with the ability to grow that as needed. All data is backed up using a combination of local network-attached disk storage arrays, long-term S3-based backup storage provided by Research Computing, and essentially unlimited off-site archival storage provided through UAB’s contract with Box. All data maintained by CCTS Informatics that contains PHI (protected health information) is housed either within the Health System’s HIPAA-compliant data processing facility or the HIPAA-compliant high performance computing system provided by Research Computing (Cheaha) (described below). All other systems outside of these secured facilities contain only non-PHI, de-identified datasets.

*All data maintained by CCTS Informatics that contains PHI (protected health information) is housed within the HSIS HIPAA-compliant data processing facility, or Cheaha, UAB’s HIPAA-compliant High Performance Computing system (see Equipment). All other systems outside of these secured facilities contain only non-PHI, de-identified datasets.*

### Panels Program

One resource available to investigators across the CCTS Partner Network that is especially useful to faculty and trainees is the Panels Program. Panels assemble teams of experienced reviewers to assist investigators as they hone their study design and analytic strategy for grant proposals. The CCTS brings methodologists and subject matter experts to participate in panels. The CCTS also invites established investigators with closely aligned yet distinct interests and disciplines to the discussion to improve the focus and impact of the scientific plan. The CCTS offers multiple panel options that may be requested by investigators via the Research Commons online portal or direct request. All three provide consultation in early phase project design, grant proposal development, evaluation and revision of unfunded grant proposals, implementation of research protocols, and interpretation and or dissemination of experimental results.

Panels Done Quickly (PDQ): **PDQs** are available to investigators seeking more rapid and targeted feedback. In contrast to the NPPs, PDQs are relevant for specific phases of research, such as project development, implementation, interpretation and/or dissemination. Relevant materials are submitted for review and within 10 working days of the initial request, a PDQ is convened. As with the NPP, there is an emphasis on multiple viewpoints and content-specific expertise, but from a smaller group of experts (usually two to four). For those who seek additional opportunities to assess progress and identify opportunities for improvement, follow-up PDQs may be convened. In order to provide continuity, at least two of the original members serve as part of the follow-up PDQ. As with the NPP, written as well as oral feedback is provided to the investigator who requested the session.

Innovation Panels (iPanels): The CCTS also facilitates **Innovation Panels (iPanels)**, which are geared toward bringing together expertise on aspects of Intellectual Property Disclosure, Patents, Licensure, Small Business Innovation Research (SBIR) awards, Small Business Technology Transfer (STTR) awards, and NSF’s Innovation Corps program (I-Corps), etc. The goal is to bring many of the relevant stakeholders to the table to discuss entrepreneurial potential and next steps for the commercialization application of scientific discoveries, technology development or novel process. Due to the nature of this work, UAB’s Institute for Innovations and Entrepreneurship is a close collaborator.

Nascent Projects Panel (NPP): The **NPP** includes over a dozen faculty members and staff who are experts in their fields and are able to provide multi-disciplinary feedback in areas relevant to clinical and translational research including, but not limited to regulatory knowledge, ethics, study design, analytic methodology, epidemiology, health outcomes, community-based participatory research, comparative effectiveness research, participant and clinical interactions and outcomes research. Each session may also include content-specific experts chosen after discussion with presenters.  Presenters provide a brief 15-minute overview of their research, followed by 20-30 minutes for the NPP members and presenter to discuss the project. CCTS personnel provide a written summary of the discussion to presenters.

### CCTS Grant Library

The CCTS developed a Grant Library, which is a compendium of best practice grant writing samples provisioned by the NIH and funded investigators from across the CCTS Partner Network. The goal of this resource is to inform investigators about funding types and share the wisdom of award-winning communications about scientific excellence and discovery. Samples in the library include extramural and institutional fellowship and mentored career development grants, federal and foundation research project grants, as well as, SBIR/STTR grants.  The CCTS Research Commons maintains and updates this resource to keep current with evolving sponsor requirements.

## CLINICAL RESEARCH RESOURCES

The mission of the UAB Clinical Trials Initiative is to promote, foster, and enhance high-quality clinical research at the University of Alabama at Birmingham. UAB’s initiative is to provide, support and direct the implementation of cutting-edge human subject research. By promoting clinical research, the effort will help the UAB community meet its mission goals of excellence in patient care, education, research, and community service. The Institution is committed to providing world-class patient care with innovative therapies to treat disease, promote health and wellness, and provide opportunity for patient participation in clinical research. As an academic medical center, it is our responsibility to participate in research that leads to new discoveries and advances the art and science of medicine for future generations. This collaboration provides services to:

* UAB researchers and research teams, assisting with feasibility assessment, methodologic rigor, study start-up, implementation, and reporting.
* Patients and the general public, providing opportunities for study participation.
* Sponsors, helping them identify UAB investigators for participation in their research.

As part of this effort, the CCTS mission addresses four programmatic tasks: 1) performance standards to meet and exceed national standards; 2) educated and knowledgeable workforce; 3) implementation of scientifically reproducible research; and 4) services to support rigorous design and interpretation. Toward these goals, the CCTS works closely with institutional leaders to transform the organizational culture at the Hub to support trials through the comprehensive integration of institutional workflows, best practices in performance, education, information technology and data systems, financial management, and participant safety in coordination with other research administrative offices (Sponsored Programs, IRB, Financial Affairs, Human Resources, etc.). The Hub has developed a multi-modal implementation strategy overseen by the ***Clinical Trials Administrative Office***, guidance in ***Quality and Efficiency***, and training via the ***CCTS Training Academy***.

### Clinical Research Capacities

The CCTS supports cutting-edge expertise and facilities for investigators conducting human subjects research. A centralized hub provides a supportive environment for early phase and task-intensive clinical research in humans. The CCTS provides cost-effective and high-quality services that exemplifies best practice for every stage of the clinical research study lifecycle, from start up through implementation to close out. The CCTS Clinical Translation staff also offers trainings, from a lunch and learn series to a 6-month certificate program in the latest clinical and translational research competencies, to strengthen the research skills of every member of your team. The environment ensures safety and provides standardized pathways for the administration of investigational agents and the management of valuable patient samples essential for translational advances. CCTS clinical services include the***Clinical Research Unit*** (CRU), the ***Phase I Clinical Trials Unit***, the ***Child Health Research Unit*** (CHRU), the ***Clinical Trials Administrative Office*** (CTAO), the ***Clinical Research Support Program*** (CRSP), the ***Specimen Processing and Analytical Nexus*** (SPAN), ***CCTS Biorepository***, and the ***Bionutrition Unit***. The Phase I Unit, the Bionutrition Unit and part of SPAN are housed on the 15th floor of Jefferson Tower, in immediate proximity to the CRU, which was renovated to become the central location for CCTS clinical services. The CHRU is located on the UAB campus within Children’s Hospital of Alabama.

#### Clinical Research Unit (CRU)

The CCTS has 15,450 square feet of dedicated clinical research space located on the 15th floor of Jefferson Tower. This space has two clinical units; The Clinical Research Unit (CRU) and the Phase I Unit. The CRU provides clinical services for investigator initiated clinical studies and Phase II and III clinical trials and the Phase I Unit provides services for Phase I clinical trials. The nursing staff support a wide range of clinical research including, but not limited to aging, Alzheimer’s disease, diabetes, hepatic disease, obesity, pain, psychiatry, reproductive health, nutrition, and various cancers. These units are supported by two nurses’ stations and a pneumatic tube station to allow for quick transport of specimens to the hospital lab as well as receipt of some pharmaceuticals. The CRU is located on the west wing of JT 15 and has five examination rooms besides an infusion suite with six infusion chairs. In addition, the west wing has storage space for equipment and/or supplies that are specific to investigator needs. If inpatient care is required, the CRU has access to inpatient beds located on the 8th floor of UAB Hospital. Inpatient utilization focuses on studies requiring hospitalization of participants for proper study activities, ranging from 24 hour sample collection protocols to studies for which participant safety is best served by an inpatient setting. Pankit Vachhani, MD, is the Medical Director of the CRU, and Joshua Vernon, RN serves as the Nurse Manager for the CRU. The nursing staff includes four full-time nurses, one part-time nurse, and seven nurses who work on an as needed basis. CRU nurses have extensive research experience with the infusion of research medications, monitoring of participants, collection of PK, PD, PG, and biomarker samples, data collection, and use of scientific research equipment. All nurses complete required hospital competencies, human subjects training, certification on pharmacokinetics and Good Clinical Practice (GCP) training.

#### Phase I Clinical Trials Unit

In 2013, the CCTS expanded the CRU by adding a 7,950 square foot Phase I Clinical Trials Unit. The unit is located on the 15th floor of Jefferson Tower, adjacent to the existing CRU and the sample processing facility. It is comprised of seven rooms to accommodate patients for the administration of research agents. Each room has the flexibility to be used as private or semi-private to allow for maximum space utilization and appropriate participant monitoring. The unit also includes the capacity for the administration of standard of care drugs and routine infusions, which enhances the nurses’ focus on the care given to those receiving Phase I agents. A centrally located nurses' station supports the unit. The Phase 1 Program supports phase 1 trials including ‘first-in-human’ clinical trials in a variety of disease conditions, especially oncology. The Phase I program has an active working group with oncologists who are passionate about early phase clinical trials. Dr. Aparna Hegde, a thoracic oncologist, leads the Phase I program. Currently, the phase I program has cutting edge novel molecules encompassing immunotherapy, targeted therapies and precision oncology treatments.

#### Child Health Research Unit (CHRU)

The CHRU was developed to provide a platform to improve our understanding of child health and childhood disease pathogenesis, and to accelerate the development of new treatments for diseases that are manifested in childhood. The CHRU is a partnership between Children’s of Alabama, one of the largest and busiest centers for child health care and the third largest free standing pediatric hospital in the US, the UAB Department of Pediatrics and the CCTS.  Its mission is to provide outpatient research space to pediatric investigators that enable the conduct of scientifically rigorous clinical and translational research. The CHRU facilitates the execution of safe and age-appropriate clinical research protocols in a flexible fashion to accelerate our understanding and treatment of childhood diseases.

The CHRU expanded in 2017 to a 2,547 square-foot facility to include a reception/registration area, triage room with scales and stadiometer, six well-equipped exam rooms, office and conference space, workspace with monitors & locked storage, lab space with centrifuge and freezer for short-term storage and an equipment storage room. Additional space is available to support primarily for ambulatory patients with special needs (e.g., respiratory conditions, such as asthma and cystic fibrosis) and it includes four outpatient beds (suitable for long-duration PK studies), a specimen processing laboratory, a state-of-the-art biospecimen storage facility with real-time monitoring and specimen-tracking capabilities, a nasal potential difference laboratory.  Specialized equipment housed for CFTR clinical science are also housed in the satellite CHRU, including two sweat iontophoresis devices (each compatible with the Macroduct collection system), two sweat evaporimeters (Cyberderm RG), a carbon monoxide monitor, a Lung Clearance Index measurement device (EcoMedics) for use by the nitrogen washout technique, nasal and exhaled nitric oxide measurement (EcoMedics), two spirometers with calibration equipment (NSpire), the “Bento Box” isolation device for live nasal imaging of mucociliary transport in patients with acute respiratory disease, an EKG machine, a Code cart, and general laboratory supplies. Investigators and research coordinators have access to CHRU research space and equipment.  All protocols that utilize the Unit must have a designated, protocol-specific physician with primary responsibility for the safe conduct of the study and must have IRB or WIRB approval.  Details for study implementation are developed on a project by project basis, with input provided by the Clinical Research Support Program. The hours of utilization are flexible and can include after-hour visits.

Daniel Feig, MD, PhD, MSCI, and Isabel Virella-Lowell MD jointly serve as Co-Directors of the CHRU.  In this capacity they oversee operations, set policies and procedures, assign project responsibilities, and in collaboration with the Clinical Research Support Program, review budget development for industry contracts, review IRB submissions and renewals, and direct weekly team meetings that include junior investigators and evaluation of potential projects. Dr. Feig is the Director of the Division of Pediatric Nephrology. He has broad training in Pediatrics, Biochemistry and Clinical Research. He is the former Chair of the American Board of Pediatrics Sub-Board in Nephrology, is currently on the American Academy of Pediatrics, Section of Nephrology Executive Board, and services as Education Director for the International Pediatric Hypertension Association. He has served as both an internal and external mentor for several K-awarded junior faculty members and is the Nephrology Training Program Director for the Pediatric Nephrology Fellowship Program at UAB.  He is an expert in childhood hypertension, nephrotic syndrome, and renal transplantation. His current research focuses on the role of uric acid in early onset hypertension and progression of chronic kidney disease. Dr. Virella-Lowell serves directs the Cystic Fibrosis (CF) Therapeutics Development Network at UAB, as well as is a member of the UAB Lung Health Center. She has broad training in Pediatrics and Basic and Clinical Research. Dr. Virella-Lowell is also an expert on studies that address fundamental aspects of CF disease, including studies examining CFTR modulators, relationships between CFTR activity and CFTR biomarkers, and new assay development.

#### Clinical Research Support Program (CRSP)

The current research environment has been impacted by the increase in regulatory requirements, the decrease in funding due to the economy, and the challenge for research sites to manage unexpected events. Additionally, novice research coordinators and limited educational experience of study coordinators leaves research sites unable to cope with these challenges. In late 2010, the Center for Clinical and Translational Science (CCTS) developed the Clinical Research Support Program (CRSP) for the exclusive purpose of functioning as a modified institutional clinical research organization. This program was designed to provide any or all support for implementing a clinical (or non-clinical) study at UAB.

CRSP provides a pool of trained, certified research coordinators to assist investigators with study implementation, including interpretation and adherence to regulatory requirements, organizational and budget management, communication with sponsors, internal quality measures, and data management.  Resource pooling provides flexibility and limits the need for individual investigators or programs to overstaff in order to handle sporadic needs.  Additionally, trained and experienced research staff are capable of managing and implementing research studies more efficiently and effectively. CRSP personnel function in a flexible manner and provide services when and where needed.  Most services and support are conducted at the study investigator’s site.  All staff received CCTS training, in addition to the standard human subjects training, certification on pharmacokinetics, and GCP training. Staff are also certified for working in UAB Hospital, the BVAMC, and Children’s Hospital.  Staff have experience in cardiology, cancer, endocrinology, nephrology, neurology, pediatrics, School of Public Health, infectious diseases, pulmonary, CV surgery, GI, and continues to expand. CRSP personnel ensure that investigators have the required research implementation resources and that research teams have the knowledge and skills for conducting protocols. CRSP services assist with

* **Pre-study activities:** such as site and study feasibility assessments, staff education and training, budget development and negotiations, DSMB plans, regulatory preparation (e.g., IRB, IND/IDE, Clinical Trials.gov, institutional requirements, sponsor requirements), site assessment visits, and study initiation meetings.
* **Study implementation services:** including subject visits and assessments, study report generation, maintenance of regulatory documents, budget maintenance, safety reporting, quality management assessments, monitoring/preparation for monitor visits, subject retention efforts, and data and specimen management.
* **Reporting expertise**: ClinicalTrials.gov, FDA, and internal audit support
* **Study closure services**: including study closeout visits, reconciliation of final data, final study reports, and archiving.
* **Training and educational programs:** to better serve the research needs of the CCTS Partner Network by building courses to increase knowledge and training for all members of the investigative team. Some of the programs that have been implemented so far are bi-weekly comprehensive research seminars that incorporate Good Clinical Practice training (GCPs), monthly research orientation program, bi- annually research training program, an investigator training program, various workshops (budget, IRB, Clinical Trials.gov) and templates for Standard Operating Procedures (SOPs).

#### Specimen Processing and Analytical Nexus (SPAN)

SPAN is the central clearinghouse for sample collection, login, handling, and storage for clinical research studies at UAB. SPAN also assists investigators in specimen distribution to other UAB analytical Cores, investigator laboratories and outside laboratories. SPAN consists of two laboratories on campus, all within a two-block radius. The clinical trials specimen-processing laboratory (704 sq ft) is located within the CRU and Phase I clinic in Jefferson Tower and facilitates centralized collection and preparative activity of specimens from participants in clinical trials. This laboratory is equipped for BSL2 level work including use of laminar flow biosafety cabinets. Specimen processing capacity for the handling of blood, urine, CSF, and other liquid specimens includes two refrigerated centrifuges, eight non-refrigerated centrifuges and tube rockers. Centrifuges can accommodate all specimen collection tubes and can achieve centrifugation speeds of up to 4740xg. Specimen storage capacity includes a refrigerator, a non-cycling -20oC freezer and three -80oC freezers. More sophisticated laboratory space for specimen processing and specimen long-term storage is located in the Shelby Interdisciplinary Research Building (2350 sq ft that includes wet lab space, data management-computer space and dedicated freezer space). This laboratory provides more specialized procedures including DNA/RNA isolation and quantitation/quality control and the capacity to isolate and cryopreserve or immortalize peripheral blood mononuclear cell from blood. Equipment includes 3 refrigerated centrifuges (Beckman and IEC capable of up 3210xg), 6 non-refrigerated centrifuges (Hettich and IEC), tube rockers, pipets, incubators, and fume hood. Sterile cell isolation and culture facilities include 4 laminar flow biosafety cabinets, 3 Forma CO2 incubators, inverted Olympus microscope and 2 Invitrogen Countess automated cell counters. DNA extraction capacity includes an Autogen Flexstar automated DNA extraction system. DNA quality control is assessed by both absorbance and fluorescence based systems including a Tecan Infinite Pro 200 (absorbance + fluorescence) with nanoquant adaptor, the Trinean Dropsense (absorbance) and the Thermo Qubit (fluorescence).

Both laboratories are capable of packaging and shipping biospecimens domestically and internationally. Staff are fully trained in IATA shipping standards and the labs have standing orders for dry ice. All SPAN activities are fully integrated with CCTS/UAB clinical activities using the OnCore clinical trials management system. Within OnCore, a full specimen inventory of all biospecimens handled in the lab is maintained at the individual tube level. Relevant specimen associated collection information can also be associated with each individual specimen aliquot. This system has full reporting capabilities and a record of chain of custody. SPAN actively works with investigators to develop specimen process protocols that meet the needs of each individual study and develops/implements new methods as required. Studies utilizing the core cover a broad range of translational research. SPAN protocols range from complex therapeutic clinical trials with PK/PD blood processing needs, to glucose tolerance tests in healthy controls with frequent blood sampling to simple phlebotomy of healthy controls for preparation of blood-derived materials (serum, plasma, buffy coats, PBMC, DNA). A strict quality control plan is in place that includes daily validation of all data entry into our inventory system and documentation of all storage (freezer, refrigeration, ambient) temperatures. There are also regular assessments of inventory integrity and freezer temperature mapping. We participate in an international proficiency testing program (IBBL, Luxembourg) to validate our aliquoting, DNA isolation and PBMC isolation/viability techniques. There are standard operating procedures in place for all methods used in the lab including the use of barcoded labeling to facilitate specimen tracking. We also prepare individualized SOPs for every protocol that uses our laboratory. These SOPs are referenced each time a protocol’s specimens are accessioned into the lab.

#### Biorepository

The CCTS Biorepository, also in the Shelby laboratories, provides access to standard operating procedures for biobanking and a full spectrum of long-term specimen storage options for studies using the CCTS. We currently have 967 sq ft of dedicated freezer storage space available for long-term biospecimen storage. Storage capacity includes an array of 16x -80°C and 7x liquid nitrogen cryogenic freezers. Specimen storage at both ultralow (-80oC) and cryogenic (LN2/-190oC) temperatures are available. All cryogenic freezers are equipped with automatic LN2 filling valves. Freezers are inventoried to the individual tube level using the Biospecimen Management module of OnCore. All freezers throughout the CCTS SPAN Biorepository are centrally monitored for alarms with call lists in the event of a freezer malfunction. In addition, every freezer has an independent NIST-certified temperature probe monitored by an on-line temperature monitoring system Temptrak (Cooper-Atkins) that provides escalating text/email/phone notifications in the event of a malfunction or an out of range temperature value. In addition to physical sample management, the CCTS has established a link with the UAB i2b2 instance where available specimens are linked to available EHR data through the MRN. UAB Investigators can search for specimens in an aggregate basis associated with clinically revenant parameters to enable scientific investigation and enhance our capacity to serve our populations. The CCTS Biorepository would act as an honest broker to connect the recruiting study team with the requesting investigator. This process connects investigators but does not obligate sample sharing; rather it connects investigators to determine whether they would like to pursue a collaborative relationship that may involve biospecimens.

#### Bionutrition Unit

The Bionutrition Unit, Clinical Research Unit (CRU), fosters the integration of nutrition into clinical and translational research by providing nutrition research expertise and resources for investigators. The Unit offers a number of core services.

* **Research design, development, and implementation**—this includes one-on-one assistance with the initial research design, calculating research diets, providing menus and meals as required by protocol, help with participant recruitment and retention, development of nutrition data collection forms, and data collection.
* **Nutrition education**—assistance with educating participants about dietary protocols and assistance with specific diet prescriptions and other individual or group counseling as needed.
* **Body composition analysis**—standardized height and weight measurements, anthropomorphic measurements (skinfold thickness and body circumferences), and bioelectric impedance analysis (BIA) to determine body composition (fat free mass, body fat mass, percent body fat), using a Tanita body composition analyzer TBF-310 and BC-418, a Scaletronic digital scale, a Biodynamics bio-impedance analyzer, a stadiometer to measure height electronically, and Lange calipers.
* **Nutrient Intake Analysis**—analysis of 24-hour food recalls, multiple-pass food records using Nutrient Data System for Research (NDS-R) software, a comprehensive nutrient calculation software that can perform analyses of 139 nutrients, nutrient ratios, and other food compounds. Customized research menu development for controlled feeding studies-using ProNutra dietary analysis software to plan, manage and analyze food as well as creating customizable reports and printouts of production sheets, labels, and menus.  A state-of-the-art Metabolic Kitchen that provides ideal infrastructure to prepare specially-designed research diets for participants in outpatient-based studies; a multi-purpose room is also available for nutrition studies that require on-site feeding.  The staff includes one full-time and one part-time research dietitians and five designated research cooks that have many years of experience implementing detailed nutrition interventions studies.

#### Recruitment and Retention Shared Facility

Since 1997 the Recruitment and Retention Shared Facility (RRSF) has offered recruitment of participants for any study, including help with developing recruitment and retention plans; identifying participants and targeting them with relevant messages; consenting, enrolling, and scheduling participants; providing databases in requested format; generating standard or customized reports; access to data analysts, statisticians, and epidemiologists with expertise in health outcomes; and retention services for follow-up data collection. It provides an experienced team that has enrolled more than 50,000 participants for more than 117 studies since 1997. The team includes project planners and coordinators, telephone interviewers, data managers and analysts, community outreach personnel, and patient navigators. We have experience with population-based studies, therapeutic clinical trials, behavioral intervention trials, telephone surveys, focus groups, and in-person qualitative interviews, as well as a proven record of recruiting multiple populations.

### Clinical Trials Administrative Office (CTAO)

The Clinical Trials Administrative Office is operationally responsible for the various policies, procedures, systems, and initiatives supporting the clinical trials conducted across the Schools at the University of Alabama at Birmingham. It enhances the efficiency, tracking, and management of clinical research activities throughout the lifecycle in order to see innovative therapies brought to our patients more quickly. In order to do so, the CTAO works collaboratively with the institutional administrative offices for both the University and the Health System, in addition to Departments and Centers. Additionally, the CTAO is home to the Office of Clinical Billing Review (CBR) which is responsible for conducting Medicare Coverage Analysis on all studies that incorporate clinical billable activities by the UAB Health System in order to ensure a compliant billing environment.

The CCTS supports the design and conduct of ethical and scientifically valid clinical trials in an environment predicated on good clinical practice and implemented by a well-trained research workforce. The CCTS works with individual investigators and research teams and with the enterprise to ensure quality and efficiency in scientific investigation involving human subjects. CCTS Institutions have organized tools, expertise, and facilities to help investigators succeed at every stage of trial development and implementation:

#### Pre-Implementation and Study Start-up

Clinical Trials Kiosk: The Clinical Trials Kiosk is an information hub intended to help inform essential clinical and translational science practice across the partner network. With training scenarios covering everything from pre-implementation to close out, the Kiosk acts as primer and companion for clinical scientists.

Training**:** (see CCTS Training Academy, below) CCTS Clinical Research Support Program (CRSP) serves a vital role in workforce education by supporting a comprehensive portfolio of complementary programs to introduce and to reinforce skills needed to succeed in translational research, especially as it applies to clinical trials (see RM-RKS). Accessible across the Partner Network, these activities embrace established competencies defined by the national CTSA Consortium and address investigator needs at any stage across the career arc.

Study Design**:** (see Biostatistics, Epidemiology, and Research Design – BERD, below) BERD engages expert methodologists spanning the Partner Network to support an array of study design and analytic needs in the performance of clinical and translational research. All investigator-initiated trials work with biostatisticians to optimize study design, power, and analytic strategies early in the development of the study. This collaborative effort also defines the components (e.g., outcome measures) needed for federal registration and reporting expectations, including clinicaltrials.gov.

Feasibility Assessment**:** (see Informatics, below)Prior to initiating a clinical protocol, a comprehensive feasibility review is conducted by the academic department of the investigator through the Scientific Review Process to determine whether a given trial has the potential to succeed relative to multiple dimensions. This assessment addresses the rigor of science, expertise, and availability (effort) of the investigative team and the competitive landscape for duplicative trials. CCTS Informatics has created both self-service and analyst-facilitated query strategies of electronic health record data through i2b2 to assess cohort feasibility.

Regulatory**:** The CCTS CRSP (see Clinical Research Services, below) is available to work with investigators in the establishment and ongoing management of human subjects protocols. In the case of multi-site, interventional, human subjects research, all CCTS Network Partners have formally agreed to use IRB reliance and have joined NCATS’ Streamlined, Multi-site, Accelerated Reliance for Trials (SMART) Internal Review Board to harmonize and streamline processes to support the protection of human subjects in research in multi-site research. The CCTS also assists investigators with IND/IDE applications, including protocols related to repurposing existing drugs for new indications, evaluating drugs in new patient populations, new biological-based imaging agents, and gene therapy vectors.

Budgeting & Contracting**:** As each new protocol is submitted to the IRB, it is also assessed for appropriate billing to sponsors. Members of CRSP are available to advise and assist investigators in the development of study budgets that are allowable and appropriate. In collaboration with the clinical study team, the Clinical Billing Review group evaluates each budget to ensure that the cost of each study procedure is appropriately assigned to the sponsor and that Medicare-assigned costs and/or standard of care costs are accounted for within the budget. Budget negotiations are handled by the department and/or the study team, and contracting is handled by the Office of Sponsored Programs. The CCTS Hub has worked with the National CTSA Consortium in the development, adoption, and use of master contracts to support multi-site study execution, including the Accelerated Research Agreements (ACTA, ACDA) to streamline the negotiation of nondisclosure agreements and clinical trial contracts and to reduce the time that it takes to initiate clinical trials.

Multi-site Trials**:** The CCTS Southeastern Health Alliance for Research (SHARe) provides the streamlined frame within which to conduct multi-site clinical, translational, and comparative effectiveness research across the Partner Network as it serves the health challenges of the populations of our region (see Net Cap). SHARe represents the CCTS Network as it interfaces with NCATS’ Trial Innovation Network (TIN) (see Network Capacities). The CCTS Hub and several Partners have also established a partnership with TriNetX, a federated clinical data network of providers and pharmaceutical companies that uses i2b2 to accelerate trial site and patient recruitment. The CCTS currently receives weekly invitations to participate in trials from TriNetX, representing a variety of adult and pediatric diagnoses related to hematology, oncology, nephrology, neurology, and genetics.

#### Study Activation and Implementation

Recruitment and Retention**:** Trial recruitment is enabled at the point of care by Cerner PowerTrials®, allowing for a seamless integration of the research recruitment process into normal clinical practice. Community-based recruitment is enabled by the Hub’s Recruitment and Retention Shared Facility (RRSF), providing hands-on assistance to investigators with recruitment materials and strategies, linkages to communities, appropriate techniques for recruitment, and maintenance of a Recruitment Database. With the appropriate IRB approvals, CCTS Informatics supports analyst-facilitated data requests defined by study criteria and can return detailed data, including PHI (e.g., name, contact information), to facilitate direct recruitment. For multi-site trials, similar queries against i2b2-SHRINE networks (e.g., SE-SHRINE and ACT Network) can then be used locally to map to specific individuals by collaborators. The CCTS has also established strategies, including patient navigation, to increase both enrollment and the retention in clinical research. The CCTS is leading a consortium effort to develop, test, and disseminate an integrated multi-level intervention to engage multiple populations in translational research (STRIDE). The CCTS also leverages XpertTrials, a proprietary search algorithm to match trials available at the Hub in ClinicalTrial.Gov with participant inquiries. Individuals interested in clinical trials can search for research opportunities based on medical conditions, procedures, symptoms, or clinical specialties. The CCTS connects the potential participant with the appropriate study team.

Trial Management**:** OnCore® Enterprise is the Hub’s Clinical Trial Management System (CTMS), used to manage protocols, subjects, finances, coverage analysis, biospecimens, scientific review process, ordering of clinical services and electronic data capture. Study teams, in partnership with the CCTS OnCore team and Department-based experts, build their trial in the CTMS, integrating calendar, billing, and regulatory components to improve communications, achieve greater efficiencies and enhance regulatory compliance across teams. OnCore also has the capability to improve patient safety by providing clinicians with important information about a patient’s involvement in a trial at the point of care through Cerner PowerTrials, a module now integrated in the Hub’s electronic health record. The CCTS CRSP team oversees initial training and continuing education in the use of OnCore and PowerTrials to manage clinical trials.

Monitoring**:** The CCTS CRSP can provide experienced monitors to assist with independent verification of data, regulatory documents, and the ethical conduct of research. Through the education effort described above, tools are available to other research sites, including those across the Partner Network, to enhance site-specific QA/QC processes. Current practices and reciprocal guidance are shared with Partner Network institutions interested in working with a similar model.

Facilities and Expertise**:** (described below under Clinical Research Services).As the driver of clinical and translational research at the Hub, the CCTS offers a number of clinical resources to investigators, available on a recharge basis, including state-of-the-art physical space and trained expertise to support clinical research encounters across the lifecourse.

#### Analysis, Reporting and Close-out

Clinical Trial Oversight and Assistance**:** With the University’s integrated research portal (IRAP) and the enterprise adoption of the OnCore CTMS to manage protocol approvals and trial accruals. This structure allows the rapid identification of trials that may be struggling to launch, to recruit or to meet milestones. The CCTS works with these teams to explore ways to overcome such issues in an efficient and effective way. Occasionally, despite best efforts to partner with investigators to meet the aims of a trial, unanticipated challenges may prevent a study from succeeding.

Reporting**:** Researchers conducting clinical trials have the responsibility to create and maintain records on ClinicalTrials.Gov. CRSP personnel review all human subjects applications at the Hub to identify eligible trials, and, together with BERD, advise investigative teams on how to register studies and to provide annual reports on a timely basis. This also involves monitoring the publication of trial results to ensure that research results are disseminated publicly.

Data management and archiving**:** The CCTS supports REDCap (Research Electronic Data Capture) as a secure, web-based application for building and managing online surveys and databases. This instance has been approved by the IRB and the Hub’s data security team to manage protected health information. For more complex studies, the CCTS BERD, in collaboration with the Hub’s School of Public Health, is able to create custom data management structures. CCTS BERD has also established a data management toolbox, including templates informed by partner experience, web-based tools (e.g., DMPTool) and a series of ‘how to’ guides for data collection, management, and archiving (see BERD).

Close Out**:** OnCore serves as the central system to track protocol activity from startup to closeout and the enterprise-wide standard operating procedures to guide study closure. These are implemented in partnership with research administration and grants and contracts accounting.

## CCTS TRAINING ACADEMY

**Mission and Vision:** *The CCTS promotes the continuous development of knowledge and skills for learners at all academic and career stages through a portfolio of robust and innovative training programs implemented through didactic, experiential, and self-directed approaches. Our multidisciplinary research workforce strives for the advancement of human health and healthcare.*

The CCTS is an innovative and evolving network of research professionals and visionary faculty that performs exemplary work in the clinical and translational science research communities while carrying high standards set by the National Center for Advancing Clinical and Translational Science (NCATS). The CCTS is committed to lifelong training. To this end,the CCTS Training Academy domain offers interdisciplinary, educational programs and enrichment activities for research teams across the academic career arc from graduate and postgraduate students to early career and senior faculty. The Training Academy is continuously enhancing CCTS Training Programs and finding creative methods to deliver stellar programs conducive for success in the translational science workforce. The CCTS provides training in specific foci such as grant writing, mentoring, leadership, career development, informatics, and more. The CCTS also utilizes didactic, experiential, and self-directed programs that are tailor-made to fit different learning styles and academic disciplines. An archive of previously recorded training sessions is available in the CCTS Hub. Archived and current news/events, including the CCTS Digest e-newsletter, can also be found in the CCTS Hub.

CCTS Fellowships: The CCTS seeks to develop a highly skilled clinical and translational research workforce well-prepared to collaborate, innovate, and accelerate the pace of scientific discoveries with the goal of more effectively turning research insights into better health for the populations we serve. With support provided by the National Center for Advancing Clinical and Translational Science (NCATS), the CCTS Training Academy offers two different formal clinical research training awards—both combine formal course work with direct research experience and are grounded in the national competencies established by NCATS to prepare clinician-scientists for success on multidisciplinary, translational research teams.

Predoctoral Clinical & Translational Science (T32): Introducing trainees who are finishing their second year in a health-related professions program to clinical and translational research, this immersive program provides 12 months of protected time for T trainees to complete the core curriculum, get experience writing a manuscript, and present their findings at a national conference.

Postdoctoral Dissemination & Implementation Science (T32): Introducing post-graduate trainees to concepts of D&I science to improve and broaden the impact of translational research, this immersive program provides 24 months of protected time and other support for postdocs to complete the core curriculum and mentored research.

Mentored Career Development (K12)**:** Providing formal research training experience to scholars who already have an MD, PhD, or equivalent doctoral degree, the CCTS K scholars focus on research addressing diseases and health outcomes. The benefits are many and include salary support, lead-author manuscripts, and an extramurally funded research grant submission.

Clinical and Translational Science:CCTS provides a package of didactic and experiential educational programs geared towards developing doctoral scholars, researchers, and staff at all stages of their respective career and academic arc. The CCTS aims to expand and enrich a vibrant and highly-skilled research team that will be prepared to bring innovative scientific discoveries to the populations we serve. 

Translational Research Summer Series: The CCTS supports a Translational Research Summer Series Training program for trainees from Partner Network institutions. The 8-week Summer Program provides mentored research training experiences for health professional students or other clinically-oriented doctoral students that have completed their first year of training. Subject matter experts introduce translational methods to translate questions into projects, research methodology to prepare a scientific abstract, and drafting research documents.

Clinical and Translational Science Training Program (CTSTP, Epi 680): The Clinical and Translational Science Training Program occurs over a six-month period (January-June) for two hours per week. CTSTP course content includes areas such as clinical trials, epidemiology, biostatistics, ethics, clinical genetics research, behavioral research, outcomes research, dissemination of results, and grant writing and funding opportunities. Approximately 50 hours of didactic instruction are dedicated to this robust certificate program that spans across numerous disciplines. All sessions are presented by experienced investigators or individuals with special expertise in areas such as grants, research methodology, contracts, and regulatory issues.

Friday Fellows: Partnering with the Center for Outcomes and Effectiveness Research and Education, Friday Fellows provides the opportunity for investigators, trainees, and others interested in population and health outcomes research to discuss best practices. T32 pre-doctoral and post-doctoral scholars, investigators, and others interested in population and health outcomes research are encouraged to attend this course. In addition, Friday Fellows offers one credit hour towards their coursework (Course: Epi 690).  Attendees are encouraged to share their latest projects in a supportive "discipline agnostic" environment, find new collaborators, develop foundational skills in study design, outcomes measurement, evaluation. Interactive activities for the development of critical "soft" career skills such as public speaking, networking, and providing/accepting constructive feedback.  Friday Fellows aims to provide the opportunity for investigators, trainees, and others interested in population and health outcomes research to discuss best practices.

Translational Science Symposium: The CCTS Translational Science Symposium is a two-and-a-half-day learning event that gathers exceptional scholars and professionals from across the Tri-State CCTS Partner Network and from all levels of the translational career arc. Each day of the event is filled with a robust lineup of structured training sessions and workshops administered by subject matter experts who bring a wealth of knowledge to elevate the learning experience. This penultimate annual regional event creates networking and collaborative opportunities that all attendees can utilize to form longstanding synergistic partnerships that can fortify their career journey.

Clinical Research Training: In partnership with the CCTS Clinical Research Support Program (CRSP), the CCTS Training Academy supports educational offerings that detail the principles essential for success in the clinical research environment. In-person, classroom-based, and online courses relevant to investigators, study coordinators, financial staff, regulatory coordinators, and other research staff are available, with emphases on Good Clinical Practices (GCP), compliance, and other core topics.

Research Orientation Program (ROP): The Research Orientation Program is a standalone session offered every two or three months. The program is for early career investigators and research staff who are new to research, as well as any who could use a refresher course in multiple aspects of a clinical trial. The ROP provides basic tools, familiarizes attendees with research study terms, and helps those new to research avoid common pitfalls. The CCTS strongly encourages new faculty, coordinators, budget, and regulatory staff to attend. CME credit is offered for the ROP sessions.

Research Training Program (RTP): In-depth training on essential areas of research with leaders in research at UAB over six sessions. This program provides academic training in the principles required to excel in today’s dynamic clinical research environment.

Clinical Investigator Training Program (CITP): The CITP aims to promote excellence in Good Clinical Practice (GCP), acquaint investigators with research capacities and expertise available in the CCTS, and improve awareness of ways to expedite clinical trials in a safe and rigorous manner. CITP is designed for those with MDs, DOs, DMDs, and PhDs, emphasizing the responsibilities of investigators conducting human subjects research.

Research Seminar Series (RSS): The CCTS presents the Research Seminar Series for the purpose of filling any gaps in information related to the implementation of clinical trials that have been identified by investigators and their research teams. The sessions are held the first and third Thursday of each month and topics such as IRB Updates, Clinical Trial Recruitment, Clinical Trial Billing, Best Budget Practices, Informed Consenting, HIPAA Regulations. The topics will be of interest and relevance to clinical research personnel including investigators, regulatory personnel, study coordinators and financial administrators. CME (Continuing Medical Education) credit is offered for attending the seminars.

CCTS Lunch and Learn Series: The CCTS Lunch & Learns is a quarterly event that aims to provide critical guidance on new or changing requirements and support the conduct of clinical research at the CCTS Hub and throughout the Partner Network. All clinical research teams, regardless of study type or areas of focus, are encouraged to send at least one person to attend and take back updates to their team and home office.

Clinical Investigator Training Program (CITP) on the Go Podcast: The CITP on the Go Podcast is a self-directed web series providing a complementary training method for the CCTS Clinical Investigator Training Program. The program is an abbreviated curriculum for clinical investigators and trialists and promotes excellence in clinical practice and educates on the research capacities and expertise available to support clinical trials.

OnCore: OnCore is the Clinical Trial Management System (CTMS) utilized by the CCTS Hub, which tracks protocols and participants involved in clinical trials and other studies through the life cycle of the protocol. OnCore integrates study calendars and billing management to ensure rigorous oversight of study conduct. OnCore offers financial management including coverage analysis, budgeting, tracking protocol milestones, invoicing, and the recording of sponsor payments. OnCore also has extensive built-in reporting features as well as custom reporting capabilities. The CCTS Training Academy, in partnership with the OnCore and CRSP teams, provides OnCore training for all users across the research enterprise. This includes in-person classroom-based training and training materials that are available for download.

Leadership and Team Science: The ability to work as part of a team is a critical skill for translational scientists, who by definition, collaborate with scientists from other disciplines, institutions, generations, countries, and stages along the translational research continuum. Increasingly, translational science teams also include community members with limited knowledge of scientific concepts and terms. CCTS offers experiential workshops and seminars taught by experts in team conflict and cohesion to introduce you to principles for successfully participating on a scientific team.

ACTion Learning: **Each session** provides an engaging and immersive training experience by utilizing live actors to help bring real-world scenarios to life. A CCTS staff member creates a bespoke script based on interviews with stakeholders in the field being depicted in the ACTion Learning event. Then a talented pool of local actors creates dynamic sessions that are tailored to a learning program's objectives and language. Actors bring realism, emotion, and instant feedback into the equation while learners interact with characters, helping them develop the necessary skills to excel in their roles, resulting in a more realistic and immersive learning experience. The event is moderated by stopping the scene and seeking input from the audience to mold subsequent action. No role-play is involved, so the audience can experience the reactions and consequences in a stress-free learning environment. Theories and models become practical because they become personal.

Relate, Inspire, Strategize, Elevate (RISE): RISE is a 9-week cohort-based program is designed to enhance the interpersonal skills, professional skills, and leadership skills of clinical research professionals and early-career faculty. RISE is creating a pipeline of forward thinkers and aspiring team leaders who are looking to advance their careers in clinical research. The RISE program framework is built on these objectives: Fundamental Concepts of Leadership, Interpersonal Effectiveness, Trust Building, and Building a Community of Practice. The cohort meets for 60-90 minutes every Thursday in person. Participants in the program are provided enrichment activities and tasks that are essential to their learning experience and future success as leaders in their field. Cohort participants will improve their interpersonal, professional, and leadership skills.

Mentoring: For mentoring and career development, the CCTS works with all learners to identify individual training needs and navigate the many resources available.  Through individualized consults, learners identify additional competencies needed for specific clinical and translational research domains as well as the necessary training and research resources. Mentoring is a crucial and foundational piece of the CCTS Training Academy.

Individualized Development Plans: The CCTS provides assistance with Individual Development Plans (IDPs), which can facilitate dialogue between mentors and trainees as they establish training goals.  An IDP is now strongly encouraged for many funding mechanisms. Information on creating IDPs is available on the CCTS website, along with information pertaining to related seminars and our entering mentoring curriculum.

Case Studies in Mentoring: This training program is open to investigators across the CCTS Partner Network at any level. From pre-doctoral students and clinical research professionals to seasoned faculty members who mentor developing research scientists, participants complete 8 – 9 weekly hour-long topics in the Case Studies in Mentoring series. Successful completion of the mentoring series will result in the awarding of a certificate documenting Excellence in Mentoring suitable for departmental review and academic promotion. The series is held tri-annually with a spring, summer, and fall session, all of which are completed over a nine-week duration to enable participants to complete the series as time allows.

Access and Engagement: CCTS's mission is accomplished through activities such as award recognition, professional development, grant matchmaking, and mentoring.

DRIVEN: In partnership with the Center for Outcomes and Effectiveness Research and Education, Driving Research: An Interdisciplinary, Vibrant, Engaged Network (DRIVEN) aims to cultivate a community of interdisciplinary clinical and translational investigators and promote their individual and collective professional development, recognition, and advancement.

UAB/Tuskegee FIRST: UAB and Tuskegee bring a history of collaboration and dedicated effort to improve health outcomes using their complementary strengths in the Faculty Institutional Recruitment for Sustainable Transformation **(FIRST)** program. As a world-renowned research institution, the University of Alabama at Birmingham offers research and infrastructure, including scientists, facilities, and resources. Tuskegee has a rich history of talented researchers and educators dedicated to educational excellence. The *FIRST Benjamin-Carver Scientists program* is funded in part through the NIH Common Fund’s FIRST program. Scientists selected to participate are deemed a “Benjamin-Carver Scientist” and will benefit from relationships with both the University of Alabama at Birmingham and Tuskegee University. Ultimately, the Partnership is designed to support excellence in research at both institutions. Benjamin-Carver Scientists are committed to advancing access and engagement in research areas pertaining to health outcomes. With an ultimate goal of improving health outcomes, the work of Benjamin-Carver Scientists focuses on research areas where negative outcomes are particularly evident in our region.

Grant Writing: The CCTS offers a comprehensive list of training program offerings focusing on grant writing and group reviews. The programs provide extensive and intense instruction that thrives on the preparation and execution of successful grants written by investigators and reviewed by grant writing experts and panels. Our grant writing programs have a proven track record of securing funding for research efforts.

Grant Writing Intensive Program (GRIT): In partnership with the Center for Outcomes and Effectiveness Research and Education, the Grant Writing Intensive Program (GRIT) cohort program provides structured activities over a 6-month timeline to assist cohorts of K-scholars in their preparation of a first R-series application. Leveraging successful existing CCTS programs, like Nascent Project Panels, and Panels Done Quickly, innovative offerings including a Specific Aims Workshop, R Writing Group, and Mock Study section, which are grounded in Team Science principles, provide K scholars with a roadmap and resources towards developing a competitive R series application. GRIT has a proven track record of success with an over 65% success rate in securing K and R series grants.

Mock Study Section: The mock NIH study section uses real applications that were submitted, received an insufficient funding score, resubmitted, and then successfully funded. The mock study places participants in the role of a grant reviewer while reviewing actual K and R grant submissions. During each session, the mock reviewers will be assigned grants to preview and explore what an NIH study section considers when critiquing the applications based on scientific merit, assessing essential elements of a successful application, and uncovering any issues that might hurt an applicant’s chance of being funded.

Biostatistics, Epidemiology, and Research Design (BERD): The CCTS Biostatistics, Epidemiology & Research Design (BERD) unit comprises a multidisciplinary team of expert biostatisticians, epidemiologists, and methodologists. For more information, see the BERD section under ***CCTS Research Commons***.

Kaizen: The Kaizen training platform, developed by CCTS Informatics, is based on the philosophy of continual improvement, and is designed to enhance education through a competitive format.Kaizen is an app-based, educational gaming platform built to provide a fun, yet competitive learning environment. Developed as an innovative quiz game, the aim is to provide a fun and flexible way to learn new competencies and test retention. Thousands of investigators across numerous institutions have been trained through the Kaizen training platform.

Kaizen R2T (Rigor, Reproducibility, and Transparency)***:***The NIH requires formal instruction in Scientific Rigor, Reproducibility & Transparency (R2T) for all federally funded trainees. In support of the high-quality investigation and our commitment to scientific integrity, the CCTS-based R2T-Kaizen course upon the review of articles focusing on common errors and fallacies in scientific research as well as the (4) focus areas of R2T. All T, K, and F awardees are encouraged to play, but it is open to all investigators.

*The Kaizen-Education platform also offers a variety of other games for coursework such as Kaizen Nursing (UAB School of Nursing), Kaizen-Introduction to Clinical Medicine (UAB Heersink School of Medicine), Kaizen-SOPH-MPH Orientation (UAB School of Public Health), Biostatistics, CCTS Clinical and Translational Science Training Program (CTSTP) and CCTS Good Clinical Practices (GCP)*.

Panels: Project Panels utilizes the overarching community of scholars across the CCTS Partner Network to brainstorm on innovative ideas and entrepreneurship while collaborating on enhancing research methodology processes. Multidisciplinary teams are integral to the panels strategy to enhance the scientific aims, methodologic rigor, and the presentation of proposed research. For more information, see the Panels section under ***CCTS Research Commons***.

Professional Development: The CCTS takes pride in the continuous development and training of scholars and professionals throughout the Partner Network in all phases of their academic and career arcs. Through mentoring, vigorous instruction, and action planning, the training programs for career development positions learners for success in their chosen professions.

Training Interdisciplinary Emerging Research Scholars: The Training Interdisciplinary Emerging Research Scholars (TIERS) incorporates structured career development lectures on topics identified by trainees and senior mentors through research presentations by scholars and unstructured time to foster relationships and create community among investigators. The mission of the CCTS TIERS program is to provide beneficial information on career planning and development in a relaxed environment that promotes collaborative learning, networking, and problem-solving. Topics are tailor-made to match the NIH grant cycle to focus discussion on shared writing challenges.

Mini-Sabbaticals: As investigators develop their IDP (Individual Development Plans), they will be encouraged to incorporate a mini-sabbatical, achieved through short-term and experiential training activities at another research site, to facilitate the acquisition of specific clinical and translational research skills. The Training Academy will collaborate with each individual campus site and off-campus site to create the experience desired by the investigator. The Multi-CTSA mini-Sabbatical Evaluation and QUality ImprovemeNt (SEQUIN) Project will expand and improve the use of mini-sabbaticals for the early-stage translational research workforce in the United States.

Innovation & Entrepreneurship: In the spirit of encouraging innovative and entrepreneurial scientific research, the CCTS offers a set of cutting-edge training programs to nurture the creative enterprise skills of investigators and scholars. The programs are delivered through an experiential format that is pertinent to the success and effectiveness of our training.

I-Corps@NCATS: The I-Corps@ NCATS program is a 5-week course, based upon the successful National Science Foundation I-Corps and I-Corps at NIH Entrepreneurial Training Program, which combines business model training with a customer discovery process. The short course helps prepare teams to apply to go on to a national program at NSF or NIH, and is designed to help all participants, regardless of the stage of development of their innovation. This program gives an opportunity for trainees to be the trainers in a creative role-playing experience. The program offers a flexible team structure to bring together multiple skillsets conducive to innovation. The CCTS will enhance the process of scientific translation by taking the demonstrated lessons learned and best practices from the I-Corps@NCATS program and disseminating them across a wider network of Clinical and Translational Science Awards (CTSA) Hubs.

Heersink Institute for Biomedical Innovation (HIBI): The Heersink institute for Biomedical Innovation (HIBI) aims to stay ahead of the pace of innovation and entrepreneurship in health care while achieving excellence during an industry-wide downturn in quality and rising costs. To achieve this, The HIBI alters how educating future health care providers and leaders is accomplished. Catalyzing the health, health care, and social and economic development of the community begins with competence development. The HIBI is creating new processes, systems, and organizational structures to solve problems and implement solutions across a range of business models. In addition, the HIBI is integrating programs and opportunities to deliver training to current and future health care providers in health care transformation and economic development while building partnerships and reinforcing a reputation to strengthen our reach.

Health Sciences Entrepreneurship Grand Rounds: The Health Sciences Entrepreneurship Grand Rounds seminar series is a collaboration among the University of Alabama at Birmingham, the University of Arkansas for Medical Sciences, the University of Kansas Medical Center, and the University of Utah (all Clinical and Translational Science Awards Program institutions), and University of Tennessee Health Science Center. HSE Grand Rounds presentations are scheduled monthly.

Informatics: CTS Informatics provides the resources and expertise (both bioinformatics and clinical informatics) to support biomedical collaboration and consultation across the translational research spectrum. The CCTS vision is to build a vibrant community of collaborating informaticians not only across the CCTS Hub with its academic medical system, but also across the regional CCTS Partner Network and national CTSA Consortium. For more information, see the Informatics section under ***CCTS Research Commons***.

i2b2 Training: The Informatics team offers help with study design; access to summary, limited (de-identified), and fully identified data sets (analyst facilitated with IRB approvals in place); innovative tools to support clinical, translational, and outcomes research; and data analytic services. Accessing Clinical Data for Research with i2b2 can help investigators: determine study feasibility (sample cohort size), identify potential participants for recruitment, perform simple data analyses of de-identified patient data, explore hypotheses for clinical studies/trials.

DBIDS Powertalk Seminar Series: This seminar series is developed and sponsored by the UAB Department of Biomedical Informatics and Data Science (DBIDS). It educates individuals on research innovations in biomedical informatics. There are two tracks: Clinical Informatics and Bioinformatics. Clinical informatics seminars focus on the application of informatics for improving healthcare delivery and using health data for research. It includes myriad topics such as design, implementation, and clinical decision support. Bioinformatics seminars present late-breaking computational techniques, tools, and applications. It includes genomics and other “-omics”. Some areas of informatics, such as precision medicine, natural language processing, and image processing, span clinical informatics and bioinformatics and have greater crossover appeal. In addition to educating, Informatics also strives to make these seminars a collaborative social gathering for the UAB clinical informatics and bioinformatics communities.

## ENGAGEMENT OF COMMUNITIES INSTITUTE

As a dedicated focus and important component of the core values of CCTS, our Engagement of Communities domain creates dialogue among scientists, citizens, and stakeholders alike to identify pivotal health priorities in the region. CEI incorporates the use of social events, forums and panels, and research to explore issues concerning issues in the community such as health outcomes, advancements in health research, and communities across the Deep South. The CCTS’ community engagement initiative aims to support health innovation and to develop strategies to navigate community/academic partnerships across the southeast and nationally. CEI Perspectives is a partnership with the UAB Center for the Study of Community Health, a CDC-sponsored Prevention Research Center.

### CCTS Community & Scientific Action Board

The mission of the Community and Scientific Action Board (CSAB) is to provide guidance to the Center for the Study of Community Health (CSCH) and the Center for Clinical and Translational Science (CCTS) for all community engaged research activities and program development and to provide similar guidance and support to other university centers and programs requesting such support. The CSAB is a new entity formed from merging the Jefferson County Community Participation Board (JCCPB) and the One Great Community (OGC) of the CCTS into one entity.

### CCTS Community Engagement Institute (CEI)

Building on a tradition of broadly-engaged teamwork, the CCTS has created the Community Engagement Institute to foster dialogue among scientists, citizens and stakeholders alike to identify pivotal health priorities in the region. The CEI platform now integrates several discussion forums and special events to bring people together to explore issues in health outcomes and support regional collaboration and best practices. Attendees represent numerous community- and faith-based organizations, non-profits, social, civic & health care groups and neighborhoods as well as academic researchers and trainees, to take part in conversations about issues facing communities in the Deep South.

Bioethics Forum: This annual event brings together researchers, bioethicists, students, community members, front-line researchers, and clinical staff to discuss special ethics topics in research. The Bioethics Forum creates a safe space for speakers and participants to openly express and reflect on ethical approaches to form best practices individually, institutionally, and collectively while complying with established policies and laws. The goal of translational scientists is to focus on the improvement of the health of individuals and the public through ethical behaviors and research methods.

CEI Perspectives: The CEI hosts necessary conversations that address focused topics of interest to communities. Attendees and speakers present multiple points of view and to serve as a call to action for science, service, and solutions. Drawing on a combination of formal presentations and moderated panels, this venue provides an agile and consistent setting to respond to pressing issues.

CEI Symposium: The CEI Symposium is a day-long, multifaceted event focused on issues related to health outcomes. The CEI Symposium examines the importance of why and how community engagement and collaboration are effective in social/behavioral research and essential in community building practices. Weaving together plenary sessions, keynote speakers, poster sessions, break-out discussions and networking opportunities, the CEI Symposium provides multiple ways to get involved and to build collaboration.

### **Community-Based Participatory Research (CBPR) Immersion Course**

Community-based participatory research (CBPR) is based on the assumption that communities are more likely to participate in, accept the results of, and put those results of research to use if they have participated and provided input across all stages of the research project. CBPR is a joint effort that involves researchers and community representatives in all phases of the research process. The joint effort engages community members, employs local knowledge in the understanding of health problems and the design of interventions, and invests community members in the processes and products of research. In addition, the collaborative is invested in the dissemination and use of research findings to improve community health. Spearheaded by the Center for Palliative & Supportive Care at the CCTS Hub, the immersion course engages academic investigators over the course of one week to understand pivotal considerations in CBPR.

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| UNIVERSITY OF ALABAMA AT BIRMINGHAM (UAB; CCTS Hub) |

The University of Alabama at Birmingham (UAB), 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. As a comprehensive urban university, UAB enrolls over 20,000 students from across the U.S. and internationally. Students pursue studies in 140 programs across 12 academic divisions, leading to bachelor’s, master’s, doctoral, and professional degrees in fields such as social and behavioral sciences, liberal arts, business, education, engineering, and health-related disciplines including medicine, dentistry, optometry, nursing, and public health.

UAB comprises 11 academic colleges and schools in both health sciences and other academic areas. The UAB Academic 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 academic campus features the College of Arts and Sciences, the Collat School of Business, the Schools of Education and Engineering, the Graduate School, and the Mervyn Sterne Library. In 2023, all six of UAB’s health-related schools ranked among the top 20 public institutions in NIH funding, with UAB overall ranking 6th in clinical trials expenditures among public institutions. The university boasts 241 endowed chairs and professorships and is ranked among the top quarter of all U.S. colleges and universities by The Princeton Review.It is a pillar of employee excellence, being named a top 10 employer in the South. Since its founding in 1969, UAB has expanded from 15 blocks to over 100 blocks, with more than 245 buildings providing over 11 million square feet of space. As the largest single employer in Alabama, UAB has an economic impact exceeding $7.15 billion annually. As of 2023, the university employed over 26,614 people, including a faculty of 3,265. In the fall of 2024, UAB’s student enrollment reached 20,905 across undergraduate to doctoral levels.

A screenshot of a computer

Description automatically generated

UAB’s research enterprise is globally renowned and as a state-affiliated institution, UAB ranks 11th in nationally federal research support among public universities. In 2023, UAB set a record with $744.5 million in research funding, including $413.7 million from the NIH. UAB Hospital, with 1,207 licensed beds, is among the 20 largest hospitals in the U.S. and the only Adult Level 1 Trauma Center in Alabama. It serves over 1.6 million patients annually and has eight medical specialties ranked in the nation’s top 50 by U.S. News & World Report, which also named it the best hospital in Alabama. UAB provides a supportive scientific environment with state-of-the-art facilities, highly qualified staff, and a collaborative spirit. This infrastructure minimizes administrative burdens and enhances the success of its investigators’ projects.

## INSTITUTIONAL RESEARCH ENVIRONMENT & EXPERTISE IN CLINICAL AND TRANSLATIONAL SCIENCE

UAB Office of Research**:** In support of the research endeavors of a dynamic institution, the administration reporting to the Office of the Vice President for Research develops and improves processes and services that promote research and scholarship by faculty, staff, and trainees, that foster an environment of integrity in research and scholarship, that improve the quality of research, and that enhance economic development. The Office of Research also works with the University, school administrations, and city and state leaders to establish new programs and research directions that promote and enhance the UAB's contribution to new knowledge and the growth of the economies across the city and the state. Units include the Office of Sponsored Programs (OSP), Research Development Office (RDO), The Office of Research Safety and Security, Conflict of Interest Review Board (CIRB), Institutional Review Board (IRB), Animal Resources Program (ARP), Institutional Animal Care & Use Committee (IACUC), The Research Technology and Communications Office, Material Transfer Office (MTO), Export Control, Southeastern Biosafety Laboratory Alabama Birmingham (SEBLAB),Occupational Health and Safety (OH&S) and the Office of Sponsored International Programs (OSIP). Working in close affiliation with UAB Research Administration and individual Offices, the CCTS serves translational researchers to optimize business and oversight practices in support of research and training. The CCTS training programs have implemented to bolster the development efforts of researchers and the promotion of research excellence.

**UAB Institutional Review Board (IRB) and Office of the IRB (OIRB):** The UAB IRB is a committee

established under federal regulations for the protection of human subjects in research (45 CFR 46). Its purpose is to help protect the rights and welfare of human participants in research conducted under the auspices of UAB. The UAB IRB requires Principal Investigators and all other research team members to complete and document appropriate training in the protection of human subjects. Additionally, the IRB monitors ongoing research for adherence to applicable regulations, policies, and procedures. The UAB IRB is located in the UAB Administration Building, with 4,526 square feet of office space and conference rooms, and housing 23 staff.

**UAB Office of Sponsored Programs (OSP):** The UAB Office of Sponsored Programs (OSP) is a central office reporting to the Vice President for Research and Economic Development. The OSP offices are located in 6913 square feet of office space within one and a half city blocks from the Veterans Affairs (VA) Medical Center and Coordinating Center in Faculty Office Towers (FOT). The OSP assists UAB’s faculty and staff in their efforts to secure and fulfill extramurally sponsored programs by performing pre-award and non-financial post-award administration. The OSP is charged with the following (including but not limited to): performing preliminary review and approval of all proposal submissions, submitting proposals through most awarding agency portals including Grants.gov, and serving as representative of the UAB business office with official signing authority. The UAB OSP also negotiates execution of clinical trial agreements and other extramurally sponsored projects to include research, selected services, non-sponsor funded collaboration, master agreements, continuing professional education agreements, and confidentiality/data use agreements. The OSP provides ongoing training for the campus, principal investigators, department administrators, and center administrators to include workshops and other structured opportunities. The UAB Research Administration Listserv from the OSP distributes latest updates, news, and information to the UAB community. There are 10 OSP officers supporting federal grants management and 8 officers assigned to non-federal awards. In addition, the OSP staffs 10 data processing specialists for the data management of the OSP activities including UAB's Integrated Research Administration Portal (IRAP). IRAP’s software consists of a suite of modules developed by InfoEd Global Inc. These modules support electronic submission of funding applications and compliance forms and will seamlessly connect the operations of the OSP with the Institutional Review Board for Human Use (IRB) and UAB Research.

University-Wide Interdisciplinary Research Centers**:** The University-Wide Interdisciplinary Research Center (UWIRC) program was proposed in 1995 to promote interdisciplinary research, education, and service. It was implemented with initial funding in 1997 for ten “full” centers and seven “pilot” centers. Since its inception, this program has played a major role in promoting interdisciplinary, cross-institutional research collaboration at UAB. The UWIRC program serves to catalyze cross-cutting research and discovery while adding to the generation of new scientific knowledge and its applications to benefit society. University-wide thematic centers provide a framework for research and training (including cancer, aging, neuroscience, infectious diseases, substance use disorders, maternal health, nutrition, diabetes, and many more). These multidisciplinary centers are open to all investigators with interests consistent with the mission of the given center. The centers assist in coordinating thematically oriented efforts for extramural grants and contracts, in developing center-associated core facilities and in integrating enrichment programs that are important trainee resources. Approximately every five years, each UWIRC was selected through a competitive selection process. To be designated a UWIRC, centers require sponsorship from at least three UAB schools, substantive interdisciplinary faculty involvement; contribution to the intellectual environment in order to enhance faculty and student recruitment, development, and retention; an extramural 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. Through a competitive review process, the Deans of sponsoring Schools and the Provost provide modest funds for research cores, pilot and feasibility studies and selective enrichment activities. The Center for Clinical and Translational Science (CCTS), a university-wide center, integrates essential resources and services for clinical and translational research for all faculty and centers and has developed a jointly sponsored pilot program in translational research.

**UAB’s Harbert Institute for Innovation and Entrepreneurship:** The Bill L. Harbert Institute for Innovation and Entrepreneurship (HIIE) assists UAB faculty, staff, and students to protect and commercialize their inventions. HIIE fosters an ecosystem that promotes and sustains innovative and entrepreneurial excellence through the building of relationships between research and industry in the local community, and beyond. HIIE strategically evaluates, protects, and licenses technology while also providing resources for patenting, funding, and startup formation. With total research expenditures exceeding $602 million, UAB is a powerhouse for academic, clinical and research innovation. The HIIE facilitates rapid development of new ideas, products and technologies and prepares faculty, students, and researchers to become entrepreneurs in an increasingly technology-driven ecosystem. To date, the HIIE office has received more than 2,800 intellectual property disclosures, facilitated the issue of more than 600 U.S. patents, and assisted with the creation of nearly 75 companies based on UAB technologies, generating more than $100 million in total revenue. In 2023 alone, HIIE generated more than $6 million in revenues with 123 intellectual property disclosures, 40 licenses, and 18 U.S. patents. The institute also achieved its ninth straight year with a positive bottom line, putting HIIE among top 20 percent nationally

**Innovation Depot**

Innovation Depot is an off-site business incubator facility and program in Birmingham, AL, that resulted from a public-private economic development effort funded by the Birmingham regional business community, the Community Foundation of Greater Birmingham, and other local private foundations. Innovation Depot is home to approximately 110 startup companies that employ more than 1,500 individuals. Innovation Depot has worked to propel economic growth and job creation in the region by supporting the development of emerging technology, biotechnology, and life science businesses for over 30 years. In addition to offering business incubation space, The Depot runs three signature programs focused on helping founders successfully envision, launch, and scale up their companies. UAB, the City of Birmingham, and Jefferson County have all collaborated with Innovation Depot to form one of the largest co-working spaces in the Southeast and the largest nonprofit tech incubator building in the country. With over 100 entrepreneurial companies located in-house, Innovation Depot offers UAB students unmatched networking, professional opportunities, and an entrepreneurial learning environment that is truly "real-world." Centrally located within close proximity of the UAB academic health center, the financial district, and the entrepreneurial district, Innovation Depot provides a wide range of support to infrastructure for emerging biotechnology/life science start-ups, information technology operations and service businesses for UAB.

**UAB Center for Teaching and Learning**

The purpose of the UAB Center for Teaching and Learning (CTL) is to provide UAB faculty with professional and teaching support programs and to encourage teaching effectiveness and innovation on campus. To align with the objectives of the UAB Strategic Plan, the CTL is on the leading edge of the University’s efforts to promote innovative instructional practices, develop UAB’s world-class faculty members, align teaching, learning, and mentorship development programs, and foster a culture of learning that supports and encourages academic, professional and personal development for UAB students, faculty, and staff. Through CTL workshops, individual and group faculty consultations, and school and departmental presentations, the CTL promotes student learning by helping UAB faculty to develop the knowledge and skills to become better teachers. The CTL is open to all UAB faculty and is focused on supporting excellence in teaching across the UAB campus. Each year the CTL offers more than 200 workshops for faculty that earn points and badges towards certification. Research shows that effective teaching by University faculty leads to higher levels of student success and higher rates of student recruitment and retention. The Center also plays a role in supporting the University’s ongoing accreditation efforts and the Quality Enhancement Plan. The QEP theme, “Learning in a Team Environment” is focused on increasing the use of effective team-learning strategies in UAB classrooms. In the spirit of professional development, CTL programs provide certification avenues that fortifies the CCTS Hub workforce and elevates our CCTS training acumen.

### Schools and Colleges

**Heersink School of Medicine** *(est. 1945; Anupam Agarwal, MD, Dean and Senior Vice President of Medicine Chair, Health Services Foundation Board)*

As the largest School within the University of Alabama at Birmingham, one of the South's premier research universities, the Heersink School of Medicine (HSOM) 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. The school is made up of over 800 students, more than 1100 residents, and over 1800 faculty members in 28 academic departments.

* The HSOM has nationally recognized clinical programs in many areas including, but not limited to, Oncology, Neurology, Psychiatry, and Immunology/Rheumatology. UAB is also a national leader in organ transplantation.
* Many of UAB’s most productive extramurally-funded research centers are based in the HSOM, including the Comprehensive Cancer Center, Comprehensive Diabetes Center, and Center for AIDS Research. The HSOM is also a national leader in research with a long track record of proven success being ranked in the top 30 of NIH funded Schools of Medicine for more than 20 years
* Announced in early 2023, a new eight-story building will house the research-intensive departments from the Marnix E. Heersink School of Medicine and the College of Arts and Sciences’ Department of Psychology, containing both wet and dry research laboratories and research support spaces to provide the flexibility necessary for investigators from various fields and disciplines. The $190 million project is supported by $152 million in federal funding, as well as funds from the Heersink School of Medicine and College of Arts and Sciences. Construction will begin in 2024 and be complete in 2026. This project directly supports the goals of UAB’s strategic plan, Forging Ahead, and the Research Strategic Initiative: Growth with Purpose.

***Department of Medicine:*** The department is driving medical education, accelerating discovery, and delivering competent and compassionate patient care. It offers clerkships, residencies, fellowships, and professional development for students. The department ranks #17 in the nation in NIH research and has award-winning scientific discovery programs. Research focuses range from whether pig kidneys can alleviate the transplant shortage to how to encourage healthy lifestyles in disadvantaged communities.

* **Division of Clinical Immunology and Rheumatology:** Since its formation in the 1950s, the UAB Division of Clinical Immunology and Rheumatology has represented excellence in patient care, research, and teaching. Faculty members have contributed substantially to the understanding of rheumatic diseases, including their pathogenesis, clinical manifestations, and current diagnostic and therapeutic approaches, and anti-viral and anti-tumor immunity. In addition, they have trained clinicians, educators, and researchers who have impacted academic and clinical rheumatology. With a vision to become the best Rheumatology center in the world for the combination of basic and clinical research, education, and patient care for rheumatic diseases, the Division remains committed to its mission to better understand arthritis and related conditions in order to improve diagnosis and treatment, with the ultimate goal of cure or prevention of these diseases.
* **Division of Nephrology:** The Division of Nephrology is committed to clinical excellence and providing high quality, multidisciplinary care. Division faculty conduct cutting-edge laboratory research and clinical trials to develop new therapies. Its Fellowship program is dedicated to training of physicians in Nephrology and to the pursuit of academic or scholarly contribution of our Fellows and graduates in clinical, basic and translational research. Research in the Division includes basic science studies, translational research including all phases of clinical trials, and outcomes research.
* **Division of Preventive Medicine:** The Division of Preventive Medicine (DOPM) is dedicated to medicine and public health through research, teaching, and dissemination and translation of knowledge for improved health outcomes. From its inception in 1967, the DOPM has played a core role in the many groundbreaking trials contributing to the knowledge of medical and health systems, behavioral aspects of disease, epidemiology, prevention, control, and disease outcomes. As a research-oriented division, it serves as the home for preventive medicine activities within the Department of Medicine. Our division supports over 26 primary faculty and approximately 250 staff. They also have active programs for the training of post-doctoral fellows and clinical scholars

***Department of Anesthesiology and Perioperative Medicine:*** The department employs leading faculty, residents, fellows, and staff while offering graduate and post-graduate education for students. The department is divided into seven divisions based on subspecialties. Ranking consistently among the top in funding from the NIH, the department’s primary research areas include free radical biology, inflammatory diseases, acute lung injury, cardio protective effects of alcohol, and mechanisms and treatment of pain.

***Department of Biomedical Informatics and Data Science (DBIDS):*** The UAB Department of Biomedical Informatics and Data Science (DBIDS) envisions sharing data between biomedical research and patient care resulting in greater knowledge and improved health for people everywhere. Informatics research, training, and practice activities are prominent throughout many schools of the University of Alabama at Birmingham. DBIDS was established in the School of Medicine to accelerate and enhance these activities within the school and coordinate with relevant activities in other schools. To this end, DBIDS is the de facto home for an informatics faculty, drawn from multiple clinical and basic science departments, who collaborate with other biomedical researchers and each other, to apply informatics solutions to biomedical research and healthcare tasks as a means to understanding fundamental challenges. This understanding, in turn, serves as the basis for their research into developing new informatics methods and tools for addressing future tasks. The department is currently establishing undergraduate, graduate, and postgraduate educational programs to train the next generation of informatics practitioners and researchers. DBIDS continues to establish undergraduate, graduate and postgraduate educational programs to train the next generation of informatics practitioners and researchers in a dynamic manner.

***Department of Biomedical Engineering:*** The department is jointly affiliated with the Heersink School of Medicine and School of Engineering, fostering the highest levels of research while offering a world-class education. The department offers bachelors, fifth-year, two-year masters, and doctoral degree programs. It ranked fourth nationally in research funding from the NIH. Key research areas include biomedical imaging, implants and devices, cardiac electrophysiology, tissue engineering, and regenerative medicine.

UAB broke ground on the Altec/Styslinger Genomic Medicine and Data Sciences Building and the Marnix E. Heersink Institute for Biomedical Innovation Conference Center in April 2022, with construction set to be completed in 2025. The 175,000-square-foot building will unite researchers, equipment, and staff from the Hugh Kaul Precision Medicine Institute, the Department of Biomedical Informatics and Data Science, and various translational scientists. This project involves renovating the existing Lyons-Harrison Research Building and will feature spaces for computational research, research support, offices, administrative and scientific collaboration, and meeting areas tailored to the needs of genomics and precision medicine investigators. This initiative directly supports UAB’s strategic plan, Forging Ahead, and the Research Strategic Initiative: Growth with Purpose.

***Department of Family and Community Medicine:*** The department is a recognized leader in the fields of clinical care, premedical education, practice-based research, and student health services. The department provides education programs and curricula for medical students including residencies, fellowships, and preceptorships. It also coordinates practice-based research on a local, regional and national scale. Key research areas include health outcomes and chronic disease, lifestyle medicine, health, mental health, and brain health.

***Department of Genetics:*** The department is committed to genetics and genomics research, education, and clinical care. The faculty focuses on performing laboratory and clinical research, providing consultation services, and offering state-of-the-art genetic diagnostic testing. The department offers undergraduate, graduate, and clinical training, and seminars for students. The key research focus is along the continuum from fundamental studies to preclinical investigations, to bench-to-bedside translation, to clinical practice and community implementation.

***Department of Microbiology*:** The department is home to a highly collaborative research community committed to excellence in research, service, and teaching. Its faculty participate in teaching classes to undergraduate, graduate, and medical students and serve in leadership roles in the undergraduate Immunology Program. The department ranks #8 in NIH funding and is amongst the best microbiology departments in the country. Key research areas include microbial pathogenesis, immunology, virology, structural biology, and cancer.

***Department of Neurology:*** The department is home to eight comprehensive divisions and seven centers. The faculty offer residences and fellowships to train students in balancing clinical duties, time for study, and research activities. The department’s experienced neurologists offer patients advanced neurological care. Key research topics include cerebrovascular ultrasound as well as neuroimaging and neuro-interventional procedures, epilepsy, multiple sclerosis, motor neuron disease, and brain tumors.

***Department of Pathology:*** The department advances pathology through clinical and translational research and shapes the future of treatment through precision medicine. Faculty in this department train graduate students, residents, and fellows to ensure their success as leaders in the field. Key research areas include fundamental mechanisms of disease to the identification of biomarkers and the development of novel therapeutics using innovative pre-clinical animal models of disease, analytical techniques, and bioinformatics and genomics.

***Department of Pediatrics:*** The department is dedicated to improving the health of children; discovering and applying important new knowledge to improve the outcomes for pediatric disorders. Comprised of 19 Subspecialty Divisions each with an educational, research and clinical focus. The faculty of the UAB Department of Pediatrics at Children's of Alabama provides an extensive spectrum of medical expertise and health care services, from primary care to subspecialty services. The faculty educates patients, families, and health care providers to become future leaders in children’s health. Ranking among the top 20 departments of pediatrics in the country in NIH funding, the research focuses on neonatology, infectious diseases, and rare diseases. Recently, the department has experienced significant growth in the number of full-time medical pediatric faculty. Currently there are over 241 faculty in general pediatrics and subspecialty divisions. The faculty of the Department of Pediatrics records more than 272,000 outpatient visits, including approximately 73,100 patients seen through the pediatric emergency medicine division. The Department of Pediatrics has a major commitment to research and consistently ranks in the top 20 among all departments of pediatrics in the country in NIH funding. Through research, we are contributing to a better understanding of the causes of many life-threatening diseases as well as advancing treatments.

***Department of Psychiatry and Behavioral Neurobiology:*** The department advances understanding of psychiatric disorders and facilitates translational integration of research findings to develop innovative and novel clinical interventions. Faculty train residents and fellows to transform them into future academic leaders, clinical investigators, and psychiatrists. Research focuses on schizophrenia, depression and bipolar disorder, neurodegenerative disorders, substance abuse, and psychiatric disorders. The department also provides patient care through an inpatient facility, community-based clinics, and other patient-focused programs

***Department of Radiation Oncology:*** The department is integrated with the O’Neal Comprehensive Cancer Center and works as a team with medical oncology and surgical oncology to develop comprehensive and individualized treatment plans for patients. Faculty train medical students, residents, clerks, and fellows. Key research examines the fundamental response to radiation and therapeutic prevention and treatment interventions in patients. The department is devoted to technically advanced radiation therapies with compassionate care for patients.

***Department of Surgery:*** The department is committed to impacting the field of surgery through innovative clinical, basic and translational research, paving the way for improved treatment options for patients. Faculty lead residency programs and fellowships dedicated to training a new generation of surgeons. With millions in funding, the research focuses on understanding and application of advanced surgical procedures. The depth and breadth of the department’s faculty’s expertise provide patients with superior care and surgical treatments.

***Joint Health Sciences:*** Within the academic health system, the Joint Health Sciences (JHS) represents a set of coordinated units embraced by the Schools of Medicine, Optometry and Dentistry that are based on shared goals in teaching and research missions. These include the Departments of Biochemistry & Molecular Genetics; Biomedical Engineering (in the School of Engineering); Cellular, Developmental, and Integrative Biology; Genetics; Microbiology; Neurobiology; Nutrition Sciences (in School of Health Professions); Pathology; and Pharmacology & Toxicology. In order to leverage the expertise throughout these programs, the JHS Departments provide faculty leadership in graduate/first professional training, mentorship, curricula development, interdisciplinary research as well as participating in institutional roles in multiple schools.

**School of Public Health *(SOPH)*** *(est. 1981; Paul C. Erwin, MD, DrPH, Dean)*

The UAB SOPH at UAB is the only accredited School of Public Health in Alabama by the Council on Education for Public Health, an independent agency recognized by the US Department of Education to accredit schools of public health. UAB SOPH is comprised of about 80 full-time faculty members complemented by over 100 part-time and volunteer faculty in multiple departments. U.S. News and World Report consistently includes the UAB SOPH in the top 20 Public Health Schools in the United States. In 2024, U.S. News & World Report recognized UAB as No. 8 for Public Schools of Public Health and No. 18 for Public Health Schools; with the departments being recognized as No. 13 in Best Biostatistics Programs, No. 16 for Best Epidemiology Programs, No. 16 for Best Health Policy and Management Programs, and No. 24 for Best Social and Behavioral Sciences Programs.

* UAB SOPH has an increasingly broad and skilled faculty that provides leadership and support for several key national and international health initiatives while undertaking an array of important research projects. The School is second only to the School of Medicine at UAB for extramural research funding among all 12 schools at UAB.
* The UAB SOPH awards a Bachelor of Science (BS), Master of Public Health (MPH), Master of Science in Public Health (MSPH), Doctor of Public Health (DrPH), and Doctor of Philosophy (PhD) degrees. Online degree programs are also offered- MPH in Environmental Health & Toxicology (ENHQ); MPH in Occupational Health and Safety (OHSQ Online MPH in Health Care Organization (HCOP); MPH in Maternal & Child Health Policy & Leadership (MCPL); and Coordinated MPH in Maternal & Child Health Policy & Leadership/Master of Social Work Online.
* In 2023, the UAB SOPH had more than $42 million in grants and contracts. In 2023, UAB SOPH ranked 29th among All Schools of Public Health and 19th for All Public Schools of Public Health for NIH funding. The School serves as the clinical or coordinating center for several large, multisite cohorts, trials, and other studies. A few examples include REGARDS, RURAL, CARDIA, CREST-2 and CHAP. The School is home to several training grants including one Ruth L. Kirschstein National Research Service Award Institutional Research Training Grant for predoctoral students (T32; NHLBI) and two Research Education Programs (R25). The five SOPH departments engage in numerous interdisciplinary training programs with the Graduate School and the various health professional schools at UAB.

The SOPH is home to several public health practice-oriented centers including the Center for the Study of Community Health, Deep South Biosafety Worker Training Program, Deep South Center for Occupational Health & Safety, Lister Hill Center for Health Policy, Sparkman Center for Global Health, Region IV Public Health Training Center, and Alabama-Mississippi Public Health Training Center. The School is also home to several groups that lead and contribute to research at UAB including the Survey Research Unit, Applied Evaluation and Assessment Collaborative, and the Biostatistics Consulting Service Center.

***Department of Biostatistics:*** The Department of Biostatistics at the School of Public Health at UAB is a leader in collaborative medical, public health, and statistical genetics research. Biostatistics is the statistical analysis of health-related data and how data from clinical trials and population studies impact human and public health. Students who concentrate in biostatistics are interested in how data, population studies, and health intersect. They study advanced statistical methodologies and apply them to better understand health trends among populations. They interpret results of statistical analyses from public health studies and translate the information into easily understandable facts for scientific and non-scientific audiences. Faculty in the department work hand-in-hand with researchers in public health, medicine, nursing, and other health-related disciplines to help improve health.

***Department of Environmental Health Sciences:*** The mission of the Department of Environmental Health Sciences is to foster excellence in scientific research, teaching/training, outreach, and practice in EHS with the goal of identifying, understanding, and preventing environmentally and occupationally related diseases and injuries in Alabama, our region, the United States, and globally. Environmental Health Sciences (EHS) focus on protecting human health from environmental and occupational pollutants and exposures, such as those that arise from poor outdoor and indoor air quality, poor water quality, waste products, and workplace hazards. Environmental health professionals seek ways to improve our environment and reduce exposure to pollutants to promote health and prevent disease. Those trained in EHS keep people safe and healthy in the community, at home, and at work.

***Department of Epidemiology:*** The Department of Epidemiology studies trends, patterns, and causes related to disease in populations. Students who concentrate in epidemiology are interested in how diseases spread among given populations. Epidemiologists create complex analytical models to help us understand the causes of and solutions to these diseases more clearly. Graduates of the UAB Epidemiology program have found employment in academia, research organizations and foundations, industry, public and private health services delivery organizations, and international agencies.

***Department of Health Behavior:*** The Department of Health Behavior addresses the behavioral, social, and multiple factors related to or driving individual and population health. Students in this program apply social and behavioral science theories and methodology to predict and explain health-related behaviors as well as develop and evaluate health promotion and disease-modifying and prevention programs. Emphasis is placed on the importance of community-based participatory research and the application of research findings through a variety of behavioral and social science health promotion strategies. Classes are engaging, interactive, and relevant to current health issues.

***Department of Health Policy and Organization:*** Students in the Department of Health Policy and Organization (HPO) develop skills in managing and leading the development of policy in a variety of settings. Students in UAB School of Public Health concentrations learn policy skills relevant to the practice and scholarship of public health. Health Policy and Organization focuses on skills needed for leading and managing public health organizations. Health Policy focuses on building the analytical skills required to recommend or evaluate systems or policy changes. Those students with a particular interest in the complex health considerations for the Maternal and Child Health (MCH) population can gain additional skills in comprehensive systems development and evaluation from a Life Course approach. Outcomes Research, emphasizing the clinical side of public health, focuses on the evaluation of the effectiveness and cost-effectiveness of specific health care interventions or treatments. UAB faculty, staff, and students are highly engaged in “real world” public health. We partner with local, state, national, and international agencies to understand the impact of policies on populations and systems.

**School of Health Professions***(est. 1969; Andrew J. Butler, MPT, MBA, Ph.D., Dean)*

The UAB School of Health Professions, one of the largest health professions schools in the nation with more than 20 innovative programs, shapes the future of healthcare through teaching, research, and translation of discoveries into practice. The UAB School of Health Professions has the #1 ranked Master of Science in Health Administration (MSHA) program in the nation and is the highest ranked academic program at UAB. The UAB SHP also provides several programs that are exclusive to UAB in the state of Alabama. To improve the quality of health around the world, UAB SHP listen to needs and identify real-world problems while focusing our resources and expertise to address those problems. Collaborative efforts are made to tailor innovative teaching and research to solve problems and partner with strategic community, business, and global leaders to expand the impact of our efforts. The UAB School of Health Professions’ strategy uniquely positions us to lead efforts to inspire quality health and living of individuals, communities, and the world.

***Department of Clinical and Diagnostic Sciences:*** The Department of Clinical and Diagnostic Sciences is comprised of academic programs essential to today’s healthcare system. To help prepare students to enter this quickly growing field, the department’s undergraduate and graduate programs provide academic and hands-on experience that can be applied to many different professions in health care. They are taught in a variety of disciplines ranging from diagnosis of illness and disease, administration of advanced treatment therapies, and performance of vital roles in surgical suites, plus outpatient and inpatient healthcare settings. CDS programs are essential to today’s healthcare system and the Physician Assistant Studies program is currently ranked 8th in the nation. Graduates work in disciplines diagnosing illness and disease, administering advanced treatment therapies, and performing in surgical and trauma settings plus outpatient and inpatient healthcare.

***Department of Health Services Administration:*** Home to the top ranked program at UAB – the #1 in the nation Master of Science in Health Administration – HSA has been shaping the future of health care for more than 50 years. They will continue to do so for the next 50 years and beyond with top-ranked education programs taught by world-renowned scholars.

***Department of Nutrition Sciences:*** The UAB Department of Nutrition Sciences is the global leader in lifestyle wellness, incorporating nutrition and lifestyle research and education to prevent chronic disease and facilitate optimum health and wellness in everyone. The department is home to two major NIH-funded research centers – The Nutrition Obesity Research Center and the Diabetes Research Center plus the UAB Precision Nutrition Clinical Center, one of six clinical centers funded by the NIH Common Fund’s Nutrition for Precision Health. These programs translate the science of nutrition and lifestyle into real-world programs and initiatives that improve people’s lifestyle wellness in order to create a happier, healthier world.

***Department of Occupational Therapy:*** The UAB Department of Occupational Therapy focuses on providing opportunities for education, training, and research to allow students to explore the different avenues for their careers. The faculty works closely with each student throughout their entire time at UAB, and for the Master of Science in Occupational Therapy applicants, this relationship starts during the interview process. Students also have access to training in specialized areas in the Post-Professional Clinical Doctorate in Occupational Therapy (OTD) and can take both this degree and the Low Vision Rehabilitation Graduate Certificate program online (the certificate program has an on-campus requirement). The inaugural class of new entry-level OTD program was ranked among the top 14% in the nation.

***Department of Physical Therapy:*** The Department of Physical Therapy has offered outstanding educational programs in physical therapy since 1964. Currently, UAB offers the Doctor of Physical Therapy program for students who want to become physical therapists, an interdisciplinary PhD in Rehabilitation Science program, as well as Neurologic and Orthopedic Physical Therapy Residency programs for physical therapists interested in specializing in physical therapy disciplines.

**School of Nursing***(est. 1969, Maria Rodriguez Shirey, PhD, MBA, MS, RN, NEA-BC, ANEF, FACHE, FNAP, FAAN, Dean)*

The UAB School of Nursing offers innovative bachelor's, master's, and doctoral programs under the leadership of an interdisciplinary clinical and research faculty vested in developing the next generation of compassionate nurses committed to contributing to the improvement of the health and quality of care for individuals, families, and populations. Among these are the oldest and most honored PhD in Nursing and a Doctor of Nursing Practice (DNP) and Nurse Anesthesia Track; a Master of Nursing program with more than 15 nurse practitioner specialty tracks with dual degree options, advanced nursing executive majors in administration and informatics, and an Accelerated Master's in Nursing Pathway (AMNP) program for students who already have one degree, among other unique opportunities. Most graduate courses are taught in a distance accessible format with on-campus intensives. The UAB School of Nursing is designated as a Pan American Health Organization/World Health Organization Collaborating Center for International Nursing.  Additionally, the School is a Paul D. Coverdell Peace Corps Fellows program and is one of the leading VA Nursing Academic Partnerships in the US. The UAB School of Nursing is a leader and trendsetter in collaborative science and home to the state’s only nursing-specific research initiative with a broad funding portfolio supporting scholarship in oncology, international nursing, HIV/AIDS, pediatrics, occupational health, aging, among others, and offers students opportunities to learn and investigate with faculty and student teams from nursing, medicine, dentistry, health professions, public health, and optometry. The UAB School of Nursing is home to an innovative nursing simulation and skills laboratory, which provides faculty and students with interprofessional learning opportunities. Faculty hold more than 70 appointments in university-wide research centers.

**School of Dentistry***(est. 1945; Nicolaas Geurs, DDS, MS, Dean)*

The University of Alabama at Birmingham School of Dentistry 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 and blends the rich tradition of a school founded over 70 years ago with cutting-edge technology and contemporary programs and facilities. The UAB School of Dentistry is comprised of seven academic departments and a variety of educational programs that span the major dental specialties. It consistently ranks among the top National Institutes of Health-funded dental schools in the United States and it centered on five core themes: **1) Craniofacial Development and Genetics, 2) Biomaterial Science and Biomimetic, 3) Oral Microbiology, Infection, and Host Response, 4) Oral Cancer and Bone Marrow Microenvironment, 5) Clinical Outcomes and Implementation Science.**

The goal of the UAB SOD is to educate a progressive oral health workforce and advance science to optimize oral health throughout our state, the nation, and the world. We offer a premier learning experience, abundant lifelong learning opportunities, and cadre of auxiliary programs supported by internationally recognized faculty and a strong network of alumni and community partners. Students are exposed to both depth and breadth of clinical experiences, while students and faculty can participate in both clinical and laboratory research within areas like craniofacial development/genetics, biomaterial science, oral microbiology and infection/host response, oral cancer, and clinical outcomes/implementation science. Through our comprehensive clinical operations, innovative practices, and robust community collaborations, we provide high-quality patient care for residents of Alabama and surrounding areas.

**School of Optometry***(est. 1969; Kelly K. Nichols, OD, MPH, PhD, FAAO, Dean)*

The School of Optometry was established in 1969. Since that time, the School of Optometry has grown to include graduate degrees (MS, PhD) in Vision Science and post-doctoral residency education in addition to the 4-year professional program. The UAB School of Optometry is located within the UAB Academic Health Center, which affords our students the opportunity to be surrounded by health professionals and researchers in a variety of disciplines. Students can also participate in combined OD/MS, OD/MPH, OD/MBA degree programs with other health professional students, unique to our university. As one of the smaller optometry schools in the country, the school offers a competitive enrollment that benefits the world-class educational environment with a family feel.

As one of the top optometry programs in the nation, UAB School of Optometry is the first in the U.S. to be fully integrated into an academic health center. Recently re-accredited to 2025, the School of Optometry has a first-rate reputation for educating optometrists and vision scientists from across the country, primarily from the South-Eastern region. Their faculty is among the best known in the country through their lectures, research and publications including many national and international textbooks, service on editorial boards, and Newsletters for optometrists. Their clinical service is widely respected for the excellent patient care including several new specialty clinics, myopic control clinic, dry eye clinic, and vision therapy clinic in the UAB Eye Care clinic, a 34,000 square foot state-of-the-art facility that covers everything from primary eye care, including the dispensing of glasses and contacts, to the treatment of ocular disease and pediatric vision care.  The school also houses and supports the Vision Science Research Center (VSRC), a campus-wide center with over 80 investigator members from across campus, with the common commitment to vision research. The core facilities allow vision researchers to successfully compete for research funding and this support has aided the School of Optometry research profile to remain among the top schools and colleges of optometry. Collectively, these commitments help the school in its mission to educate optometry students, residents, and future scientists; to discover and broadly communicate new principles and concepts in eye care and vision science; to translate these ideas into clinical practice; and deliver health care with integrity and compassion.

**School of Education and Human Sciences** *(est. 1971; Teresa Taber Doughty, PhD,Dean)*

The School of Education and Human Sciences provides an innovative environment that promotes professionals in education, health, and wellness in collaboration with content experts in associated academic areas. The UAB SOE is driven to create the most prepared, inspired, and dynamic practitioners in the workforce today with cutting-edge programs that prepare professionals to serve in a complex world. We want to help each and every one of our students become the absolute best-prepared practitioner fully capable of working in any setting, whether it be urban, suburban, or rural. This collaboration in developing strong professionals is emblematic of UAB’s interdisciplinary, collaborative culture, strengthening cooperation between departments and programs for excellence in research and scholarship where students can thrive in an open environment with a bold, innovative approach to education.

**School of Engineering** *(est. 1971; Jeffrey W. Holmes, MD, PhD, Dean)*

The UAB School of Engineering embraces a collaborative mission, supporting projects that bring engineers together with medical professionals, business leaders, and fellow scientists from other disciplines, in order to push the envelope and discover new, innovative solutions for the challenges in the world. With renowned faculty spread across five academic departments, the School of Engineering provides undergraduate students with a solid foundation in engineering fundamentals with a curriculum focused on experiential learning opportunities and progressively advanced hands-on applications. With more than 15 graduate degree programs and tracks to choose from at the master and Ph.D. level, as well as a variety of certificate programs, UAB offers highly adaptable programs that range from traditional M.S./Ph.D. pathways to online Master of Engineering degree tracks for working professionals. It is likewise committed to training at the undergraduate and graduate levels, where student engagement in design projects is prioritized throughout the curriculum.

In July 2023, UAB broke ground on Gorrie Hall, a new Science and Engineering Complex, which will be home to the School of Engineering. The school will relocate to this new facility that will support its goals of attracting faculty, increasing grant funding and training the next generation of engineers. Gorrie Hall will be on display in prominently featured “showpiece” spaces throughout the nearly 116,000-square-foot facility with advanced labs, research suites and common areas. The 2,000-square-foot materials testing lab will house the equipment needed to conduct compression, bending, tensile and impact testing on materials ranging from concrete and steel to gels and foams. Additional features of the building will advance research through teaching labs, a design and rapid prototyping lab, a transportation and smart cities research suite,

**Collat School of Business** *(est. 1971; Christopher L. Shook, PhD, Dean)*

Located in the heart of Alabama's business center, UAB’s Collat School of Business offers an engaging learning environment with classrooms extending well beyond the walls of the UAB campus. The school’s unique location allows faculty to integrate the practical experiences of the State's leading companies - from Fortune 500 corporations to entrepreneurial startups - into the programs it offers. Students gain valuable, real-world experience through a wide variety of internships, career coaching and planning, and other opportunities in the business community. The Collat School of Business is accredited at the baccalaureate and master’s levels by AACSB International and holds supplemental AACSB International accreditation for our undergraduate and master’s programs in accounting, an accomplishment held by less than 2% of business schools worldwide. The school offers eight undergraduate programs in accounting, economics, finance, human resource management, industrial distribution, information systems, management, and marketing. It offers three graduate programs in accounting, business administration and management information systems as well as certificates in technology commercialization and entrepreneurship, social media, enterprise systems, and professional sales. All undergraduate and graduate programs are delivered in Face-to-Face and Online formats to serve the varying needs of students.

**College of Arts and Sciences** *(est. 2010; Kecia M. Thomas, PhD, Dean)*

The UAB College of Arts and Sciences was formed in 2010 with the integration of the schools of Arts and Humanities, Social and Behavioral Sciences, and Natural Science and Mathematics. Today, the college is home to 19 academic departments, 9 interdisciplinary programs, and 5 centers. The College of Arts and Sciences also offers 40 baccalaureate undergraduate majors and 23 graduate programs. In addition to our more than 5,000 majors, nearly every student pursuing a baccalaureate degree at UAB takes their core curriculum classes in the College of Arts and Sciences. To ensure that each student leaves UAB with the tools they need to succeed in an expanding and increasingly complex world, the College of Arts and Sciences is dedicated to helping them develop the following skills and competencies: ethical and moral reasoning, the Scientific Method, communication, competence, and confidence in the “Face of Complexity”. The college includes more than 300 full-time faculty members, approximately 59% percent of whom are tenured.

***Department of Computer Science:*** The Department of Computer Science at the University of Alabama at Birmingham provides an excellent learning environment for both [undergraduate](https://www.uab.edu/cas/computerscience/undergraduate-programs) and [graduate](https://www.uab.edu/cas/computerscience/graduate-programs) students, and is proud to be part of UAB, one of the top universities in the nation that are ranked as "R1: Doctoral Universities — Highest Research Activity" in the Carnegie Classification of Institutions of Higher Education. Continuing our success in scholarly research, department faculty are challenging the boundaries of knowledge in four focused research areas, including cyber security, data science and analytics, biomedical applications, and advanced cyber infrastructures (encompassing cloud computing, high-performance computing, and the Internet of Things). Our faculty’s research has been funded by both major federal agencies and industrial technology giants. Additionally, we collaborate closely with researchers from other universities, industries, and government agencies.

***Department of Sociology:*** The UAB Department of Sociology offers the only PhD program in medical sociology in the state of Alabama, and more than 50 alumni having graduated with a PhD in medical sociology from UAB. With UAB's prestigious medical school, seven hospitals, and several on-campus clinics and medical research centers, there are numerous opportunities and fellowships for research and training. The Department of Sociology features faculty who are either teaching specialists or leaders in research in a research-intensive environment. With the exception of a few alumni who hold administrative positions, about half of graduates teach and conduct research in universities, while the other half conduct research full-time. Some are affiliated with medical schools (e.g., UAB, Harvard, South Carolina, Texas, Miami), schools of public health (e.g., UAB, Brown), and various colleges and universities in the US (e.g., UAB, William & Mary, Mary Baldwin, Tuskegee, Mississippi State, Western Kentucky, Middle Tennessee, Akron) or abroad in Europe and Asia.

***Department of Social Work****:* The mission of the UAB Department of Social Work is To improve the well-being of people, and to advance healthcare through evidence-based teaching, research, and service designed to effect change at local, state, national, and global levels. The Bachelor of Science in Social Work (BSSW) program prepares students for generalist social work practice with multiple populations. Our Master of Social Work (MSW) program is one of the few in the nation that has a sole focus on clinical/medical social work, and it prepares students for practice in health and behavioral health settings. Both programs are fully accredited by the Council on Social Work Education (CSWE). UAB’s Undergraduate Social Work Program was established in 1976 and was fully accredited in 1977. In 2011, Social Work became an independent department within the College of Arts and Sciences and has remained committed to evidence-based research, innovative teaching models, and service leadership. The UAB Department of Social Work remains housed in University Hall, a state-of-the-art facility overlooking the Campus Green.

UAB Libraries *(est.1945, Kasia Gonnerman, MLS, Dean)*

The UAB Libraries provide access to an array of rich scholarly resources that inform intellectual, social, and economic transformation of its community. It also provides the essential expertise to support excellence in education, research, patient care, and community outreach that collectively advance the success and impact of the University of Alabama at Birmingham. The UAB Libraries’ collections include over 1.4 million volumes and more than 40,000 journals and serials, in addition to extensive electronic resources, rare books, microforms, and audio-visual materials. The UAB Libraries host nearly 1 million patrons each year and support students and faculty in advancing their learning, research, and teaching. UAB Libraries administratively merged in2015 to provide shared services, such as a single catalog, and achieve economies of scale while collectively expanding access to digital resources. UAB Libraries encompass the Lister Hill Library of the Health Sciences, the Lister Hill Library at University Hospital, the Mervyn H. Sterne Library, UAB Archives, UAB Digital Collections, Reynolds-Finley Historical Library, the Alabama Museum of the Health Sciences, and an off-site storage facility termed the “801 Building”.

* ***Lister Hill Library of the Health Sciences****:* The largest biomedical library in Alabama, was established in 1945. Located in the heart of the academic medical center, LHLHS provides a variety of reference and educational opportunities ranging from one-on-one instruction at point of need to scheduled workshops on using library resources. The collections of the library span seven centuries of knowledge with medieval manuscripts and some thirteen thousand rare books, bound journals and books in the various health science disciplines, archival records and photographs, and electronic access to thousands of online journals and books. Access to electronic resources is available across the campus and remotely to authorized users. The library catalog is also available on the web and can be used to search for print, electronic, and media holdings. The library has a liaison program with its constituent schools. It also provides a variety of reference and educational services plus extensive education opportunities through one-on-one instruction at the point of need or in scheduled workshops that address the library's resources, information retrieval, and emerging technologies. A recent renovation of physical space increased group study rooms from 7 to 18 and added ergonomic furniture for individual study in public spaces and access to 3-D printers.
* ***The Lister Hill Library at University Hospital:*** The Lister Hill Library at University Hospital (LHL@UH) is a branch location of the Lister Hill Library of the Health Sciences and is located in the West Pavilion in the Graduate Medical Education Wellness Center. The physical space primarily serves hospital residents and is not open to other hospital employees or the public. However, all clinical faculty can drop in or make appointments with the LHL@UH librarians during normal business hours. The mission of LHL@UH is to provide all UAB patient care providers support for education, research, and patient care.
* ***Mervyn H. Sterne Library***: When UAB was formed in 1969, a small extension division library existed. From that beginning, the Mervyn H. Sterne Library emerged and has developed into a major academic library through numerous expansions and renovations since inception. The Sterne Library’s collections support teaching and research in the arts and humanities, business, education, engineering, natural sciences, mathematics, and social sciences. In addition to more than 1 million print and electronic books and subscriptions to over 41,000 periodicals, the library also provides users with access to specialized databases, audio-visual materials, microforms, and other electronic resources. The Sterne Library has seating for more than 1,150 users. In addition to serving the University community, Sterne Library provides support to users from schools and businesses within the city and the state through various partnership agreements and maintains a collection of over one-million items and rapidly expanding access to digital resources in support of teaching and research in arts and humanities, business, education, engineering, natural science and mathematics, and social and behavioral sciences. The Sterne Library recently consolidated services to a new single desk and added ergonomic study spaces. A Maker Space is staffed by engineering students.
* ***UAB Digital Collections****:* UAB Digital Collections is an online repository for UAB Libraries and the university’s digital collections, enabling the preservation, access to, and promotion of the collections. UAB Digital Collections was established in 2006. The mission of UAB Digital Collections is to identify and deposit material which reflects the needs of the University's academic, research, and service programs. The digital collection supports the library’s goal of accessibility to provide “the members of the University community with access to the highest quality information resources required for teaching, scholarship, research and service.” Some of the items in the collections include historical and health-science related materials, UAB publications, electronic theses and dissertations, audio and visual materials, digitized books and manuscripts, faculty- and course-related materials.
* ***UAB Archives***: The function of the UAB Archives is the appraisal, collection, organization, description, and reference use of the University of Alabama at Birmingham's (UAB) official records of enduring historical value. Reference service is provided to both the university community and the general public. All persons who visit the UAB Archives to conduct research are interviewed by staff to determine the scope of research and the most effective research strategy in the usage of UAB records. Staff will explain applicable usage restrictions during this interview. Patrons are also required to register during their research visit. For members of the university community, the UAB Archives accepts mail, telephone, e-mail and in-person reference requests and provides research support on a case-by-case basis. The archives does not conduct research for students or complete student assignments. When the UAB Archives is unable to provide research support due to staff availability, time or financial constraints, members of the university community will be encouraged to utilize the UAB Archives in person to conduct research. For members of the general public, the UAB Archives accepts ready reference requests via mail, telephone, e-mail, or in-person. Ready reference implies easily obtainable, quickly disseminated public information which does not have to be tabulated for dissemination and which is readily obtainable from archives sources.
* ***Reynolds-Finley Historical Library***: Named in 2014 due to a gift from Sara J. Finley and Randall W. Finley that honors their father, Dr. Wayne H. Finley. A new endowment was established for the continued enhancement and expansion of the medical historical collections. In recognition of this significant gift and of Dr. Finley's longstanding commitment to medical history at this university, the Reynolds Historical Library was renamed the Reynolds-Finley Historical Library (along with Dr. Lawrence Reynolds. The Reynolds-Finley Historical Library, a growing collection of over 20,000 rare books, manuscripts, journals, and pamphlets pertaining to the history of medicine, science, and health care, dating from the 1300s through the mid-1900s. The library is free and open to the public.
* ***Alabama Museum of the Health Sciences****:* The Alabama Museum of the Health Sciencesis dedicated to the preservation and display of equipment, instruments, and objects that represent the history and development of the health sciences in the areas of education, research, and practice in the United States with special emphasis on the state of Alabama and its contributors to the practice of medicine. Notable artifacts include small ivory 16th and 17th century anatomical models, a collection of wax moulage and an antique iron lung. The scope of the collection includes but is not limited to the following fields: medicine, nursing, ophthalmology, dentistry, public health, and allied health. The Alabama Museum of the Health Sciences is located in a beautiful gallery space on the 2nd floor of LHLHS.
* ***The 801 Building****:*  The 801 Building has a treasure trove of vinyl albums, CDs, and other formats of music and spoken word recordings. Music genres in the collection include jazz, classical, rock, country, musicals, and more. The collection also includes spoken word recordings, such as poetry and plays. Most items in the collection can be found in in the central database, OneSearch. The 801 Building is a remote storage facility where less-frequently requested items in the collection are kept. These items remain available to library users and can be requested through our courier service. A sampling of items stored here include journals from the Sterne Library dating from 1999 and back, microfilm, microfiche, cassettes, albums, kits, and print books. Many of the items here may be of interest to individuals doing historical research.

### Graduate Education and Post-Graduate Training

UAB offers over 85 doctoral, master’s and educational specialist programs designed to help you obtain a rewarding career aligning with your professional goals. In addition, UAB offers the Office of Professional Studies and Experiential Learning (OPSEL) to further hone skills and competencies for graduate scholars. OPSEL hosts the Interdisciplinary Graduate Studies MA and MS degree programs (IGS) as well as numerous opportunities for professional, leadership, and career development experiences.

**Graduate School** *(est. 1970; Shadi Martin, PhD, Dean)*

Established in 1970, the UAB Graduate School offers doctoral programs in 40 areas, post-masters education specialist programs in 8 areas, and master’s level programs in 55 areas, spanning across the disciplines. There are multiple support systems – administrative, financial, health care and career counseling.  To facilitate the wide spectrum of ongoing research, state-of-the-art facilities are found all over campus.  UAB’s research centers, lecture halls, labs, classrooms, dorms, greenways, hospitals, libraries, student center, recreation center and performing arts center occupy 82 city blocks inside Birmingham, Alabama.  The Graduate School supports graduate students and post-doctoral fellows with an extensive Professional Development Program, as well as monthly Discoveries in the Making events connecting students to the community. The expansive makeup of the UAB Graduate School includes students, faculty, and staff who proudly represent over 100 countries, including 7,665 graduate students involved in research.

**Graduate Biomedical Sciences Program***(David Schneider, PhD, Associate Dean)*

The Graduate Biomedical Sciences (GBS) program at UAB encompasses approximately 380 graduate students and 375 faculty. Trainees participate in multiple interdisciplinary thematic programs that integrate more than 25 departments in the School of Medicine; partner schools throughout the university; Southern Research (an affiliated drug discovery and development institute); and HudsonAlpha Institute for Biotechnology. UAB is consistently among the top 25 institutions in the US for NIH research funding and is currently in the top 15. The GBS program 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, and Stem Cell Biology; Cancer Biology; Cell, Molecular, and Developmental Biology; Genetics, Genomics, and Bioinformatics; Immunology; Microbiology; Neuroscience; and Pathobiology and Molecular Medicine.  Working closely with the GBS Program, the CCTS has been instrumental in developing a Translational & Molecular Sciences certificate program to enhance the graduate curriculum.

**Office of Postdoctoral Education***(est. 1999)*

The University of Alabama at Birmingham Office of Postdoctoral Education is committed to the development and success of outstanding postdoctoral scientists. Nearly 300 postdocs are training currently in a variety of disciplines, including but not limited to engineering, medicine, natural sciences & mathematics, public health, and optometry. 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 UAB Office of Postdoctoral Education and the UAB Postdoc Association work together to develop career opportunities that enhance and define the training experience for all postdoctoral scholars at UAB. Past and continuing events include courses in grant writing, lab management, translational science, & job skills, structured programs in teaching and business entrepreneurship, and awards for career enhancement, travel, grant incentives, and internships. The possibilities for academic and research-related careers are ever changing. As such, OPE aims to prepare postdoctoral fellows for these possibilities.

**Office of Professional Studies and Experiential Learning** (**OPSEL)**

OPSEL is home to UAB’s Interdisciplinary Graduate Studies degree programs (MA & MS), multiple graduate certificates, and numerous other academic, leadership, and professional development opportunities. Offerings are open to anyone affiliated with UAB interested in advancing their knowledge, skills, and career with post-baccalaureate studies. UAB Undergraduate Students may also enroll in our academic courses with permission from their academic advisor and the course instructor. OPSEL embodies UAB’s education mission by offering interdisciplinary academic and professional development programs designed to support leadership and career advancement among student populations. Everyone is welcome to take a class, earn a certificate, attend a free informational seminar, or workshop, or drop by for holistic academic support or career transition consultations.

**UAB Division of Continuing Medical Education** *(Ronan O’Beirne, EdD, MBA, MSEE, Director)*

The Division of Continuing Medical Education (CME) at UAB strives to be a national leader in defining and delivering meaningful learning opportunities for healthcare professionals to improve patient and community health. The Division’s CME program strengthens the UAB Health System through the quality, and scope of its educational activities. Topics include traditional areas of basic science, clinical medicine, patient care, and public health, as well as more contemporary themes of quality improvement, patient-centered care, leadership, and others within the Accreditation Council for Graduate Medical Education’s professional core competencies. The mission of the Division of CME is to develop and provide a professional development program for physicians and physicians-in-training that is effective in increasing knowledge, awareness, and competence; enhances physician performance; and improves patient and community health. UAB CME sponsors a wide variety of educational initiatives including single- and multi-day live courses, regularly-scheduled series, print and Internet enduring materials, journal-based activities, and performance improvement activities. The type of educational format used to deliver educational content is determined by a number of factors but is driven by the needs of the target audience, evidence of desired outcomes, and important principles of adult learning and theories of human behavior change. The CME group supports the broader Heersink School of Medicine’s tri-part mission of research, education, and clinical practice, working together with other units within the spectrum of medical education, faculty development, and quality improvement.

### Information Technology (UAB IT)

**UAB Information Technology Operations**: The responsibility for campus network, IT resources, and IT security resides with the UAB Office of the Vice President for Information Technology. UAB Health System IT operations are provided by the Health System Information Services (HSIS) unit. The CCTS utilizes services and resources provided by both UAB-IT and HSIS. Within UAB-IT, the Research Computing unit provides shared, subsidized access to computing resources supporting all research, including CCTS-conducted and supported projects. Most resources provided by Research Computing are provided at no cost for routine processing needs. A cost schedule can be arranged for large capacity needs (more than several hundred TB of storage or reserved allocations of high capacity HPC nodes to individual projects).

**UAB Information Technology Facilities:** In 2021 UAB IT moved into a new building, the 37,500 square foot Technology Innovation Center (TIC) that houses the campus data center, data storage facility, campus and offsite network connectivity, IT administrative offices, and a colocation facility for partners in distributed IT. High-capacity power and cooling is supplemented by a Tesla Powerpack battery system. In addition, to serve as an offsite compute and storage facility, UAB IT leases space within DC BLOX, a private entity that provides a data center in downtown Birmingham, within 2 miles of the UAB campus. DC BLOX has available a 31,000 square foot colocation facility providing 48U lockable cabinets, 100/200 GE connectivity, and high-capacity power and cooling.

**UAB Network Infrastructure**

**On-campus Network Connectivity:**The campus network backbone is based on a 40 GE redundant Ethernet network with 480 gigabit/second backplanes on the core L2/L3 Switch/Routers. Connection between UAB IT’s Research Computing facilities that support local high performance computing resources, local campus storage facilities, and off-campus hosted storage and compute facilities at DC BLOX is served by a 200 GE network. For efficient management, a collapsed backbone design is used. Each campus building is connected using 10 GE links over single mode optical fiber. Within multi-floor buildings, a 10 GE building backbone over multimode optical fiber is utilized. Category 6 or better unshielded twisted pair wiring is used to connect desktops to the network with 1 GE default desktop connections. Computer server clusters are connected to the building entrance using Gigabit Ethernet. All CCTS servers and desktops have 1 GE connections. The campus wireless network blankets classrooms, common areas and most academic office buildings. The UAB network has the capability to establish high speed connections between data intensive research facilities across the institution. This network can support very high-speed secure connectivity between nodes for high speed transfer of very large data sets without the concerns of interfering with other traffic on the campus backbone; thus ensuring predictable latencies.

**Off-campus Network Connections:** The UAB network supports direct connection to high-bandwidth regional networks. UAB connects to the Internet2 via the University of Alabama System Regional Optical Network (UASRON), a University of Alabama System owned and operated DWDM Network offering 100 GE connections to the Southern Light Rail (SLR)/Southern Crossroads (SoX) in Atlanta, Ga. The UASRON also connects UAB to the University of Alabama in Tuscaloosa, and the University of Alabama in Huntsville, and the Alabama Supercomputer Center. UAB is also connected to other Alabama universities and schools (including CCTS Hub sites) through AREN (Alabama Research and Education Network). Connection to the commodity Internet is via Gigabit Ethernet, of which UAB currently uses approximately 3.0 Giga-bits-per-second (expandable as needed).

**High Performance Computing Resources**

**UAB IT Research Computing (UABRC)** maintains the Research Computing System (RCS), an integrated computing platform that provides access to enhanced compute, storage, and network capacity for UAB investigators and their collaborators. The RCS compute resources include a high-performance compute (HPC) cluster for large scale modeling and analysis workloads, an on-site cloud platform for highly customizable virtual machine (VM) based workloads, and a container orchestration platform for cloud-native workloads. The RCS storage resources include a high-speed GPFS file system attached to the HPC cluster to support data analysis workloads and large-capacity block and object storage to support the cloud and container workloads. The RCS networking infrastructure connects the computing and storage systems via 800 Gb/s Ethernet interconnect that provides ample capacity for data access and movement between the compute and storage resources. RCS networking also includes connectivity to the UAB Campus Network, a dedicated EDR/HDR Infiniband fabric for low-latency data exchange on the HPC cluster, and a 40 Gb/s ScienceDMZ for high-speed data transfers with national research and education networks.

These RCS resources combine to provide a low-friction application hosting platform that enables research teams to build and deploy preferred tools without enforced refactoring to adopt applications to campus resources. The RCS resources are deployed spanning two data centers. The on-campus data center is in the recently constructed Technology Innovation Center (TIC). The off-campus data center is located at a nearby (less than 10 km) commercial facility operated by DC BLOX, a regional data center provider offering a Tier III colocation facility in Birmingham with adequate power to support the high-density power requirements for expanding the compute capacity of the RCS and a resilient physical infrastructure designed to withstand natural disasters like tornados, which are common in the region. The commercial facility is connected to the campus data center via a dedicated fiber path lit with dual 100 Gb/s optics that leverages the University of Alabama System Regional Optical Network (UASRON). UABRC designs and maintains the RCS resources in open collaboration with the campus research community to ensure that the system addresses research needs and has the capacity to meet research demand.

**Primary campus HPC Facility:** Cheaha is a campus high-performance computing (HPC) resource dedicated to enhancing research computing productivity at UAB. Cheaha is managed by UAB IT Research Computing (UABRC) and is available to members of the UAB community in need of increased computational capacity. Cheaha supports both high-performance computing (HPC) and high-throughput computing (HTC) paradigms. Cheaha provides 10752 CPU cores, 112 GPUs, and 88 TB of memory across 159 compute nodes interconnected via an EDR/HDR InfiniBand network, providing over 1.1 PFLOP/s of aggregate theoretical peak performance. A high-performance parallel filesystem running is connected to these HPC compute nodes via the InfiniBand fabric. Node details follow.

* Gen 7 (2017): 18 nodes, 2x14 core (504 cores total) 2.4 GHz Intel Xeon E5-2680 v4 compute nodes with 256 GB RAM, four NVIDIA Tesla P100 16 GB GPUs per node, and an EDR InfiniBand interconnect.
* Gen 8 (2019): 35 nodes, 2x12 core (840 cores total) 2.60 GHz Intel Xeon Gold 6126 compute nodes with 21 compute nodes at 192 GB RAM, 10 nodes at 768 GB RAM and 4 nodes at 1.5 TB RAM, and an EDR InfiniBand interconnect.
* Gen 9 (Q2 2021): 52 nodes, 2x24 core (2496 cores total) 3.0 GHz Intel Xeon Gold 6248R compute nodes each with 578 GB RAM and EDR InfiniBand interconnect.
* Gen 10 (Q4 2021): 34 nodes, 2x64 core (4352 cores total) 2.0 GHz AMD Epyc 7713 Milan compute nodes each with 512 GB RAM and EDR InfiniBand interconnect.
* Gen 11 (Q4 2023): 20 nodes, 2x64 core (2560 cores total) 2.0 GHz AMD Epyc 7713 Milan compute nodes each with 512 GB RAM and 2 A100 80 GB GPUs.

Cheaha provides researchers with both a web-based interface, via open OnDemand, and a traditional command-line interactive environment, via SSH. These interfaces provide access to many scientific tools that can leverage a dedicated pool of on-premises compute resources via the SLURM batch scheduler. The on-premises compute pool provides access to four recent generations of hardware based on the x86 64-bit architecture.

**High-Performance Computing Software Tools**

General research computing and scientific programming software are available on Cheaha, including Anaconda, R and RStudio, and MATLAB through the Lmod environment module system. RStudio, MATLAB, Jupyter Notebook server, and Jupyter Lab are all available on our Open OnDemand web portal as interactive applications, along with a general-use desktop environment via no-VNC, directly in the browser. Researchers are enabled to develop and share their own custom interactive applications through a sandbox application feature within Open OnDemand.

The UAB Center for Clinical and Translational Science (CCTS) Informatics group has installed and supports a variety of bioinformatics tools that are available to be run from Cheaha. Standalone packages are available for quality control (fastQC, Picard Tools), alignment (Abyss, Velvet, BWA, Bowtie) visualization (IGV), variant calling (GATK, SnpEff, annoVar), RNAseq (Cufflinks, Cuffdiff, TopHat) and microbiome and metagenomic analysis (QIIME, HUMAnN, MEGAN).

Additional scientific domain-specific software is also available, including Relion for cryo-electron microscopy analysis, AFNI for fMRI analysis, and ANSYS for simulations for research efforts of the UAB School of Engineering. Many other software packages are installed and maintained, and we encourage and facilitate researchers installing their own additional software using Anaconda, R and MATLAB package management where possible.

**UAB Research Cloud Resources:** UABRC operates a production private cloud called cloud.rc based on OpenStack, which echoes the research workload support goals of the NSF’s Jetstream2 resource part of the ACCESS network. The Cloud.RC platform has been used to support application development and DevOps processes to research labs across campus and is increasingly being leveraged to support many aspects of research IT operations. This fabric is composed of five Dell R640 48 core 192 GB RAM compute nodes for 240 cores and 960 GB of standard cloud compute resources. In addition, the fabric features four NVIDIA DGX A100 nodes that include 8 A100 GPUs and 1 TB of RAM each. These resources are available to the research community for provisioning on demand via the OpenStack services (Ussuri release). The production implementation further supports researchers by making their hosted services available beyond campus, while adhering to standard UAB Campus Network security practices. Scientific software developers have access to the full stack for limitless development opportunities, with a frictionless migration path to public cloud providers as needed for specific research projects. A Kubernetes environment was deployed in Q3 2022 to allow for development workflows using containers. The compute resources of the Kubernetes environment are a duplicate of the cloud resources. The OpenStack and Kubernetes resources are deployed via Canonical’s Charmed operations stack enabling node migration between platforms in response to capacity demand.

**Storage Resources:** The compute nodes on Cheaha are backed by high-performance, 7 PB GPFS storage on DDN SFA14KX hardware connected via an EDR /FDR InfiniBand fabric. Two additional storage systems are available to support research operations and application design. They are based on the Ceph storage technology and provide different hardware configurations to address different usage scenarios. The fabrics include a 6.9 PB archive storage fabric for long term storage (LTS) built using 12 Dell DSS7500 nodes, and an 11 PB nearline storage fabric built with 14 Dell R740xd2 nodes and 248 TB SSD cache storage fabric (Q3 2023) built with 8 Dell 840 nodes. These storage systems provide block and object storage services to the OpenStack and Kubernetes platforms. Additionally, the object storage services are empowering research applications with cloud-native data management and availability capabilities.

**Network Resources:** The RCS networking infrastructure connects the on- and off-campus computing and storage systems via 800 Gb/s Ethernet interconnect that provides capacity for data access and movement between the compute and storage resources. RCS networking also includes a dedicated EDR/HDR Infiniband fabric for the HPC platform and a 40 Gb/s ScienceDMZ for high-speed data transfers with national research and education networks. The ScienceDMZ supports direct connection to campus and high-bandwidth regional networks via 40 Gb/s Globus Data Transfer Nodes (DTNs) providing the capability to connect data intensive research facilities directly with the high-performance computing and storage services of the RCS. This network can support very high-speed secure connectivity between nodes connected to it for high-speed file transfer of very large data sets without the concerns of interfering with other traffic on the campus backbone, ensuring predictable latencies. The Science DMZ interface with (DTNs) includes Perfsonar measurement nodes and a Bro security node connected directly to the border router that provide a “friction-free” pathway to access external data repositories as well as computational resources.

The UAB Campus Network backbone is based on a 40 Gb/s redundant Ethernet network with 480 Gb/s back-planes on the core L2/L3 Switch/Routers. For efficient management, a collapsed backbone design is used. Each campus building is connected using 10 Gb/s ethernet links over single mode optical fiber. Desktops are connected at 1 Gb/s speed. The campus wireless network blankets classrooms, common areas and most academic office buildings. UAB connects to the Internet2 high-speed research network via the University of Alabama System Regional Optical Network (UASRON), a University of Alabama System owned and operated DWDM Network offering 100 Gb/s ethernet to the Southern Light Rail (SLR)/Southern Crossroads (SoX) in Atlanta, Ga. The UASRON also connects UAB to UA, and UAH, the other two University of Alabama System institutions, and the Alabama Supercomputer Center. UAB is also connected to other universities and schools through Alabama Research and Education Network (AREN).

**Data Management and Transfer Resources**: A traditional POSIX filesystem is available on all Cheaha HPC nodes through GPFS for data requiring computational analysis, with separate data, scratch, and shared storage. Object storage is available via our Long-Term Storage (LTS) S3 interface. A REST endpoint is provided for LTS and exposed to the Internet to facilitate hosting research data products for external use. Block storage is available to support storage needs for our cloud and Kubernetes fabrics.

All faculty, staff and students who create a Research Computing account have immediate access to 5 TB of personal GPFS storage and may request an additional 5 TB of LTS storage. Research PI groups, Core facilities, and other research groups at UAB may request up to 25 TB of GPFS storage and 75 TB of LTS storage for shared collaboration spaces.

Globus High-Assurance (HA) endpoints are maintained on the RCS platform to facilitate internal and external data transfers. Connectors to our enterprise Box.com instance and our LTS S3 interface are made available as part of our Globus subscription. A controlled-access Science DMZ partition of our hardware is available to facilitate high-throughput, parallel batch data transfers over the available 40 Gb/s connection to the external internet. Standard data transfer software such as Rclone, AWSCLI and s3cmd, and UAB-specific documentation and support, are provided to researchers to facilitate data transfers whenever Globus is infeasible.

**Facilitation, Outreach, Documentation, and Support:** UABRC provides research computation facilitation services for researchers using RCS. These services exist to reduce friction for researchers seeking to scale workflows from desktop and workstation scale up to HPC scale. Part of facilitation serves include computational outreach efforts within UAB, including facilitating lesson design for courses making use of our platform, teaching a Data Science Journal Club course, providing how-to-use-HPC lessons at University events, and proactively identifying opportunities for education and efficiency improvements using our internal observability stack.

Extensive documentation of computational capabilities, good practices for system use, references and tutorials are all available on our documentation website, publicly available on the Internet. Links to common, standard external educational resources are provided and encouraged where applicable, including to, the Software Carpentries and Data Carpentries lessons, and GitHub and GitLab version control documentation. We provide coverage for support requests during standard business hours, and greater coverage for outages and security incidents. Tickets are tracked using ServiceNow software, and most requests are addressed within 1-2 business days, with faster responses for critical incidents. Support requests covered include software installation and update requests, new researcher training, hardware and software errors, data transfer and shared storage requests, and facilitation of collaborative, grant-funded research computation projects ranging from individuals, through labs, to core facilities.

**Research Computing Personnel:** UAB IT Research Computing currently maintains a support staff of 14 led by the Assistant Vice President for Research Computing and includes one HPC Architect-Manager, one Research Facilitation and Data Manager, four Software developers, four Research Facilitation Scientists, and three system administrators.

**Other Available High Performance Computing Resources:** UAB is a member of the SURAgrid Virtual Organization (SGVO) on the Open Science Grid (OSG). This is a national computer network and consists of nearly 80,000 computer cores aggregated across national facilities and contributing member sites. The OSG provides operational support for the interconnection middleware and facilities research and operational engagement between members. UAB and CCTS investigators also have access to the Alabama Supercomputer Center (ASC), a State-wide resource located in Huntsville, Alabama. The ASC provides UAB investigators with no cost access to a variety of high-performance computing resources. These resources include:

* A Dense Memory Cluster (DMC) HPC system with 3740 CPU cores and 26.1 terabytes of distributed memory. Each compute node has a local disk (up to 7.5 terabytes of which are accessible as /tmp). Also attached to the DMC is a high-performance Spectrum Scale storage cluster, which has 93 terabytes of high performance storage accessible as /scratch from each node. Home directories as well as third party applications use a separate BeeGFS volume and share 750 terabytes of storage. The DMC is connected to the internet via a 10 GE connection.
* A large number of software packages are installed supporting a variety of analyses including programs for Computational Structural Analysis, Design Analysis, Quantum Chemistry, Molecular Mechanics/Dynamics, Crystallography, Fluid Dynamics, Statistics, Visualization, and Bioinformatics.

**Integrated Research Administration:** UAB has implemented an Integrated Research Administration Portal (IRAP). The underlying software consists of a suite of modules developed by InfoEd Global Inc. IRAP supports electronic submission of funding applications and compliance forms and currently consists of eight fully integrated modules supporting the operations of the Office of Sponsored Programs (OSP), Institutional Review Board for Human Use (IRB), Institutional Animal Care and Use Committee (IACUC), Materials Transfer office, Environmental Health and Safety including the Chemical Safety Committee and the Radiation Safety Committee, and the Conflict of Interest Review Board. Other features of the system provide access to potential collaborators and automated notification of funding opportunities meeting user specified criteria. Additional applications support administration processes (Oracle), animal facility management (Bioware), and intellectual property submissions (Sophia).

**Institutional Software Licenses (Partial Listing):**A variety of software packages are available through institutional licenses maintained by UAB-IT. These include:

* Institutional campus-wide license for Oracle RDBMS.
* Institutional campus-wide Microsoft Campus Agreement and Microsoft Select programs that provide licenses for desktop and server operating system upgrades, SQL Server, Microsoft Office, and Microsoft program development tools.
* Access to the complete catalog of Microsoft products for STEM programs through Microsoft Dreamspark/Imagine.
* Institutional campus-wide licenses for Antivirus software (Sophos and Microsoft), EndNote, GraphPad Prism, Mathematica, MATLAB, LabView, IBM/SPSS, SAS, Qualtrics, Adobe Creative Cloud, VMWare, and others.
* The UAB Department of Biostatistics provides investigators with access to a wide range of statistical software including SAS, S-plus, SPSS, and R. They also maintain many more specialized software programs including some specifically for statistical genetics such as SAGE, SIMWALK, ALLEGRO, DANDELION, GENEHUNTER, MERLIN, MX, PEDCHECK, PHASE, PREST, SOLAR, FASTLINK, VITESSE, SIMLA, and SUPERLINK amongst others. For software development purposes, the group has access to compilers for Fortran, C/C++, Perl, and Java as well as Fortran and Java IMSL libraries.

**Operational Healthcare Information Systems**

The UAB Health System (UABHS) through HSIS houses and supports over 3,600 servers and more than 350 applications and databases in a mostly virtualized computing infrastructure with a mix of operating systems including Windows, AIX, Linux (both Red Hat and SUSE), Solaris, zOS and Macintosh. The current storage for UABHS resides mostly on Hitachi Data Systems and provides over 10 Petabytes of storage across a redundant fiber channel network. Both data centers run on a 10Gig backbone, utilizing Cisco Nexus equipment, and have redundant 40 Gig connections between the primary and secondary data centers. Backups are done on tape and multiple disk arrays.

* Clinical, financial, and administrative data are managed on behalf of the UAB Health System and include patient demographics records available in the ***Enterprise Master Member Index (EMMI) system***; lab results dating back over ten years; documents dating back over ten years; encounter records, showing paths of patients across the UAB Health System; clinical images, including CT, MRI, X-rays, and more; user audit trails, showing the usage of the data by operational and clinical staff. Multiple systems are in place, and an active program to enhance integration / interoperability has been underway for several years.
* ***Horizon*** is a UAB-developed web portal used across the UAB Health System. Horizon includes all inpatient discharge and operative notes, all The Kirklin Clinic outpatient documents and notes and all laboratory and imaging results, each of which is integrated with EMMI to ensure valid patient demographics on the front end of the process. No documents can be created without first selecting a valid EMMI patient, and this occurs via a self-developed CORBA PIDS (Patient Identification Service) implementation wrapped around EMMI.
* ***The Cerner Millennium Core Clinical system*** is used as our core clinical system, supporting a complete clinical environment, with medication management, bedside device integration, and clinical decision support via alerts and content as some of the primary features. Cerner Millennium objects allows for object based access to the Cerner system for the purpose of integration. Although we have direct database access as well, this is a preferred abstraction layer that protects both Cerner and their customers from breakage due to changes in the database layer.
* ***The Cerner PowerInsight Clinical Data Warehouse*** is used to support reporting, analytics, quality measures and data extraction for research, clinical and administrative operations within UABHS. PowerInsight feeds data into our i2b2/SHRINE (version 1.7) informatics framework.
* ***Oracle SiteMinder*** supports clinical trials with tools for scheduling patient visits, tracking completion targets, and tracking expenses and billings to enhance optimal protocol performance and appropriate financial management for the study sponsor. To date, the major focus has been financial management.
* ***Forte Systems OnCore eClinical Solution*** is used by the Comprehensive Cancer Center and the CCTS Clinical Research Unit for management of clinical trials.

**Software Licenses (Partial Listing)**

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* Institutional campus-wide Microsoft Campus Agreement and Microsoft Select programs that provide licenses for operating system upgrades, SQL Server, Microsoft Office, and Microsoft program development tools.
* Access to the complete catalog of Microsoft products for STEM programs through Microsoft Dreamspark/Imagine.
* Institutional campus-wide licenses for Antivirus software (Sophos and Microsoft), EndNote, GraphPad Prism, Mathematica, MATLAB, LabView, IBM/SPSS, SAS, Qualtrics, Adobe, VMWare, and others.
* The UAB Department of Biostatistics provides investigators with access to a wide range of statistical software including SAS, S-plus, SPSS, and R. They also maintain many more specialized software programs including some specifically for statistical genetics such as SAGE, SIMWALK, ALLEGRO, DANDELION, GENEHUNTER, MERLIN, MX, PEDCHECK, PHASE, PREST, SOLAR, FASTLINK, VITESSE, SIMLA, and SUPERLINK amongst others. For software development purposes, the group has access to compilers for Fortran, C/C++, Perl, and Java as well as Fortran and Java IMSL libraries.
* CCTS Informatics maintains licenses and provides investigators with access to the Ingenuity Pathway Analysis tool suite and database that provides the ability to mine genomic and other –omics data for information on pertinent biological systems, networks, and pathways.

**UAB Cybersecurity Policies and Practices**

UAB IT maintains a comprehensive privacy and information security program that preserves and protects the confidentiality, availability and integrity of all information assets including patients, research, customer and business data. The security program upholds values and provides high standards of service, trust, confidentiality and responsiveness. The security program include the following:

* IT security policies designed to help ensure a secure state of operations and information management.
* Technical security standards that document baseline security requirements for key technologies and platforms such as major operating systems, databases, network device operating systems, firewalls, web-server security, email, encryption, secure file transfer protocols, virus defense, media reuse and media disposal.
* A comprehensive risk management program based on the NIST Cybersecurity Framework (CSF).
* A data classification rule to assist the UAB community in the classification of data and systems to determine the appropriate level of security. All UAB data stored, processed, or transmitted must be classified in accordance with this rule. Based on classification; users are required to implement appropriate security controls.
* A data protection rule to assist the UAB research community in the protections requirements of data and systems. All UAB research data stored, processed, or transmitted must be protected in accordance with these standards. Based on the regulatory or contractual requirements of the award; researchers are required to implement appropriate security controls.
* A computer security incident response plan that is supported by cross-functional response and recovery teams.
* User system access is tightly controlled and meets standards required by various regulations (e.g. HIPAA, FERPA, etc.). Two-factor authentication is utilized for many of the shared systems. Users must agree to the requirements set forth in the password rule. We also must routinely demonstrate compliance with Federal granting agencies and the corresponding security requirements such as the NIH, FISMA and the VA.
* An enterprise firewall platform for perimeter, datacenter and customer layered protection and segmentation. The firewall also consists of an Intrusion Prevention System (IPS) as well as content filtering and malware sandboxing.
* An enterprise centralized logging solution (aka SIEM tool) to store logs and generate alerts to the Security Operations team for items that might need attention.
* In addition to the Security Operations team (SOC) who handles incident response, forensics, EDR management, firewall management, etc., we also have a Threat and Vulnerability Team (TVT) that handles penetration testing, vulnerability scanning, phishing simulations and threat hunting. We also have a Risk Management team that handles application/business unit risk assessments, 3rd party risk assessments, MFA administration, Security Awareness and Training. We also have a Security Architect who handles architectural discussions for all sorts of projects across the campus.
* UAB maintains an IoT policy to ensure all IoT devices that reside on the UAB network (wired or wireless) must be proactively managed and adhere to the university’s IoT security strategy.
* Email is monitored with the highest level of defense offered from Microsoft with their XDR platform. This includes safe attachments, impersonation and other anti-phishing methods. UAB also utilizes DMARC, DKIM and SPF for additional email best practices. We also maintain email guidelines for the UAB community to adhere to.
* Encrypted VPN tunnels for business associates, staff remote access, or partner VPN connectivity.
* Capability to support encrypted secure file transfers with Globus for HPC and other cloud-based solutions for traditional cloud-based storage needs.
* Endpoint Detection / Response (EDR) agents and comprehensive patch management programs installed on all UAB managed computer workstations and servers to protect against malware infections. The EDR logs are monitored 24x7x365 by a third party to give full oversight and attention to needed items on the systems.
* A vulnerability management rule describes the process used by University of Alabama at Birmingham Information Technology (UAB IT) in mitigating the risks from computer security vulnerabilities.
* In-depth security awareness training that is provided for all Faculty, Staff.

UAB also maintains an IT Governance program that will, in consultation with strategic campus partners, provide a review that evaluates the risk associated with the above items. This review is also intended to prevent duplication of technology while complying with security and regulatory requirements

UAB has an extensive infrastructure to secure HIPAA-defined Electronic Protected Health Information (ePHI) from its creation and throughout its lifecycle. Secure web portals are utilized to make the required information accessible only to those who need access. The existing wireless infrastructure and secure VLAN architecture make the required ePHI portable but secure and transmissions are encrypted. UAB/UABHS applications are designed and developed using a comprehensive set of security standards. Areas addressed within application security standards include: password construction, strength and control, browser technologies, authentication and access control, security administration, and logging, auditing, and monitoring. All systems require 2-facotr authentication for access. Internet applications mandate TLS encryption with strong cipher suites for the transmission of any sensitive data. Before going into production, all new Internet applications must be submitted for security testing. All identified security issues that could impact the confidentiality / integrity / availability of our data must be corrected prior to production release. Applications are retested on a regular schedule that coincides with major release cycles. A comprehensive change management system is utilized for updates, production changes, quality control and revision management.

Physical security is controlled by the following:

* Access to data center facilities is electronically controlled using card access systems. The access to computing facilities is granted on an as needed basis based upon the employee’s job function.
* Access to the data center is removed as soon as the employee leaves or changes jobs within the UAB/UABHS. Authorizing approvers perform periodic reviews of employees with data center access. All IT personnel are required to submit to pre-employment security background screening.
* Access of personnel entering the data center area is monitored by operators in the Control Room. Operators are authorized to permit access of individuals such as vendors who may be required to support a system in the data center, but do not have a card that permits them access and provide escort while on site.
* A video surveillance system is in place to monitor the main data centers. This system is managed and monitored by physical security and operations personnel.

*Environmental security is integral at each data center. All data centers are equipped with smoke and heat alarm systems, water sensors, fire suppression systems, fire extinguishers, emergency lights, air conditioning, humidity control systems, and backup power (UPS and Emergency Generators). UAB/UABHS has comprehensive provisions for Business Continuity and Recovery Systems. UAB contracts with third party vendors for rapid emergency equipment shipping and are currently implementing a “hot site” alternative-processing center. Supplemented by on-site technical and administrative personnel, this solution will facilitate the exercise of a recovery plan, thus enabling the institution to rebound from an unplanned outage should a critical IT disruption occur.*

**Data Security Plan**

Each CCTS Partner Network site maintains a unified and comprehensive privacy and information security program that protects the confidentiality, availability, and integrity of all information assets (i.e., patient, research, customer, and business data). In addition, the CCTS is committed to providing an IT environment focused on ensuring compliance with all applicable laws, regulations, and guidelines for investigators at all Partner institutions. The information security environment maintained by each institution is described in the Institutional Resources section of this proposal. Generally, these security programs are the responsibility of the institution and its health system IT office working as necessary with institutional personnel to provide the required services and resources. Below we describe in general, the environment that all CCTS institutions provide to protect the security and privacy of human subject research data, and more specifically, the environment available at the UAB hub.

* ***Policies, Standards, and Controls:*** Review and consolidation of existing security policies and requirements is a continual process, involving individuals from each Partner and their respective health system. Information security policies establish controls based on educational and research needs, patient care, governmental guidelines, and other best practices. Data security controls are a part of IRB review as well. Each health system follows HIPAA policies and undergoes review by the Joint Commission on Accreditation of Healthcare Organizations. Each academic organization complies with Family Educational Rights and Privacy Act controls for student information. Every Partner institution dealing with PHI has an appointed HIPAA Entity Security and Privacy Officer. Compliance with IT Security policies and local and federal laws and regulations is further ensured through review by each institutional health system and its internal audit organization. UAB has also adopted the NIST Risk Management Framework (NIST SP 800-37) – a security life cycle approach that consists of Categorization, Selection, Implementation, Assessment, Authorization and Monitoring, as the basis of its Information Security Program to ensure compliance. In addition to HIPAA requirements, the Federal Information Security Management Act of 2002 (FISMA) requires a minimum set of security controls and protection of the sensitive data created, stored, or accessed by either the federal government or any entity on behalf of the federal government. Investigators will work with the CCTS, Office of Sponsored Programs, IRB, and UAB-IT to identify how the information and information systems detailed in their grants and contracts have been categorized by NIH or other federal agencies to determine the level of control needed meet the required security and privacy standards. UAB-IT has established policies (uab.edu/it/home/policies/data-classification/data-protection-rule ) and provides guidance to investigators (uab.edu/it/home/policies/data-classification/restricted-data ) to help with this assessment and with meeting any requirements. Security categorization provides a structured way to determine the criticality and sensitivity of the information and to assign a security impact value (low, moderate, high) to meet the objectives of confidentiality, integrity or availability. Once the overall security impact level of the information system is determined, an initial set of security controls is selected from the corresponding FISMA or HIPAA standards.
* ***Implementation, Management, and Enforcement:*** All Partners working with clinical data also have HIPAA-compliant data processing facilities to support their research needs. At UAB, to ensure that these systems continue to protect patient privacy, adhere to updated or new standards, and meet the needs of investigators, UAB-IT and HSIS of regularly review technical standards and revise policies and procedures as necessary. The CCTS also supports training for investigators handling covered research data to familiarize them with the data security plan as well as the use of the RDE to store and process their own datasets. We will also work with IRB staff and Board Members to ensure that they have the knowledge necessary to support their review of the data security requirements of each covered study

## TRANSLATIONAL RESEARCH INFRASTRUCTURE

**Core Facilities**

UAB's shared Core Facilities offer state-of-the-art instruments, resources and technologies that are beyond the reach of the individual laboratory, available to investigators and trainees throughout the Hub and Partner Network research enterprise. Scientific capacities that include animal models, biomolecular analysis, imaging, genomics, proteomics and metabolomics, exercise medicine, structural biology, biological sample repositories and many others are available to CCTS investigators to support fundamental and translational research.

UAB Institutional Research Core Program (IRCP): The Institutional Research Core Program was created to promote the development and operation of outstanding Core Facilities that can serve the needs of UAB investigators. The IRCP boasts 15 Institutional Research Core facilities. The program is designed to provide assistance to Cores in developing sound business plans, preparing, and implementing robust standard operating and quality assurance procedures, providing customer-focused service to facilitate the advancement of research and scholarship, and to assist in maintaining the financial stability of the core.

**The Current IRCP Cores:**

* *Advanced Materials Characterization*
* *Animal Behavioral Assessment*
* *Bio-Analytical Redox Biology (BARB) Core*
* *UAB Biological Data Sciences (U-BDS)*
* *Cryo-Electron Microscopy Facility*
* *Flow Cytometry and Single Cell Core Facility*
* *Genomics Core Laboratories*
* *High Resolution Imaging Facility*
* *Human Imaging*
* *Macromolecular Structure Core*
* *Mass Spectrometry and Proteomics*
* *Metabolism Core*
* *Microbiome Core*
* *Mixed Methods Research-Community Based Participatory Research-Qualitative Research Approaches (MMR-CBPR-QR)*
* *Nuclear Magnetic Resonance*
* *Preclinical Imaging*
* *Research MRI*
* *Small Animal Imaging Shared Facility (SAIF)*
* *SDH Core*
* *Transgenic & Genetically Engineered Models (TGEM)*

**Select examples of research cores at the Hub:**

* ***Animal Behavioral Assessment Core***: The Behavioral Assessment Core provides a facility for the behavioral testing of mice and rats. Newly created transgenic mice can be analyzed using the most-accepted battery of behavioral tests, the SHIRPA (Rogers et al. 1997). This battery will include a primary neurological screen, sensory and motor test (including rotarod, spontaneous locomotor activity, walking coordination, etc.), an open field test for emotional and exploratory activity, and an elevated plus maze for anxiety. Motor function testing is available, and cognitive testing is provided with the Morris water maze, Barnes maze, hole board maze and eight-arm radial maze tasks. Other, more complex, tasks are also available.
* ***Flow Cytometry and Single Cell Core Facility***: Comprehensive Flow Cytometry Facility provides state-of-the-art equipment and services for UAB investigators to advance basic and clinical research.
* ***Genomics Core Laboratories***: The Genomics Core Laboratory has the capability of performing standard fluorescent and Next-Generation Sequencing (NGS), high and low throughput custom genotyping from 1 SNP to more than 5 million SNPs.
* ***High Resolution Imaging Facility***: The High-Resolution Imaging Facility (HRIF) provides state-of-the-art imaging resources and technical support to the UAB community.
* ***Human Imaging Shared Facility***: The Human Imaging Shared Facility (HISF) provides advanced medical imaging resources and services in support of campus wide research, including the O’Neal Cancer Center clinical studies.
* ***Macromolecular Structure Core***: Cryo-EM and X-ray crystallography are complementary techniques that work in concert to resolve mechanistic aspects of biological processes. The MSC addresses the needs of investigators for both XRC and Cryo-EM in one unified core facility.
* ***Mass Spectrometry/Proteomics Shared Facility***: Mass Spectrometry/Proteomics Shared Facility provide state-of-the-art capabilities and training in mass spectrometry, proteomics, and bioanalytic technologies to support the research needs of UAB Cancer Center members.
* ***Metabolism Core***: Metabolism Core provide state-of-the-art assessments of human energy expenditure, substrate metabolism, body composition, body fat distribution, and bone quality.
* ***Microbiome Core***: The UAB Microbiome Core provides 16S rRNA gene sequencing of fecal and other biological samples for microbiome analysis.
* ***Nuclear Magnetic Resonance***: The NMR Facility consists of seven NMR spectrometers located in six research laboratories in UAB’s Department of Chemistry building. The facility is designed to allow researchers direct 24/7 access to all spectrometers. It also provides NMR expertise for researchers needing NMR data through submitted samples, either on a service basis or as part of a collaborative research project.
* ***Preclinical Imaging Shared Facility***: The Preclinical Imaging Shared Facility supports multimodality imaging in preclinical models to accelerate the translation of basic research to human trials. Imaging conducted in the facility currently provides rapid, repeated, accurate, and cost-effective evaluation of new cancer treatments in preclinical models, using the most sophisticated technologies available.
* ***Research MRI Core***: Research MRI provides resource at UAB for state-of-the-art MRI neuroimaging experiments and analyses for examining brain and body anatomy and function both in health and disease.
* ***UAB Biological Data Science Core (U-BDS)***: The UAB Biological Data Science Core (U-BDS) offers access to computational biology capabilities. This newly founded Institutional Research Core provides services supported by Masters and Ph.D. level scientists who are experts in Computational Biology and Biomedical Data Sciences.
* ***UAB Transgenic & Genetically Engineered Models Core (TGEMs)***: UAB Transgenic & Genetically Engineered Models Core include the production of mouse models using gene targeting and DNA and ES cell injection methods. Our most recent service is in creating gene knockouts using the TALEN and CRISPR/Cas9 nucleases in mice, rats, and zebrafish.

**Biomolecular Analysis*:*** To assist in the characterization of molecular interactions, signal transduction pathways and other fundamental analyses, Core expertise and technology are available to help define mechanisms of action and clinical and translational applications of research discovery.

* ***Pharmacokinetic and Pharmacodynamic Shared Facility***: The PK/PD Shared Facility offers pre-clinical and clinical trial design to support sample analyses for drug and metabolite quantitation as well as PK/PD determinations. Data analysis and interpretation is also available.
* ***Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) Expression Core:***The CFTR assists investigators interested in CF with the complex technology necessary to efficiently express CFTR in experimental systems. It maintains a repository of reagents for studying CFTR, including over 50 constructs containing mutations that lead to disease and CFTR plasmid molecules used as part of gene therapy protocols in CF patients in the past. Expertise is available to assist with expression using vaccinia, adenovirus or other methodologies and to detect expression using antibody directed against CF related gene products.
* ***Islet Resource Facility***: The Islet Resource Facility provides state-of- the art islet isolation and in vitro/in vivo assessment of functionality. The Islet Resource Facility is equipped to process human and non-human tissues and isolating islets. A complementary facility, the Beta Cell Biology Core assists investigators with islet morphology and measurements of whole pancreas beta cell mass, whole pancreas insulin content, whole pancreas beta cell morphometry, and whole pancreas islet visualization (stitching).
* ***UAB Vector Production Facility****:* The UAB Vector Production Facility provides the UAB translational research community with the capability of producing viral vectors and cell-based proteins in compliance with current Good Manufacturing Practices (cGMP) for FDA-directed preclinical studies and early phase human clinical trials of cancer.
* ***Tissue and Immunopathology Core Facility****:* The Tissue and Immunopathology Core Facility has extensive experience in collecting, processing, storing/banking, and distributing a wide range of cancer-related tissues. The Core has established a bank of well characterized tumor specimens and matching normal/control specimens from patients who have given informed consent for their tissues to be used in genetic and other types of research so tissue can be supplied to investigators along with clinical data including outcome and familial histories of ovarian, breast, and related tumors. Fresh, frozen and paraffin preparations of tissues can be supplied as well as unstained tissue slides, tissue matrix arrays, microdissection and other histology services. The Core also provides light microscopic and immunocytochemical interpretation of animal and human tissues and cytologic materials including methods to detect gene products within transfected cells and adjacent tissues.
* ***Multidisciplinary Molecular Interaction (Biacore) Core (MMIC)***: The MMIC uses a GE Biacore T200 optical biosensor to detect biomolecular interactions of proteins, nucleic acids, carbohydrates, and lipids. Characterization of interactions includes binding specificities, kinetics, affinity, concentration and epitope mapping.
* ***Targeted Metabolomics and Proteomics Laboratory (TMPL):*** TMPL is organized to provide a variety of analytical and technical services using mass spectrometry to UAB and consortium investigators.  The laboratory is well equipped to analyze the metabolome, including a triple quadrupole instrument (SCIEX 4000) and a quadrupole-linear ion trap instrument (SCIEX 6500Qtrap), both of which have been combined with microflow LC systems to improve analyte sensitivity. The SCIEX 6500Qtrap is fitted with a SelexION interface for performing ion mobility separations of isomeric species. In addition, there is a quadrupole-TOF (SCIEX 5600 TripleTOF™) which is combined with nanoLC to carry out highly quantitative and comprehensive SWATH analysis of proteins. The SCIEX 5600 TripleTOF™ is also particularly powerful for comprehensive and targeted lipidomics and metabolomics.  These technologies are instrumental in characterizing host molecules, those coming from the diet and those produced by bacteria. The latter represent the link between the microbiome and chronic diseases such as cancer, diabetes, neurodegeneration and obesity. TMPL also offers training in data analysis, particularly for statistical evaluation of the data obtained from comprehensive analyses.
* ***Southeastern Biosafety Laboratory (SEBLAB)****:* Southeastern Biosafety Laboratory is a 43,500 s.f. facility that 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.

**UAB Heflin Center Genetics/Genomics:** The Heflin Center for Genomic Sciences (HCGS) was founded in 2002 as a University Wide Interdisciplinary Research Center (UWIRC) with the goal of enhancing resources to enable UAB investigators to incorporate genetic and genomic approaches in their research. UAB cores support fundamental, routine capacities in sequencing and genotyping, DNA Sequencing as well as leading-edge technologies in next-generation genomics on a low-throughput scale to establish proof-of-concept among a broad research portfolio.

* ***Laboratory*:** The Genomics Core is dedicated to basic and applied research in genomics and genetics.  The Core, which opened in 2001, is housed on the fourth floor of the Kaul Human Genetics Building and the facility is well-equipped state-of the-art laboratories. The Core laboratory is 2,500 square feet in area and has bench and desk space for all the staff required to run the facility and all the standard equipment for molecular biology, genetics, and genomics work, including several PCR machines, refrigerators, freezers, centrifuges, incubators, water baths, etc. The Core provides the necessary expertise in Next-Generation Sequencing library production. To that end, the core has the Covaris S2 sonicator to randomly shear genomic DNA for whole genome-based library production that is housed in a separate room on the 4th floor of the Kaul building.  The core utilizes an Illumina NextSeq500 and a MiSeq Next-Generation sequencing systems from Illumina to generate NGS related data. The Genomics Core Laboratory has the capability of performing standard fluorescent and Next-Generation Sequencing (NGS), high and low throughput custom genotyping from 1 SNP to more than 5 million SNPs, whole genome linkage and association studies, targeted and whole genome gene expression, and targeted and whole genome assays.  In addition, the core can also process Illumina genotyping microarrays for SNP and methylation-based studies.  Finally, the core is the provider of Sanger sequencing data of individual clones for campus.
* ***Computer*:** UAB IT Research Computing maintains high performance compute and storage resources for investigators. UAB IT Research Computing maintains the Cheaha Supercomputer. Named after the Cheaha mountain, or Mount Cheaha, the highest natural point in Alabama. Cheaha is currently the largest and fastest supercomputer in the state of Alabama with a theoretical throughput of approximately 528 TFLOPS and consists of over 3500 CPU cores and 72 NVIDIA-P100 GPU’s. Cheaha is supported by a high-speed parallel filesystem that can store 6 PB of data (raw) interconnected by a high speed infiniband network. Cheaha is a campus resource dedicated to enhancing research computing productivity at UAB. UAB researchers use Cheaha for wide variety of research such as genomics, neuro-imaging, machine learning, statistical genetics, cancer detection etc. Cheaha is available to members of the UAB community in need of increased computational capacity.
* ***Major Equipment:***
* Illumina Next-Seq500 and MiSeq instruments for Next-Generation sequencing data.
* An Illumina iScan instrument.  Located in a dedicated equipment room adjacent pre-PCR room, the Illumina scanner includes full robotics and are staffed by a team of three dedicated technicians.
* Tecan Evo robot for liquid handling and Illumina microarray processing.
* Human EPIC Methylation bead chip from Illumina, which contains approximately 850,000 CpG sites within the human genome.
* Applied Biosystems AmpFlSTR system is used to screen 15 different small tandem repeat (STR) markers and the Amelogenin locus. This service is intended for Human Cell line identification and is for research purposes only.
* Agilent 2100 Bioanalyzer, available for the analysis of total RNA. The system can also perform quality control for NGS ready libraries.
* Roche 480 LightCycler for real-time quantitative PCR using with Taq-man or fluorescent detection.

**Animal Models:** To enable proof of principle investigation and studies of biological function / significance, model systems play an essential role in clinical and translational science.  UAB has an extensive animal resources program (UAB ARP) that provides support to the animal research community. To facilitate investigators in the identification and access of the best animal models, CCTS established, the human to animal model (H2M) consultative service, which won an AAMC innovative practices award in 2014. The H2M works closely with the UAB ARP to ensure investigators have access to cutting edge animal models and resources. The UAB ARP is accredited by the AAALAC, is registered as a research facility by the USDA, and has an Assurance of Compliance on file with the Public Health Service Office of laboratory Animal Welfare. The UAB ARP encompasses ~225,000 sf of animal housing and procedure space in 17 buildings. The program provides husbandry, veterinary care, diagnostic and research histopathology, facility and equipment management for approximately 450 animal researchers with approximately $150M in extramural funding. The average daily census of animals at UAB is approximately 28,000 cages of rodents, 2,000 aquaria of fish and 350 larger animals such as rabbits, tree shrews, pigs, ferrets, guinea pigs, and dogs. The UAB ARP has ~90 husbandry staff, 10 veterinary staff and the necessary personnel to manage the administrative, financial, safety and personnel responsibilities of the program. The UAB ARP program also has the needed support of other institutional units such as the Facilities and Maintenance, Department of Occupational health and Safety, Human Resources Management, Project Management, Police, Physical Security, Communications, and Information Technology. The following are examples of the animal cores integrated within the UAB ARP providing specialized services.

* ***UAB Animal Model Systems Facility:*** Genetically modified murine models continue to be the most tractable system to examine the role of an identified genetic variant associated with human disease, as well as creating much needed translational models for developing novel therapeutics. The facility provides expertise and technical service related to the creation of genetically modified rodent models.  The Core works with investigators to devise targeting strategies and will facilitate DNA or ES cell microinjection, ES cell gene targeting, assisted reproduction and line cryopreservation.  Additionally, it provides unique services for in vitro fertilization, embryo and sperm cryopreservation, long-term storage of cryopreserved embryos and sperm, and assistance with reproduction / re-derivation of transgenic animals.
* ***Small Animal Imaging Shared Facility:*** The Preclinical Imaging Core Facility is to support sustainable and responsive multimodality imaging in preclinical oncology models for UAB University and Medical Center investigators through advanced preclinical imaging acquisition and analysis. The facility provides a multimodality imaging approach to provide a molecular understanding of disease processes in animal models, allows for therapeutic assessment of response, supports the development of novel imaging contrast agents, and facilitates translational preclinical imaging studies precluding clinical trials. To facilitate those goals, UAB has a team of four faculty scientists (Director, three Associate Directors) whose expertise range from ultrasound imaging, magnetic resonance imaging (MRI), computed tomography (CT), nuclear imaging, including positron emission tomography (PET) imaging and single photon emission computed tomography (SPECT), and optical imaging. The team routinely collaborates with imaging scientists and non-imaging scientists to help design experiments and enable preclinical imaging in many animal models. To enable imaging data acquisition, UAB also has a staff of professionals, including an MRI-trained PhD scientist, a PET-trained PhD scientist, a core lab manager with over 20 years of preclinical imaging experience, two staff researchers, and a program administrator. Along with experimental design and acquisition, the facility also offers data analysis and image processing and secondary biological studies (associated with imaging) such as radioactive biodistributions of animal models. Importantly, many of the technologies applied are similarly applied in UAB clinical trials. The Director of the Preclinical Imaging Core (Departments of Radiology and Biomedical Engineering) has a research program centered around preclinical imaging in oncology as well as a role in translational clinical research, including clinical trials utilizing imaging, therefore will be involved in ensuring the evolution of new techniques is available in the preclinical imaging core facility. The Small Animal Imaging Facility is supported by the O’Neal Comprehensive Cancer Center and the O’Brien Center for Acute Kidney Injury Research.
* ***UAB Zebrafish Research Facility:*** The UAB Zebrafish Research Facility (ZRF) welcomes all UAB investigators and others interested in working with zebrafish. The Facility occupies ~ 5000 net square feet in the Research Support Building and includes a recirculating aquaria system (Aquaneering, Inc.) with central water conditioning/purification supplying 27 racks (>2200 3 L tanks). The ZRF Procedural Laboratory provides numerous embryo processing stations (each made of a dissection microscope, injector, and micromanipulator), incubators, a pipette puller, and two fluorescent microscopes, as well as other equipment needed for embryo manipulation and fish work. There is a separate zebrafish quarantine facility on the 4th floor of the RSB building.
* ***Small Animal Microsurgical Core:*** The UAB Small Animal Microsurgical Core Facility (UMCF) was originally established by the Departments of Medicine and Surgery in 2007 with the assistance of an HSF-GEF award to fulfill an acute need for complex rodent microsurgical services in a cost-effective and timely manner on the UAB campus. The UMCF is now supported by the P30 funded UAB-UCSD O’Brien Center for Acute Kidney Injury Research, the Nephrology Research and Training Center (NRTC) and by The Office of the Vice President for Research. Specific procedures include organ transplantation, models of ischemia reperfusion injury, cannulations, and other microvascular procedures. The core also provides customized surgical services for individual investigators. The primary function of this core is to provide access to complex small animal microsurgical procedures for investigators in a cost-effective and timely manner. The core also offers the use of surgical workstations, which consist of ARP-approved laminar flow hoods, microscopes, an isolation room, and gaseous anesthesia delivery systems. The facility is located on the 6th and 9th floors of the Zeigler building with ancillary space on the fourth floor of the Lyons-Harrison building. There are three operating rooms on the 9th floor. Two of these (200 sq. ft. each) include an operating microscope and a videocapture/recording system that is used for documentation and for teaching purposes. The third room (400 sq. ft.) is dedicated to open and low complexity procedures (nonsurvival surgeries or terminal tissue acquisition). The 6th floor location occupies about 400 sq. ft. of space. This is used in conjunction with primary cell culture isolations performed in a separate space (~900 sq. ft.) on the 4th floor of the Lyons Harrison Building. Animal housing is located on the 8th floor of the Zeigler Building By providing critical pre-clinical research capabilities, the UMCF serves as a unique venue for collaborations among investigators across unit boundaries on the UAB campus and around the country.
* ***Animal Physiology Core Facility:*** The Animal Physiology Core (APC) provides for diabetes related phenotyping in small animal models. Services offered include the assessment of body composition, energy balance, glucose homeostasis, and transgenic animals models. The core takes comprehensive assessments of metabolic rate (indirect calorimetry), food intake, fecal output, activity, and body temperature. The facility also performs whole-body composition analysis by chemical carcass analysis, dual-energy X-ray absorptiometry (DXA), quantitative magnetic resonance (QMR), and micro-computed tomography (µCT) It can also facilitate animal imaging including bioluminescence and fluorescence imaging, gamma ray imaging, SPECT/CT, microPET/CT, bioluminescence, fluorescence, magnetic resonance (MR) imaging and ultrasound imaging. This technology has been used to detect tumor location and mass, receptor expression (tumors, brain, etc.), organ function, metabolism, perfusion, and response to therapy.
* ***Behavioral Assessment Core:*** The Behavioral Assessment Core provides a facility for the behavioral testing of mice and rats. Newly created transgenic mice can be analyzed using the most-accepted battery of behavioral tests, the SHIRPA (Rogers et al. 1997). This battery will include a primary neurological screen, sensory and motor test (including rotarod, spontaneous locomotor activity, walking coordination, etc.), an open field test for emotional and exploratory activity, and an elevated plus maze for anxiety. Motor function testing is available, and cognitive testing is provided with the Morris water maze, Barnes maze, Hole board maze and eight-arm radial maze tasks. Other, more complex, tasks are also available. The Managing Director can also assist investigators in the development of tools/testing methods that are needed by them for a more detailed assessment of specific behaviors or behavioral deficits.
* ***Gnotobiotic Mouse Core:*** The UAB Gnotobiotic Mouse Core facility (GMC), provides gnotobiotic animal services to UAB investigators. These services include access to existing gnotobiotic mouse models, assistance in developing new gnotobiotic models, and transplantation of human and mouse archived microbiota. GMC staff have extensive experience in derivation and maintenance of gnotobiotic mice. Since our establishment in 2002, we have derived 18 different genotypes of mice and have colonized and maintained mice with various limited microbiota and human intestinal microbiota. The facility employs two highly capable full-time gnotobiotic technicians and occupies over 1,700 sq. ft. on the 9th floor of the Zeigler Research Building. The facility has dedicated high-vacuum autoclave; new heating, ventilating, and air-conditioning (HVAC) system, high-efficiency LED lighting, and emergency backup electrical service. Housing for gnotobiotic mice includes 10 Trexler-type plastic film isolators, 28 30" Park Bioservices semi-rigid isolators, and 16 Park Bioservices MiniQ™ semi-rigid isolators, for a total of 54 isolators for breeding and experiments. We also have two 70-cage Tecniplast Isocage™ positive pressure isolation cage systems, which are used for short-term experiments such as housing mice colonized with human microbiota.

**Imaging:** These facilities offer pre-clinical research support with a range of cutting-edge imaging modalities and assistance with protocol development and analyses. The resources are available to CCTS Partner network investigators, trainees and partners. These core capacities support imaging across the research spectrum.

* ***High Resolution Imaging Facility:***The High Resolution Imaging Facility (HRIF) is a cutting-edge facility providing a variety of microscopy services for UAB Scientists. The HRIF supports research by offering access to a comprehensively equipped Shared Resource. Available are confocal laser scanning microscopy, transmission and scanning electron microscopy, Ca2+ imaging, FRET, FRAP, and FLIM imaging, 3d time lapse with extensive digital analysis for cell fluorescence quantification, colocalization and image processing, Imagestream, high throughput fluorescent imaging, Nanosight system for studying exosomes and nanoparticles, and a laser capture microdissection system. In addition, the facility offers STORM and SIM super resolution imaging capability.
* ***Civitan International Neuroimaging Laboratory:*** The Civitan International Neuroimaging Laboratory (CINL) is located on the first floor of UAB Highlands Hospital in a newly renovated 5000 sq. ft. suite. It houses a research dedicated Siemens Prisma 3T whole body scanner for structural and functional brain and body imaging, MRI preparation rooms and interview rooms for pre- and post-scan patient monitoring and testing, and a fully-equipped experimental suite for behavioral and physiological recording. Research equipment is housed in a dedicated room adjacent to the scanner room with a dedicated research penetration panel. The Siemens MAGNETOM Prisma MRI Scanner offers a 3T whole body MRI platform for the highest quality MRI research. Its design delivers maximum performance under prolonged high-strain conditions. Unmatched 3T full body magnet homogeneity, XR 80/200 gradient coil, parallel transmit architecture for shaped excitation and B0 shimming, and at-the-scanner 64 channel receiver architecture.
* ***Advanced Imaging Facility and UAB Cyclotron Facility:*** The UAB Cyclotron Facility enables a broad scope of research and cutting-edge patient care through initiatives ranging from novel isotope production to developing and supplying state-of the art molecular imaging agents for clinical trials and routine patient care. Isotope production at the UAB Cyclotron facility is enabled by our TR24 cyclotron capable of variable energy proton acceleration. Four target stations allow for versatile isotope production through a variety of different production routes. UAB’s cyclotron is in immediate proximity to our cGMP radiochemistry facility and nuclear pharmacy. Additionally, it is in proximity to the UAB Advanced Imaging Facility equipped with two TOF-PET/CT’s and the only PET/MRI in the state. In addition to the production of commonly used PET radioisotopes such as fluorine-18, carbon-11, and nitrogen-13 we specialize in the production and shipping of unique radiometals for clinical and preclinical use. The UAB Cyclotron Facility makes use of faculty chemistry expertise in isotope production and the radiosynthesis of novel molecules to bring new agents online in a timely fashion. Collaborations with basic scientists in Chemistry, Biochemistry and Biomedical engineering are also ongoing. Molecular imaging is a powerful technique that can be applied to basic, translational, and clinical research as well as to routine patient care. Molecular imaging allows spatial localization and quantification of biological processes such as metabolism, enzyme activity, cell proliferation, receptor density and cellular transport that are not readily assessed with conventional anatomic imaging techniques. The Cyclotron Facility positions UAB to be a leader in molecular imaging and enables new research and clinical endeavors directly relevant to UAB’s mission.

The UAB Cyclotron Facility serves as a key resource for the UAB community, the Southeast, and, for some applications, the entire United States. Through collaborations with clinical faculty and preclinical and basic researchers, we aim to maintain a program which operates in close synergy with other investigators at UAB. The Cyclotron Facility provides human use radiopharmaceuticals to investigators with programs in molecular imaging and educates potential new investigators about the use of molecular imaging in their research. The Cyclotron Facility also provides physicians and patients at UAB with access to molecular imaging tracers not available at most other centers in the United States. The facility leverages existing strengths in the UAB Cancer Center in immunology and experimental therapeutics to enable the use of molecular imaging for personalized medicine. Pilot projects establish the techniques and are used for materials for outreach to other investigators. The development and application of diagnostic molecular imaging agents directly coupled to therapy is a major emphasis. The Cyclotron Facility provides clinicians in Neurology, Psychiatry, and related fields as well as neuroscientists at UAB access to the tools needed for molecular neuroimaging in disease models and patients. Tracers include amyloid, tau and neuroinflammation imaging agents that are revolutionizing our understanding of Alzheimer’s disease and other neurodegenerative processes. The availability of molecular imaging agents adds a new dimension to already strong clinical and research programs centered on neurological diseases and neuroscience. Cardiovascular imaging at both the preclinical and clinical levels benefit from molecular imaging agents available through the Cyclotron Facility. In addition to tracers specific to cardiovascular applications, imaging agents already in demand by investigators at the cancer center are leveraged for use in investigating cardiovascular metabolism and other parameters of interest such as hypoxia. The Cyclotron facility at UAB makes use of existing and new faculty chemistry expertise in isotope production and the radiosynthesis of novel molecules to bring new agents online in a timely fashion. Collaborations with basic scientists in Chemistry, Biochemistry and Biomedical engineering are also ongoing.

**Structural Biology:**A comprehensive structural biology capacity at UAB has been developed, leveraging the robust expertise and technological investment to enable high resolution microscopy and proteomics, including mass spectrometry, post-translational modification analysis, X-ray crystallography and high-field NMR. Together, these bioanalytical resources are a critical feature available to the biomarker and drug-discovery initiatives.

* ***Mass Spectrometry/Proteomics (MSP) Shared Facility (SF):*** The Institutional UAB & CCC MSP-SF provides a variety of analytical and technical services using mass spectrometry to UAB investigators. The UAB O’Neal Comprehensive Cancer Center Mass Spectrometry/Proteomics (MSP) Shared Resource (SR) is a research resource that provides services to UAB O’Neal CCC members to identify, characterize, and quantify proteins, and protein post-translational modifications isolated from cells, biological fluids, and tissues. The over-arching goal of the MSP-SF is to provide state-of-the-art capabilities and training in mass spectrometry, proteomics, and bioanalytic technologies to support the research needs of UAB Cancer Center members. Standard workflows include 1) help with experimental design, 2) complete sample preparation, 3) quantitative high-resolution MS driven proteomics, 4) in addition to advanced informatics, statics, and systems biology analysis.  In addition to standard sample preparation and separation equipment, the Facility is also equipped with multiple high-end MS systems: two LTQ Orbitrap Velos Pro’s, two LTQXL’s with CID & ETD, and an Ultraflex III MALDI TOF/TOF. All of these instruments are paired with updated UPLC’s and nano-HPLC systems, in addition to software tools that include MASCOT, MASCOT Distiller, SEQUEST, and Proteome Software (Scaffold, Scaffold PTM, and Q+S modules) to offer the very best outcomes for a wide range of proteomics-driven procedures.
* ***UAB Central Alabama High Field NMR Facility:*** The UAB High-Field NMR Facility is one of the best equipped and state-of-the-art NMR facilities in the Southeast and provides instrumentation and expertise for elucidating the structure and dynamic behavior of macromolecules, perform solution metabolite analysis, and characterize small molecule structure and binding. The NMR Facility consists of seven NMR spectrometers located in six research laboratories in UAB’s Department of Chemistry building. The facility is designed to allow researchers direct 24/7 access to all spectrometers. It also provides NMR expertise for researchers needing NMR data through submitted samples, either on a service basis or as part of a collaborative research project. The NMR Facility is an essential university-wide resource dedicated to supporting structural biology and drug discovery, and to making this powerful analytical technique available to researchers throughout UAB and elsewhere in the scientific community. It provides unique training opportunities for faculty, staff, and students on the application of NMR spectroscopy for their research. The facility provides enables analysis of molecular interactions critical for both understanding basic mechanistic structures and using that information to refine potential therapeutics for a variety of diseases.  The facility is equipped with Bruker 600 (Avance III), 700 (Avance II), and 850 (Avance III) MHz NMR spectrometers with cryoprobes. In addition, a 500 MHZ Bruker Avance NMR Spectrometer with TXI and TBI probes is also available.
* ***X-ray Crystallography Shared Facility:*** Cutting-edge technology and expertise are available to study protein-protein/ligand interactions using differential scanning, isothermal calorimetry, and surface plasmon resonance.  High-throughput aqueous and membrane protein crystallization robots, protein crystallization imagers, high throughput crystal growth optimization and structure determination via in-house or national synchrotron x-ray systems.
* ***Cryo-Electron Microscopy:*** The Cryo-Electron Microscopy Facility provides capabilities for high-resolution electron microscopy and tomography of stained and unstained specimens. Cryo-EM allows the observation of biological samples in their native environment, in the absence of the distortions and artifacts associated with traditional sample preparation methods, and is suitable for proteins and protein complexes, viruses, fibers, liposomes and intact prokaryotic cells up to about 1µm thickness. A recent upgrade to the Gatan K2 direct electron detector and SerialEM automated acquisition software enables near-atomic resolution imaging for suitable specimens as small as 150 kDa. The facility is equipped with an FEI Tecnai F20 FEG microscope and is located in the basement of Shelby Biomedical Research Building (SHEL B40). An FEI Vitrobot, a Leica cryo-ultramicrotome, lab space for sample preparation and a dark room for film processing are available.

### Data Resources Available To CCTS Investigators, Scholars, And Trainees

**Medicare, Medicaid, and Administrative Databases from Private Insurers:** CCTS HUB faculty have considerable experience in managing and analyzing the Medicare 5% sample and (50 state) Medicaid (MAX) data. Work to date has predominately focused on the epidemiology of osteoporosis, bone mass measurement, the longitudinal comparative effectiveness and safety of biologic medicines, and the prevention and treatment of cardiovascular disease. The data management and analysis team includes 14 faculty members in the Schools of Public Health and Medicine, supported by a senior systems analyst, 2 senior statisticians, and 19 statistician/analysts. Data management and analysis tasks and resolution of study design and statistical analysis issues are coordinated through monthly Medicare/Medicaid Data Group meetings, attended by investigators and project staff and weekly meetings dedicated to specific projects.

* CMS encourages researchers to use its diagnosis and treatment database. The Medicare ID returned on this file is an encrypted ID that contains no identifying information including no component of the SSN. The encryption is uniquely created for this proposed study and does not correspond in any way to Medicare data obtained for other studies. CMS has well established, secure procedures for linking research subjects’ identifiers to Medicare files for purposes such as this. They uniquely encrypt IDs for each project. Thus, the Medicare data received cannot be combined with Medicare data from any other source or project without CMS assistance.
* One strength of Medicare and Medicaid is that the computerized pharmacy records provide an objective, detailed, high-quality, and relatively low-cost measure of drug exposure. Inpatient, outpatient, nursing home, and other files provide information on outcomes and other important study variables. Although the limitations of these data always must be considered, Medicare and Medicaid databases have long been recognized as an essential resource for pharmacoepidemiology and health services research.
* Data security and integrity is accomplished by a combination of hardware and software protocols. Comodo and Microsoft firewall software packages are used to prevent access from unauthorized computers. Microsoft Forefront is used to provide anti-virus protection. Access to the server is restricted to computers located on the UAB campus with specific IP addresses. Data containing individually identifiable data are stored in encrypted, password-protected datasets that can only be accessed through a Remote Desktop Connection to the server. Data integrity is accomplished by a nightly backup routine and by replicating the data to a secure, off-site server. The UAB Office of Internal Audit conducted an audit of the facility where the data are housed. Based on their recommendations, additional security protocols were implemented, and the User Authorization Agreement was amended to reflect stricter CMS guidelines. The auditor was pleased with the attention to detail and also gave suggestions for maintaining a secure environment. All project personnel are required to have current IRB and HIPPAA training and will be signatories to Data Use Agreements in order to access any research identifiable data.

**Coronary Artery Risk Development in Young Adults (CARDIA):** The Coronary Artery Risk Development in Young Adults (CARDIA) Study is a study examining the development and determinants of clinical and subclinical cardiovascular disease and their risk factors. The participants were selected so that there would be approximately the same number of people in subgroups in each of 4 centers: Birmingham, AL; Chicago, IL; Minneapolis, MN; and Oakland, CA. These same participants were asked to participate in follow-up examinations during 1987-1988 (Year 2), 1990-1991 (Year 5), 1992-1993 (Year 7), 1995-1996 (Year 10), 2000-2001 (Year 15), 2005-2006 (Year 20), 2010-2011 (Year 25), and 2015-2016 (Year 30). A majority of the group has been examined at each of the follow-up examinations (91%, 86%, 81%, 79%, 74%, 72%, 72%, and 71%, respectively). While the specific aims of each examination have varied, data have been collected on a variety of factors believed to be related to heart disease. These include conditions with clear links to heart disease such as blood pressure, cholesterol and other lipids, and glucose. Data have also been collected on physical measurements such as weight and body composition as well as lifestyle factors such as dietary and exercise patterns, substance use (tobacco and alcohol), behavioral and psychological variables, medical and family history, and other chemistries (e.g., insulin). In addition, subclinical atherosclerosis has been measured via echocardiography during Years 5, 10, 25, and 30, a chest CT scan during Years 15, 20, and 25, an abdominal CT scan during Year 25, and carotid ultrasound during Year 20. A brain MRI was performed on a subset of participants at Years 25 and 30. The CARDIA cohort, born between 1955 and 1968, has been influenced substantially by the obesity epidemic at ages younger than participants in other established NHLBI cohorts. Further investigation of the mechanisms linking obesity to derangements in cardiovascular structure and function and the etiology of clinical events promises to generate important new knowledge to inform health promotion and disease prevention efforts.

While the specifics of each examination have differed somewhat, data have been collected on a variety of factors believed to be related to heart disease. These include conditions with clear links to heart disease such as blood pressure, cholesterol, and other lipids. Data have also been collected on physical measurements such as weight and skinfold fat, as well as lifestyle factors such as substance use (tobacco and alcohol), dietary and exercise patterns, behavioral and psychological variables, medical and family history, and other chemistries (e.g., insulin and glucose). In addition, subclinical atherosclerosis was measured via echocardiography during Years 5 and 10, computed tomography during Years 15 and 20, carotid ultrasound during Year 20, and Brain MRI during Years 25 and 30. Lewis and K. Saag have mentored trainees using CARDIA data.

**REDCap (Research Electronic Data Capture):** REDCap (Research Electronic Data Capture) is a secure, web application designed to support data capture for research studies, providing user-friendly web-based case report forms, real-time data entry validation (e.g. for data types and range checks), audit trails and a de-identified data export mechanism to common statistical packages (SPSS, SAS, Stata, R/S-Plus). REDCap also provides a powerful tool for building and managing online surveys. The research team can create and design surveys in a web browser and engage potential respondents using a variety of notification methods. REDCap data collection projects rely on a thorough study-specific data dictionary defined in an iterative self-documenting process by all members of the research team with planning assistance from the system owner. The iterative development and testing process results in a well-planned data collection strategy for individual studies. REDCap provides a secure, web-based application that is flexible enough to be used for a variety of types of research, provide an intuitive interface for users to enter data and have real time validation rules at the time of entry. The system was developed at Vanderbilt University but is now part of an international and multi-institutional consortium which includes The University of Alabama at Birmingham (UAB). REDCap has been disseminated for use locally at other institutions and currently supports 4296 academic/non-profit consortium partners in 137 countries on six continents and over 927K projects with 1.3M research end-users, 10,357 articles utilizing REDCap have been published.

**Survey Research Unit (SRU):** The mission of the SRU is to provide scientifically valid survey results for clients to reach their research goals and objectives. SRU data has been published in over 300 peer-reviewed journals and used in presentations and posters for scientific conferences. The SRU conducts approximately 40,000 surveys annually for UAB investigators, local and state health departments, and other state and national agencies. Services include survey design, sample design, computer-assisted telephone interviewing (CATI), and field survey research. With a well-trained, IRB-certified staff of 80 interviewers, the SRU can conduct large-scale data collection projects. SRU provides professional assistance for all stages of survey research such as data collection, data entry, pilot studies, presentations, program evaluation, report preparation, sample design, and survey design. SRU staff combines a broad knowledge of advanced survey methodology with extensive experience in project management to offer services such as CATI(computer-assisted telephone interviewing), face-to-face surveys, field surveys, focus groups, mail, fax, or web-based surveys. Developments are underway for smartphone app data collection.

**COVID Enterprise Biorepository and Registry:** Working with the Division of Infectious Diseases, Departments of Microbiology and Pathology, as well as other UAB divisions and departments and coordinated by the CCTS, the IRB has endorsed an Enterprise Research Platform for COVID-19 to shepherd the safe and efficient consent process and collection of specimens and clinical data, which is ongoing. The COVID-19 Enterprise Biorepository is approved to collect a wide-variety of specimens, including research-specific samples as well as remnant clinical and autopsy specimens. CCTS Informatics, with the Center for Outcomes & Effectiveness Research and multiple schools, is coordinating clinical data and longitudinal follow-up for rigorous secondary analysis that ensures efficient and respectful engagement of research participants. In addition, the COVID-19 Collaborative Outcomes Research Enterprise (CORE) is leading the initial and longitudinal data collection and information curation to support a broad set of research goals. Through the CORE, investigators benefit from the permissions established by the COVID-19 Enterprise Research Platform to use clinical data (HIPAA Limited and Detailed Data Sets), to access protected health information and to allow longitudinal follow up. This new Enterprise Platform will serve to anchor and enable all COVID-19-related human subjects research across the campus.

**(ENCOURAGE): Evaluating Community Peer Advisors and Diabetes Outcomes in Rural Alabama:** ENCOURAGE is a group-randomized, controlled implementation trial in partnership with the UAB DRTC and established community coalitions. Diabetes is highly prevalent in the South and rural residents have a higher incidence of negative outcomes. This cluster randomized trial was conducted to determine if volunteer peer support added to diabetes education is superior to education alone in improving diabetes outcomes. It is designed to improve diabetes health outcomes in adult patients (> 18 years of age) with uncontrolled diabetes living in Alabama’s rural region. Peer advisors with diabetes or familiar with its management will counsel and link patients to clinical care and community resources. Part of the 12-month, weekly intervention for 8 weeks, followed by monthly contacts for the remainder of the year, is empowering/activating patients to self-manage their diabetes. Four community coordinators, 36 peer advisors, and 424 research participants were enrolled for the full study. The infrastructure established through the initial study has led to four additional projects. The first is examining the cost-effectiveness of using peer advisors. The second will assess peer support intervention for patients with diabetes and chronic pain. The third will examine peer advisor roles and integration into a larger health care team. Finally, investigators will look to implement the program in Birmingham. All of these projects will provide junior investigators with the opportunity to conduct research in disadvantage areas and engage both patients and other community stakeholders in research.

**The Osteoporotic Fractures in Men (MrOS) Study:** The Osteoporotic Fractures in Men (MrOS) Study (Lewis, CE PI) funded by the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), the National Institute of Aging (NIA), and the National Cancer Institute (NCI), began in July 1999. MrOS a 7-year multi-center prospective, longitudinal, observational study examining risk factors for vertebral and all non-vertebral fractures in older men, and of the sequelae of fractures in men enrolled approximately 6000 men aged 65 and older). The specific aims of the MrOS study include: (1) to define the skeletal determinants of fracture risk in older men, (2) to define lifestyle and medical factors related to fracture risk, (3) to establish the contribution of fall frequency to fracture risk in older men, (4) to determine to what extent androgen and estrogen concentrations influence fracture risk, (5) to examine the effects of fractures on quality of life, (6) to identify differences in the predictors and outcomes of fracture, (7) to collect and store serum, urine and DNA for future analyses as directed by emerging evidence in the fields of aging and skeletal health, and (8) define the extent to which bone mass/fracture risk and prostate diseases are linked. Lewis and Curtis have mentored trainees using this cohort.

**The Multicenter Osteoarthritis Study (MOST):** Knee osteoarthritis (OA) is a common chronic painful disorder that is the most frequent cause of mobility disability in older people. The MOST study has been a major source of new knowledge about the course of this disease and factors that affect its course. Since the study began in 2003, it is increasingly recognized that by the time people develop chronic symptoms of knee OA, they usually have advanced structural findings of disease on MRI. Findings such as meniscal tears, malalignment and cartilage loss drive further structural deterioration and almost certainly limit prevention opportunities. MOST investigators believe that prevention opportunities are likely to be greater if started in those who do not yet have severe continuous knee pain or advanced structural findings of disease, and that there are opportunities to develop treatments and disease prevention strategies that have been unexplored, and that by using new technologies and focusing on persons at a milder or earlier disease stage than previous studies, we can identify such opportunities. While continuing to follow the existing cohort, originally over 3000 participants, MOST is recruiting a new mild disease cohort of 1500 participants to identify new risk factors for disease and to study consequences of disease. The goal is to find new strategies to prevent disease at an early stage and to limit the impact of disease once it has occurred.

**Systolic Blood Pressure Intervention Trial (SPRINT) Study:** The University of Alabama at Birmingham serves as one of the NIH/NHLBI Clinical Center Networks (CCN; Oparil, PI; Lewis, Co-PI) and Tulane serves as one of the clinic sites (Krousel-Wood, Site-PI) for the Systolic Blood Pressure Intervention Trial (SPRINT). The Systolic Blood Pressure Intervention Trial is a multicenter, randomized, controlled trial that compares two strategies for treating systolic blood pressure: one targets the standard target of <140 mm Hg, and the other targets a more intensive target of <120 mm Hg. Enrollment focused on volunteers of age ≥50 years (no upper limit) with an average baseline systolic blood pressure ≥130 mm Hg and evidence of cardiovascular disease, chronic kidney disease, 10-year Framingham cardiovascular disease risk score ≥15%, or age ≥75 years. The Systolic Blood Pressure Intervention Trial recruitment also targeted three pre-specified subgroups: participants with chronic kidney disease (estimated glomerular filtration rate <60 mL/min/1.73 m (2)), participants with a history of cardiovascular disease, and participants 75 years of age or older. The primary outcome is first the occurrence of a myocardial infarction (MI), acute coronary syndrome, stroke, heart failure, or cardiovascular disease death. Secondary outcomes include all-cause mortality, decline in kidney function or development of end-stage renal disease, incident dementia, decline in cognitive function, and small-vessel cerebral ischemic disease. For the trial, 9361 people from 102 clinics were recruited and randomized. The major findings of SPRINT were a 25% reduction in the primary outcome and a 27% reduction in all-cause mortality. The extension of SPRINT, SPRING-ASK (Alzheimer’s, Senior and Kidney), is ongoing. Oparil, Lewis, Krousel-Wood, and Muntner are available to mentor trainees using this cohort.

**Study of Aging (SOA):** The Study of Aging is a prospective, observational study of a population-based sample of 1000 community-dwelling Medicare beneficiaries.  The results of this study were used to identify the distribution of life-space changes associated with specific events and help identify factors that moderate precipitous life-space mobility changes in community-dwelling adults aged 75 years and greater and will guide the development and testing of interventions to optimize life-space mobility in late life.

**Healthcare Cost and Utilization Project (HCUP) – HealthSouth:** The Healthcare Cost and Utilization Project (HCUP) is a family of health care databases and related software tools developed through a Federal-State-Industry partnership to build a multi-State health data system for health care research and decision making. HCUP is the Nation's most comprehensive source of hospital care data, including information on inpatient stays, ambulatory surgery and services visits, and emergency department encounters. HCUP enables researchers, insurers, policymakers and others to study health care delivery and patient outcomes over time, and at the national, regional, State, and community levels. HCUP is sponsored by the Agency for Healthcare Research and Quality (AHRQ) as part of its mission to improve the quality, safety, efficiency, and effectiveness of the Nation's health care system. HCUP databases bring together the data collection efforts of State data organizations, hospital associations, private data organizations, and the Federal government to create a national information resource of patient-level health care data. HCUP includes the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to health care programs, and outcomes of treatments at the national, State, and local market levels. The Lister Hill Center for Health Policy at CCTS HUB (Muntner, Director) has HCUP National Inpatient Sample (NIS) data through 2015.  It is available to all Lister Hill scholars and trainees through a sponsoring Lister Hill Scholar.  Kilgore has expertise and experience mentoring trainees using this data.

**Atlanta Research Data Center (ARDC):** Located at the Federal Reserve Bank of Atlanta, the Atlanta Research Data Center (ARDC) seeks to provide qualified researchers in Atlanta, and around the Southeast, with the opportunity to perform statistical analysis on non-public Census microdata. The ACRDC, established in 2011, is 1 of 8 centers in the United States and is a partnership between the U.S. Census Bureau and a consortium that includes Georgia State University, the Federal Reserve Bank of Atlanta, the Centers for Disease Control and Prevention (CDC), Emory University, Georgia Tech, the University of Alabama at Birmingham, and the University of Georgia. There are four general categories of data on which qualified researchers may perform statistical analysis inside the secure ACRDC: 1) Economic Data; 2) Demographic Data; 3) Mixed Data; and 4) Health data. The ARDC is part of a network of secure Research Data Centers located across the United States, collectively known as the Federal Statistical Research Data Centers (FSRDCs). The ARDC is managed by the Census Bureau’s Center for Enterprise Dissemination (CED). Funding for the ARDC is provided in part by the member institutions.

**OsteoArthritis Initiative (OAI):** The Osteoarthritis Initiative (OAI) is a nationwide, multi-center, longitudinal, prospective observational research study. The OAI is a public-private partnership between the NIH and private industry which has an overall aim to develop a public domain research resource to facilitate the scientific evaluation of biomarkers for osteoarthritis as potential surrogate endpoints for disease onset and progression. Osteoarthritis (OA) is the most common form of arthritis and the major cause of activity limitation and physical disability in older people. Four clinical centers and a data coordinating center conducted the Osteoarthritis Initiative (OAI), a public-private partnership that brought together new resources and commitment to help find biochemical, genetic, and imaging biomarkers for development and progression of OA. The OAI established and maintain a natural history database for osteoarthritis that will include clinical evaluation data, radiological (x-ray and magnetic resonance) images, and a biospecimen repository from 4,796 participants. The seven-year project enrolled participants who have, and those who were at high risk for developing, symptomatic knee osteoarthritis. All data and images collected is available to researchers worldwide to help quicken the pace of biomarker identification, scientific investigation, and OA drug development. Access to biospecimens is by application to the National Institute of Arthritis, Musculoskeletal and Skin Diseases (NIAMS).

**Cohort Study of Medication Adherence among Older Adults (CoSMO):** The mission of the Tulane-led Cohort Study of Medication Adherence among Older Adults (CoSMO) is to lay the groundwork for interventions to improve medication adherence and clinical outcomes in older adults with hypertension and will increase our understanding of factors contributing to therapeutic outcomes in the use of medications by these patients. The adverse impact of Hurricane Katrina led to hypertension medications and care to not be accessible, which led to PTSD and untreated hypertension patients in Katrina ravaged area codes. The CoSMO was initiated to observe the Katrina recovery and effects on untreated hypertension. The goal of Cohort Study of Medication Adherence among Older Adults (CoSMO) with essential hypertension (HTN) in a managed care setting is to investigate the multiple factors that influence antihypertensive medication adherence (via validated self-report and pharmacy fill measures). The specific aims of this cohort study are as follows:

* to assess the impact of psychosocial, behavioral, health, quality of life, function, medication class, and clinical factors measured at baseline on subsequent change in antihypertensive medication adherence over 2 years of follow-up
* to assess health care system issues (perception of primary care provider, satisfaction with access and communication), use of prescribed and over-the-counter and unconventional medications and lifestyle modifications on anti-hypertensive medication adherence and change in adherence
* to determine the relationship of antihypertensive medication adherence at baseline with future medical and psychosocial outcomes such as blood pressure control, cardiovascular disease incidence and all-cause mortality, quality of life, utilization
* to explore differences in aims 1-3
* to address these specific aims, a random sample of 2194 HTN patients > 65 years of age who met the study eligibility requirements from the pool of all hypertensive patients enrolled in a large southern managed care organization. Study participant’s medication adherence, demographic, behavioral, treatment (i.e., medication class), quality of life, duration of hypertension, psycho-social factors and perceptions of primary care provider, and satisfaction with access to care were assessed at baseline and after 1 and 2 years of follow-up via telephone-administered surveys.
* Rigorous quality control procedures have been implemented to assure high quality data. Blood pressure control, severity of hypertension, cardiovascular outcomes, healthcare utilization at baseline and follow-up have been collected. Models predicting change in medication adherence, blood pressure control, utilization, and cardiovascular events are under development. Krousel-Wood and Muntner have experience mentoring trainees using this cohort.

**Cooperative Human Tissue Network (CHTN) – Southern Division:** The CHTN was initiated in 1987 by the National Cancer Institute (NCI) Cancer Diagnosis Program to provide increased access to human tissue for basic and applied science from academia and industry to accelerate the advancement of discoveries in cancer diagnosis and treatment. The CHTN –Southern Division at the CCTS Hub is one of six member institutions funded by the National Cancer Institute to prospectively collect, process, and distribute remnant human tissue specimens to IRB-approved biomedical researchers. The CHTN operates through a shared networking system which allows investigators greater access to available research specimens. CHTN offers a variety of preparation and preservation techniques to ensure investigators are receiving the quality specimens needed for research. The CHTN operates on a unique prospective procurement model rather than a banking model and focuses on being user friendly. While a bank collects, processes, and stores specimens in a "one-shoe-fits all" approach, the CHTN staff work closely with each investigator to tailor the collection, processing, temporary storage, and distribution of tissues in order to meet his/her exact needs and to support his/her research in a timely manner. A diagnostic pathologist reviews each request and can help investigators select the proper tissues and protocols to support their research. All tissues distributed must meet quality assurance/control standards, ensuring investigators a high quality product. Remnant human tissue specimens (including normal, benign, malignant, or diseased) from routine surgical resections and autopsies are procured to the specifications of the investigator. Frozen aliquots of fluid (serum, plasma, buffy coat, urine, saliva) as well as paraffin blocks and/or slides may also be made available. Although the CHTN operates as a network, each CHTN division is responsible for primary coordination and intake of applications from investigators based upon the investigator’s geographic location. The Southern Division encompasses Kentucky and all states south and west from the Carolinas to Texas.

**Veterans Affairs (VA) Administrative Databases (inpatient, outpatient, and pharmacy datasets)**

* ***VA administrative databases (inpatient, outpatient, and pharmacy datasets):*** VA administrative data documenting utilization of care and patient characteristics are available as computerized VA administrative databases, including patient treatment file (PTF) and outpatient clinic (OPC) tables, through the Austin Automation Center, a national VA data warehouse. These data are reliable for demographics and most common diagnoses, and valid for specific diagnoses. Data are available from fiscal year 1998. The PTF covers four main categories of care: (1) acute (inpatient admissions); (2) extended (domiciliaries, VA nursing homes, or community nursing homes); (3) observation (hospital stays (generally less than 24 hours); and (4) non-VA (care funded by the VA and provided in non-VA hospitals). The OPC files have two components, visit file which contains one day’s services for a patient (date, patient demographics, codes for each clinic stop (up to 15) for the day etc.) and event file which contains one ambulatory encounter by a patient (date, appointment type (e.g., regular, employee, research), procedure done (up to 15), surgeries performed (up to 15), provider type etc.). These datasets have been used extensively to perform clinical research in veterans for decades.
* ***Veterans Health Information Systems and Technology Architecture (VISTA) / Veterans Affair Medical Centers (VAMC):*** VAMCs use 180 health information systems deployed across all veteran care sites in the United States. VISTA provides clinical, administrative, and financial functions for all of the 1700+ hospitals and clinics of the Veterans Health Administration VISTA consists of 180 clinical, financial, and administrative applications integrated within a single transactional database. The Veterans Health Administration (VHA) is the largest integrated national healthcare delivery system in the United States, providing care for nearly 9 million veterans by 180,000 medical professionals.
* ***Informatics and Computing Infrastructure (VINCI):*** As part of the mission of the VA Informatics and Computing Infrastructure (VINCI), data sources collected both locally and nationally through various initiatives are aggregated and prepared for research use. In addition to data available from individual VISTA systems, data from the Regional Data Warehouses for all 4 VA regions, the VA Corporate Data Warehouse, and the VA Health Data Repository are included. Other data sources collected and published from the VHA Decision Support System (DSS), and Inpatient and Outpatient Medical SAS (MedSAS) can be requested through VINCI. VINCI does not grant use of the data but instead facilitates the process through VA National Data Services and other data stewards as needed. VINCI’s physical environment is at the VA Automation Center in Austin, Texas. It has 20 high-performance servers and 72 terabytes of fast storage. This environment is a secure enclave within the VA and has multiple technologies and procedures in place to prevent data loss.
* ***The VA Pharmacy Benefits Management (PBM) database***: is a national database of information about all prescriptions dispensed within the Veterans Health Administration (VHA) System beginning with fiscal year 1999. The PBM system is a longitudinal database including VA pharmacy data for each individual patient. PBM data have been used more extensively for pharmacy utilization studies, and validation on PBM data is more complete than for other VA data sources, such as the Decision Support System, which only includes data to 2002. The PBM Database is a Microsoft SQL ServerTM database maintained by the PBM Service located at Hines, IL. Outpatient prescription orders filled at a VA Pharmacy or Consolidated Mail Outpatient Pharmacy (CMOP) are extracted monthly from each VistA site and loaded into the PBM Database. The data elements available for each prescription order dispensed for a patient include: product name, ordering provider, drug product costs, dosing instructions, National Drug Code (NDC) where applicable, quantity dispensed, formulary status, and VA drug class. Other data elements are available depending on whether the order was an IV, unit dose, or outpatient prescription order. These VA databases will be linked with each other using scrambled Social Security Numbers (SSNs), or in some cases, real SSNs, as has been done in previous VA studies.

**Arthritis Patient Partnership with Comparative Effectiveness Researchers (AR-PoWER):** In recognition of the importance of filling evidence gaps in inflammatory arthritis-related research, CreakyJoints (CJ) arthritis patient network, a network of approximately 55,000 arthritis patients and caregivers in all 50 U.S. states, and the University of Alabama at Birmingham received funding from the Patient-Centered Outcomes Research Institute (PCORI) to establish the Arthritis Patient Partnership With Comparative Effectiveness Researchers (AR-PoWER) patient-powered research network (PPRN). Partnered with the UAB CCTS, UAB DSAM CERTs, the American College of Rheumatology (ACR), and the Consortium of Rheumatology Researchers of North America, Inc. (CORRONA) the AR-PoWER PPRN is translating a high-impact patient support and education-focused organization into an equally high-impact patient-centered network able to conduct research (additional details of active research provided in the scientific plan).

**Cancer Care Outcomes Research and Surveillance Consortium (CanCORS):** The CCTS HUB serves as a Primary Data Collection and Research (PDCR) site in the NCI-funded Colorectal and Lung Cancer CanCORS consortium (Fouad, PI). This research consortium of eight grantees measures the quality of cancer care and associated health outcomes in the United States. The project supports prospective research in a cohort of approximately 10,000 patients with newly diagnosed lung cancer or colorectal cancer recruited from geographically broad populations and health care systems. The CCTS HUB PDCR site is for newly diagnosed cases of both lung and colorectal cancer. Fouad is an author of the publication that introduced the goals and methods of the Consortium to the broader community of cancer researchers and clinicians; several manuscripts elucidating the findings of the consortium with regards to ovarian cancer and the recruitment of patients to cancer clinical trials are in the process of being submitted for publication. Fouad has mentored trainees using this cohort.

**UAB Health System Cancer Community Network (CCN):** The UAB Health System Cancer Community Network, developed by the UAB Comprehensive Cancer Center and UAB Medicine, is a network of hospitals across Alabama, Florida, Georgia, and Mississippi that emphasizes collaboration between UAB and community cancer centers on evidence-based guidelines for cancer treatment to patients in local communities. The UAB Health System Cancer Community Network provides a structured program to support community-based oncology services to foster collaborative physician relationships, provide continuing medical education and offer local patients the opportunity to enroll in clinical trials managed by leading scientists and physicians, and access to UAB’s best practices in cancer care at a local level.

**Alabama Regional Quality Management Group:** The Alabama Regional Quality Management Group (ALRQG) initially formed in response to the Ryan White Treatment Modernization Act of 2006, which instructed quality leaders in Part C and D clinics to implement a continuous quality improvement program with activities particularly focused on the HIV Care Continuum. The ALRQG is comprised of Ryan White Part C and D clinics and represent all 67 counties in Alabama. After UAB CFAR members shared study findings that missed HIV clinic visits are linked to a three-fold increased mortality risk,4,5 a risk level equivalent to a CD4 count <200, the ALRQG decided to add missed visits as a quality indicator to quarterly reports. As these missed visit data have now been shared quarterly for several years, a number of participating sites have questioned what can be done in response to the observed high clinic-wide missed visit rates.

**CFAR Network of Integrated Clinical Systems (CNICs):** This is the first electronic medical records-based network poised to integrate clinical data from the large population of HIV-infected persons in the modern HAART era. CNICS provides research infrastructure to support HIV clinical outcomes and comparative effectiveness research using data collected at one of 8 Center for AIDS Research (CFARs). As of early 2016, CNICS contained 32,237 patients. CNICS directly reflects the outcomes of clinical decisions and management options made daily in the care of HIV infected individuals. Unlike data collected in structured interviews or retrospective medical record review, CNICS captures a broader range of information associated with the rapidly changing course of HIV disease management. CNICS is distinguished by its ability to provide peer-reviewed-open access to a rich and rapidly evolving clinical research platform that prospectively collects comprehensive patient data including validated outcomes, longitudinal resistance data, and detailed PROs with readily available biological specimens.

**National Exercise Clinical Trials Network (NExTNet Clinical Database):** The National Exercise Clinical Trials Network (NExTNet) was established to facilitate multi-site exercise clinical trials to address these knowledge gaps in a disease-specific or population-specific manner. Currently 68 institutions from coast to coast are members of the growing network. Among NExTNet’s primary functions is to foster standardization of procedures for rigorous multi-site trials. The University of Alabama at Birmingham (UAB) Center for Exercise Medicine serves as the NExTNet Coordinating Center.

**Spinal Cord Injury Model Systems Database:** Since 1975, the UAB-SCIMS has enrolled more than 2,600 people with acute SCI in our database with 13,041 annual follow-up entries. Combined with the other centers across the country, more than 42,000 people have been enrolled with over 150,000 subsequent annual follow-up visits documented.

**UAB Pharmacoepidemiology and Economic Research Unit of COERE (PEER):** Offering considerable experience using Medicare and Medicaid data and other large administrative databases including those from large health plans (e.g., United HealthCare, Aetna, Blue Cross Blue Shield, and the General Practice Research Database). Expertise includes: 1) preparing applications to the CMS for permission to obtain claims data; 2) storing and managing large databases securely and efficiently; 3) designing studies to use the data appropriately; 4) processing and analyzing the data; and 5) conducting linkages with the National Death Index (NDI).

**Treatment Efficacy and Toxicity in Rheumatoid Arthritis Database and Repository (TETRAD):** A sustainable database of treatment-response data and a repository of accompanying samples. Funding for the start-up phase of TETRAD stemmed from a two-year, $3.3 million Grand Opportunity (GO) grant from the National Institute of Arthritis, Musculoskeletal, and Skin Diseases (NIAMS). The database is headquartered at UAB with the repository of samples residing in New York. UAB will spearhead the undertaking involving 10 sites nationwide. Other sites include Johns Hopkins University, University of California at San Francisco, Stanford University, and Harvard University.

**UAB 1917 HIV Clinic Cohort:** A prospective, observational HIV clinical cohort study established in 1992 through support by UAB Center for AIDS Research (CFAR). It includes extremely well characterized patients (>7,000 overall, 1,700 active). In 1999, the database was expanded to include real-time collection of clinic utilization data, thereby allowing cost / expenditure analyses. In August 2004, the UAB 1917 Clinic deployed a client server-based point-of-care electronic medical record system (1917 EMR) developed within the clinic to its own specifications. The 1917 EMR system allows for real-time collection of medication, laboratory, clinical, behavioral, and health care utilization data. Over the years numerous clinical and behavioral comparative effectiveness studies have been conducted through the cohort. These include evaluation of the “efficacy vs. effectiveness” of initial ART regimens in patients treated in clinical trials vs. routine care.

## CLINICAL CARE AND MEDICAL TRAINING

### Facilities

Partnering with UAB and the School of Medicine to provide resources for clinical care and training for medical professionals, the entities listed below highlight the UAB network and showcase the advances made since its inception. UAB Medicine unites ***UAB Hospital***, The ***Kirklin Clinic***, ***UAB Health Centers***, the ***Callahan Eye Foundation***, ***VIVA Health*** (a health maintenance organization and subsidiary of Triton Health Systems, LLC, owned by UAB Medicine that provides quality, reliable health care) and a host of other facilities. The entities listed below are part of the broad patient care network on the UAB campus:

UAB Hospital**:** The centerpiece of UAB’s clinical enterprise with 877,036 square feet of building space, UAB Hospital is located in Birmingham’s Medical District. In the midst of UAB’s major research centers and clinics, the 1,157-licensed-bed hospital is among the 20 largest and best equipped in the nation. It includes the UAB Women & Infants Center, Spain Rehabilitation Center, the Center for Psychiatric Medicine, and the freestanding UAB Hospital-Highlands. As Alabama’s only Level 1 Trauma Center (as designated by the American College of Surgeons), UAB Hospital provides care for many of the most serious injuries that occur anywhere in the state through its emergency department, operating rooms, Trauma/Burn Unit, and Spain Rehabilitation Center, which is one of the Southeast’s foremost providers of comprehensive rehabilitation care. The Women & Infants Center offers advanced services and the latest medical technology to care for healthy and high-risk pregnancies, healthy and high-risk newborns, and those receiving care for a variety of gynecological problems, including gynecological cancers. It includes UAB’s Regional Newborn Intensive Care Unit (RNICU), the state’s largest. Together with Children's of Alabama, UAB offers the only Level IV NICU in Alabama – designated by the American Academy of Pediatrics as the highest and most comprehensive level of care available.

UAB Hospital-Highlands is a general acute care component adjacent to campus that provides an emergency department for non-traumatic and non-catastrophic cases, comprehensive surgical and nonsurgical treatment for bone and joint disorders, a specialized unit for fragility fractures, and the UAB Sleep-Wake Disorders Center. It also houses the Acute Care for the Elders (ACE) Unit, the region’s first model patient unit for coordinated geriatric care, and the UAB Pain Treatment Clinic, which serves patients with acute and chronic conditions including intractable cancer pain. In 2024, Highlands Family and Community Medicine Clinic began offering prenatal care. The clinic's partnership with UAB's Department of Obstetrics and Gynecology provides low-risk pregnant patients with access to prenatal care with a complement of 14 providers and seven residents to treat them and their newborns.

In response to an unprecedented demand for emergency medical services and to mitigate capacity challenges, UAB Hospital is expanding the University Emergency Department. Temporary expansion renovations, which began in June 2023, have temporarily relocated the waiting area and offer nine new exam spaces. Two ED Modular Units that contain eight exam spaces each are operational, improving wait times and allowing new operational models to be implemented. The long-term plans for the $73 million expansion of UED includes renovations to the first floor of UAB Hospital’s North Pavilion, turning the adjacent atrium into clinical care space and the construction of a new three-story space in the drop-off drive of North Pavilion. With 66,030 new square feet of new construction, the project will provide 59 new exam rooms and additional imaging capacity for emergency clinical care. Design of the expansion is continuing, and the project will bid later in 2024. This project directly supports UAB’s patient care mission pillar, including patient satisfaction and employee satisfaction priorities. Funding comes from a $50 million grant from the Alabama state legislature, and the remainder from UAB Medicine funding.  
  
The Kirklin Clinic**:** The Kirklin Clinic® (TKC) opened in 1992 as a premier outpatient facility to provide examination and treatment rooms for physicians representing nearly three dozen specialties in adult medicine. The five-story facility covers a full city block with 577,350 square feet, 51 different services for patients, 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 variety of patient care services south of Birmingham, established in the suburban community. The Whitaker Clinic of UAB Hospital opened in the summer of 2017. The two clinics serve more than 2,000 patients per day. With more than 250 exam rooms and many nationally ranked specialties, The Kirklin Clinic of UAB Hospital and the Whitaker Clinic of UAB Hospital combine the latest in clinical care with teaching and research. TKC staff collaborates and communicates extensively with our patients in order to deliver the ultimate patient experience and the highest quality of health services.

1917 HIV/AIDS Outpatient Clinic**:** The 1917 Clinic provides care to individuals infected with HIV. The 1917 Clinic is the largest HIV health care unit in Alabama and one of the country’s leading HIV clinics. Its mission is to address the needs of patients, their families and significant others, doctors and scientists, and the community in responding to the urgent and unique issues surrounding HIV/AIDS. The Clinic’s mission is to provide comprehensive and compassionate health care for people with HIV infection by: 1) delivering world-class, state-of-the-art primary HIV treatment; 2) offering specialty clinics for HIV patients with needs in dermatology, oncology, neurology, addition recovery, and palliative care; 3) providing social service support; 4) offering chaplain services; 5) facilitating interactions between laboratory scientists and the Clinic by providing clinical specimens from well-characterized patients; 6) providing ongoing medical education; 7) establishing a vital link between the activities of the Clinic and the community; and 8) conducting clinical trials of new approaches to treatment

Brain Aging and Memory Hub**:** In 2024, UAB celebrated the opening of the UAB Brain Aging and Memory Hub, made possible by the UAB Health System and the UAB Marnix E. Heersink School of Medicine. The nearly 20,000-square-foot hub is located on the newly renovated fifth floor of UAB Callahan Eye Hospital and houses two divisions in the UAB Department of Neurology: the ***Division of Neuropsychology*** and the ***Division of Cognitive and Behavioral Neurology***. In addition to the two divisions, the ***Alzheimer’s Disease Center*** and the ***UAB Evelyn F. McKnight Brain Institute*** are located in the new space.

Comprehensive Transplant Institute**:** UAB is one of the busiest transplant centers in the nation, performing more than 400 transplants each year across all organ groups. We also have the largest comprehensive program in the Southeast, performing 100 more transplants each year than any other program in the region. With a team of internationally renowned surgeons, physicians, researchers and numerous support staff, the CTI is well-positioned to continue its history of leadership and achievement. To date, more than 15,000 organ transplants have been performed at UAB, including heart, lung, combined heart/lung, liver, kidney, and pancreas procedures.

Spain Rehabilitation Center**:** As one of the Southeast’s premier providers of comprehensive rehabilitation care, the nationally recognized programs available at Spain Rehabilitation Center are designed to address every aspect of a patient’s rehabilitation, including physical, social, and psychological health. Spain Rehab is the hub for UAB Medicine’s Traumatic Brain Injury Model Systems, Spinal Cord Injury Model Systems, and the National Spinal Cord Injury Statistical Data Center. Specialists are devoted exclusively to the practice of rehabilitation medicine, utilizing advanced research, technology, and expertise to provide the highest level of patient care. Spain Rehab specialists and staff provide the highest level service across the SRC spectrum with services that include Physician Services, Neuropsychology and Rehabilitation Psychology, Orthotists and Prosthetists, Rehabilitation Case Management, and Therapeutic Recreation Specialists. In addition, Spain Rehab offers stellar therapeutic services which include Occupational, Physical, Music, Speech-Language, and Outpatient Therapy Services. Interdisciplinary treatment integrates specialists from all areas of the UAB Health System to bring together unique skills and expertise to form care teams that evaluate and treat each patient. These efforts result in a comprehensive care plan that coordinates treatment to meet each patient’s individual needs. In 2024, Spain Rehabilitation Center was named a Dr. Joanne Smith Memorial Rehabilitation Innovation Center. UAB Spain Rehabilitation Center is one of 15 rehab facilities in the nation to receive this designation which recognizes rehabilitation facilities that lead the nation in medical research, complex treatment and that drive innovative research for the entire field.These rehabilitation centers care for patients with highly complex medical conditions, conduct multidisciplinary rehabilitation research and educate a high number of medical residents.

UAB broke ground on its replacement Inpatient Rehabilitation Facility in 2022, an 11-story facility directly adjacent to the existing Spain Rehabilitation Center. The new building boasts three floors dedicated to specialty units of rehabilitation therapy. Each of these floors will provide 26 state-of-the-art inpatient beds with technology designed to provide comprehensive rehabilitation care for patients across Alabama and beyond. The new building will focus on neurorehabilitation for patients following stroke, traumatic brain injury and spinal cord injury. In addition, there will be two floors of acute care beds. A 30-bed general acute care unit is located on the fifth floor, and on the seventh floor is a 28-bed inpatient floor dedicated to a seizure monitoring unit that offers clinical, research and education services to patients with epilepsy. The total count of inpatient beds for this new building is 136. Construction is projected to be complete in the first quarter of 2025, with occupancy taking place in spring 2025.

UAB Women and Infants Center**:** UAB’s newest facility, the UAB Women and Infants Center is a world-class health care facility dedicated solely to the care of women and infants. Whether it is inpatient surgical care or a routine outpatient office visit, the Center provides complete care, all under one roof. The 400,000-square-foot-hospital is one of the first in the Southeast with all private neonatal intensive care nursery and continuing care nursery rooms. It also offers private labor, antepartum, postpartum, and gynecology patient rooms. The department of obstetrics and gynecology has a regional, national, and international reputation for clinical excellence and innovation, and in 2020, it was ranked #15 by US News and World Report. UAB Hospital is the third largest public hospital in the USA. The UAB Women & Infants Center houses one of largest neonatal ICUs in the United States. In 2019, UAB was honored with the America's Best Hospital designation by the Women's Choice Award for obstetrics, bariatric surgery, heart care, cancer care, and as a best breast center practice. After surpassing more than 10,000 robotic surgeries in 2018, UAB also became one of the nation's leading hospitals in robotic surgery volume. In addition, the Department of Obstetrics and Gynecology provides subspecialty expertise in gynecologic oncology, maternal-fetal medicine, prenatal genetic and structural diagnosis, pelvic floor and urogynecologic disorders, reproductive endocrinology and infertility, in vitro fertilization and human reproductive genetics, adolescent gynecology and primary care in obstetrics and gynecology. The private room design enhances maternal, family, and infant bonding. Specialized isolation rooms and rooms designed for twins and triplets further enhance the family atmosphere. UAB’s highly-trained and compassionate physicians, nurses and other health professionals utilize advanced services and sophisticated state-of-the-art medical technology dedicated to the care of healthy and high-risk pregnant women, healthy and high-risk newborns, and those receiving care for a variety of gynecological challenges, including gynecological cancers.

UAB Medicine Urgent Care**:** UAB Medicine Urgent Care offers convenient access to both UAB Medicine physicians and Advanced Practice Providers when a provider needs to be seen quickly for non-life-threatening illnesses and injuries. UAB Urgent Care offers walk-in appointments seven days a week, with lab and x-ray services available onsite. The 2,756-square-foot clinic features seven exam rooms, a digital X-ray machine and a moderate complexity lab, and it will employ the UAB electronic health record, which will enable seamless follow-up and communication with other UAB providers. Clinic physicians will not refill or change narcotic or other controlled substance prescriptions. Patients must have those requests handled by their primary-care physician.

UAB Eye Care**:** At UAB Eye Care, comprehensive eye care services is provided to the community as well as training and education for optometry students and resident optometrists. UAB Eye Care’s state-of-the-art, multidisciplinary clinic is outfitted with the latest optometric equipment necessary for the accurate diagnosis and treatment of most eye problems. UAB Eye Care clinicians provide comprehensive services for both pediatric and adult patients in a number of optometric subspecialties. Exemplary patient care is provided in the recently renovated clinic “UAB Eye Care,” a 34,000 square foot state-of-the-art facility that covers everything from primary eye care, including the dispensing of glasses and contacts, to the treatment of ocular disease, as well as low vision rehabilitation and pediatric vision care.

Callahan Eye Foundation Hospital**:** The UAB Callahan Eye Hospital (CEH) is the state’s only facility dedicated to providing quality medical and surgical eye care to the people of Alabama and the Southeast. Callahan’s primary business consists of outpatient ophthalmology and ambulatory surgery, making it one of the busiest ophthalmology surgery centers in the country. To meet the growing demand for eye care in Alabama, UAB Callahan Eye Hospital Clinics operates numerous convenient locations across central Alabama. These satellite clinics are backed by the knowledge and expertise of Callahan Eye Hospital, which for over 50 years has focused on delivering innovative eye care and pioneering breakthroughs in preserving and restoring eyesight. Callahan Eye Hospital Clinics provide that same level of vision care within the community. Moreover, the hospital offers a 24-hour, 7 day a week eye emergency room and is the region’s only Level I Ocular Trauma Center. With exceptional healthcare professionals, dedicated surgery suites, and state-of-the-art equipment, more than 11,000 surgeries per year. The hospital offers nine superbly equipped ophthalmology operating rooms and provides the full spectrum of specialized eye care. UAB Callahan Eye Hospital is also home to a comprehensive eye research program via partnership with the UAB Department of Ophthalmology and provides the state’s only accredited (Accreditation Council for Graduate Medical Education, ACGME) ophthalmology training program.

University of Alabama Health Services Foundation**:** UA Health Services Foundation is a nonprofit, group physician practice including The Kirklin Clinic and The Kirklin Clinic at Acton Road. The UAHSF was founded by pioneering heart surgeon John W. Kirklin, M.D., in 1973. UAHSF comprises multiple clinics and a network of community based clinics that offer medical services in over 35 specialties, as well as administrative, technical, and support departments. Since its inception, the UAHSF has achieved national prominence for high quality patient care services and the unique knowledge, dedication, excellence, and compassion of its employees.

* ***HSF General Endowment Fund****:* The University of Alabama Health Services Foundation (UAHSF) General Endowment Fund (GEF) provides capital on a competitive, peer-reviewed basis, to enhance the infrastructure of the UAB academic health center for laboratory research, patient-oriented efforts, clinical care program development, and medical education initiatives. In general, funds from the HSF-GEF are invested in research, educational, and clinical programs that are deemed in the best interest of the UAB Medical Center and for UAB university-wide projects which are consistent with institutional priorities.

#### Affiliated Hospitals Involving UAB Faculty, Campus, and Resources

In addition to the UAB Medicine facilities listed above, two additional hospitals are physically part of UAB's main campus in Birmingham along with three affiliated off-campus hospitals. In addition, the use of UAB faculty and an extensive network of affiliated faculty and staff provides both clinical and investigative expertise to the greater Birmingham area and beyond.

**Children's Hospital of Alabama:** Since 1911, Children’s of Alabama has provided specialized medical care for ill and injured children. Ranked among the best pediatric medical centers in the nation by U.S. News & World Report, Children’s provided care for youngsters from every county in Alabama, 45 other states and six foreign countries last year, representing more than 677,000 outpatient visits and more than 15,000 inpatient admissions. With more than 2 million square feet, including dedicated space for the Center for Clinical and Translational Science (CCTS) Child Health Research Unit, it is the third largest pediatric medical facility in the U.S. In 2012, Children’s opened two additional facilities, strengthening its ability to serve pediatric patients statewide. The Benjamin Russell Hospital for Children, a 12-story, 760,000-square-foot, $400 million expansion allowed Children’s to increase its licensed beds from 275 to 332, ranking Children’s in the top 10 pediatric medical centers based on bed count. The hospital also opened the Joseph S. Bruno Pediatric Heart Center, which includes a 20-room cardiovascular intensive care unit, two dedicated surgical suites, three heart and vascular catheterization labs and four dedicated extracorporeal membrane oxygenation (ECMO) rooms. The floor connects directly via skywalk to the University of Alabama at Birmingham (UAB) Women and Infants Center to provide quick and efficient access for physicians and surgeons to pediatric patients, as well as immediate transport of newborns requiring specialized care for congenital heart ailments. At the cornerstone of the Bruno Heart Center is its innovative pediatric hybrid catheterization suite, the only one of its kind in the state of Alabama. The hybrid cath lab is equipped with $3 million worth of state-of-the-art technology that allows it to be immediately converted to a cardiovascular surgical suite, eliminating the need to bring children out of anesthesia for a second procedure in a different room.

**Birmingham VA Medical Center:** Also situated in the heart of the UAB academic research center and interconnected with UAB research and health care delivery facilities since 1975, the Birmingham Veterans Affairs Medical Center (BVAMC) is an acute care facility with 313 beds currently in operation. The Birmingham VA Health Care System also provides health care services at 11 locations in Alabama. Facilities include the Birmingham VA Medical Center and 9 community-based outpatient clinics in Bessemer, Birmingham, Childersburg, Gadsden, Guntersville, Huntsville, Jasper, Shoals, and Anniston-Oxford. medical center provides Veterans with comprehensive primary and specialty health care in medicine, surgery, psychiatry, physical medicine and rehabilitation, neurology, oncology, dentistry, and geriatrics. BVAMC also provides specialty care for Veterans referred from other VA facilities, including eligible veterans in the VA Southeast Network Veterans Integrated Service Network. The facility provides acute tertiary medical and surgical care to veterans of Alabama and surrounding states. Recent construction provides state-of-the-art facilities and equipment in all clinical programs. Research at the BVAMC is conducted by the University of Alabama at Birmingham faculty from the School of Medicine and the School of Nursing. Grants funded through the VA support those research projects. Most staff physicians have joint appointments with VA and its primary affiliation, UAB.

**Baptist Health**: Baptist Health, a proud UAB affiliate located in Montgomery, AL, is the largest healthcare system serving central Alabama, providing comprehensive hospital-based and outpatient services to residents in Central Alabama. With over 600 highly respected and experienced physicians on the medical staff, Baptist Health provides residents of Central Alabama with access to advanced treatments, technologies, and cutting-edge medical care close to home. The 775-bed health system has a regional service area of 14 counties with approximately 700,000 people. Baptist Health's family of health care services includes three acute care hospitals, a regional cancer center, a free-standing psychiatric hospital, a joint venture surgical center, a network of ambulatory clinics, outpatient imaging centers, urgent care facilities, wound care services, rehabilitation, and home care services. Baptist Health also proudly supports medical education and teaching through support of the UAB School of Medicine Montgomery Regional Campus, physician and nurse residency programs and clinical rotations offered through numerous allied health programs. In addition, the Institute for Patient Safety and Medical Simulation provides medical education for practicing professionals and clinicians in training with real-time simulation exercises to advance learning, improve the quality of health care delivery and reduce the likelihood of medical errors. Baptist Health makes a commitment to providing compassionate care and advanced technology offerings that are relevant today and in the future for each and every patient they serve. Baptist Health has placed a strong emphasis on teaching community members to reduce their risks of illness and disease while encouraging them to live healthier lives. Baptist Health providers know that wellness conversations are not the wave of the future, but instead, life-changing conversations for today. The Baptist Health focus on preventive care began well ahead of its time and continues today because prioritizing the health of the community is their primary goal.

**Cooper Green Health Services:** Cooper Green Mercy Health Services is owned by Jefferson County, Alabama and is an affiliate of UAB. It first opened as Mercy Hospital in 1972 as a 319-bed acute care facility and in 2012, the facility was transitioned to a multi-specialty outpatient health service organization. The health service organization offers both primary and specialty care, behavioral health, and urgent care. In addition, it offers an onsite pharmacy, radiology, and clinical laboratory, as well as OT, PT, Speech, and Respiratory Therapy. Consistent with its mission, the health service organization continues to offer healthcare to the citizens of Jefferson County regardless of their ability to pay. As a county-owned health service organization, Cooper Green Mercy provides healthcare services to all Jefferson County residents with fees based on family size and income. The health service organization coordinates with the University of Alabama at Birmingham (UAB) Health System, one of the nation's leading academic medical centers, as a training site for medical residents and to provide patients with diagnostic tests and procedures not provided onsite. In addition, many of the specialty clinics are staffed by UAB faculty who practice part-time at the facility. Through this partnership, Cooper Green Mercy Health Services' patients, most of whom are low income or economically-challenged, are able to receive not just comprehensive healthcare services, but world class healthcare.

In January 2023, Cooper Green broke ground on a new Outpatient Clinic just west of the original 1970s facility to house expanding clinical operations better suited to efficient delivery of modern ambulatory health care. The new five-story, 211,000-square-foot building, with an estimated cost of $120 million, is under construction on the site of the former Cooper Green parking deck. The facility will feature urgent care, pharmacy, imaging, employee services, administrative offices, a conference center, laboratory facilities and outpatient physical therapy space. The facility will offer main clinical services including primary care, specialty care, ophthalmology, behavioral health, an oncology clinic and expanded dental care. Cooper Green Mercy Health will continue to provide clinical services in the existing building until the new building opens.

**UAB Medical West:** UAB Medical West offers outstanding health care in and around Bessemer, Alabama. Our 13 health center locations offer a combination of emergency care, orthopedics, rehabilitation, medical imaging, and more. Medical West provides 310 licensed beds for primary and specialty care, plus a 21-bed emergency room and new professional office building with surgical center. In November of 2021, Medical West Hospital Authority, broke ground on its replacement facility in Bessemer, slated to be opened in 2024. The new building will include a 412,000 square foot, 9-story hospital with 200 beds and a 127,000 square foot, 5-story medical office building. The facility, a full-service hospital, will feature a new surgical and endoscopy suite, state-of-the-art imaging technology and more intensive care beds.

**Ascension St. Vincent’s:** The University of Alabama at Birmingham Health System and Ascension St. Vincent’s have entered into a strategic alliance that will increase access to high-quality, innovative medical care through multiple outlets and health programs. In January 2020, the health systems announced their intention to form a strategic alliance and began a period of due diligence. The formal alliance began July 1, 2020. St. Vincent's Health System, based in Birmingham, Alabama, United States is an operator of acute care hospitals located in the Birmingham area and a health ministry of Ascension Health. St. Vincent's Health System is made up of six facilities: St. Vincent's Birmingham, St. Vincent's Blount, St. Vincent's Chilton, St. Vincent's East, St. Vincent's St. Clair, and St. Vincent's One Nineteen. The company employs over 4,700 people throughout its six facilities.

**Lakeshore Foundation**: The Lakeshore Foundation is a non-profit 501c3 organization that promotes independence for persons with physically disabling conditions and provides opportunities to pursue active, healthy lifestyles. Lakeshore Foundation offers a wide range of rehabilitation, fitness, recreation, athletic and education programs to children and adults who experience diagnostic conditions including spinal cord injuries, cerebral palsy, multiple sclerosis, stroke, amputation, and visual impairment. The Foundation also serves persons who have been diagnosed with arthritis, diabetes, chronic pain, cardiac conditions, and many other related disorders. The University of Alabama at Birmingham (UAB) and Lakeshore Foundation established a formal collaboration in 2011 to advance research and training in promoting the health of people with disabilities. The primary aim of the Collaborative is to create a unique and focused research program that capitalizes on Lakeshore Foundation’s success in promoting the health of people with physical disabilities, with UAB’s advanced research expertise in exercise, nutrition, disease prevention and health promotion. The Collaborative explores research topics on exercise, physical activity, sport, recreation, and rehabilitation science. Interventions examine the dose-response relationship between exercise and obesity, health and function, secondary conditions, quality of life and health care expenditures across the lifespan. The UAB-Lakeshore Research Collaborative began with a $10 million research investment funded by the Lakeshore Foundation with additional support from UAB for startup costs. Two million dollars funded an Endowed Chair’s position in the School of Health Professions, and the remaining funds will be used to support UAB researchers interested in disability, exercise, nutrition, and rehabilitation science. James H. Rimmer, Ph.D., is the first Lakeshore Foundation Endowed Chair in Health Promotion and Rehabilitation Sciences and Director of the Research Collaborative.

* Lakeshore is located on a 45-acre campus in Homewood, Alabama. In 2001, due to growing community need, Lakeshore opened one of the nation’s world-class fitness, recreation, and education facilities for persons with physically disabling conditions. A highly trained and experienced staff of more than 100 full and part-time employees provide programs in this state of the art facility which includes: Aquatics Center with two heated pools; Fieldhouse with three hardwood courts and a 200-meter Mondo surface track; 7-lane Marksmanship Range; 6,000 sq-ft. Fitness Center; Research Laboratory; Climbing Wall; The Cottages of Lakeshore; and Athletic Dormitory. These facilities serve the fitness, recreation, and athletic needs of youth and adults with physically disabling conditions from across the Southeast. Since 2003, Lakeshore has also served as an official U.S. Olympic & Paralympic Training Site and is the official home of USA Wheelchair Rugby. In addition to these amenities, the Lakeshore campus is home to an outdoor tennis facility with eight championship lighted hard courts, the Birmingham office of the Alabama Department of Rehabilitation Services (ADRS), and the HealthSouth Lakeshore Rehabilitation Hospital.
* Lakeshore Foundation has more than 30 years of experience as a community-based service provider of fitness, recreation, sport, and health promotion programs for approximately 3,500 people with disabilities, chronic health conditions and aging-related health issues. Lakeshore staff play key leadership roles in local, national, and international organizations that are important assets to the Research Collaborative.
* The UAB/Lakeshore Research Collaborative is home to two federally funded Centers, the National Center on Health, Physical Activity and Disability (NCHPAD) and the Rehabilitation Engineering Research Center on Exercise and Recreational Technologies for People with Disabilities (J. Rimmer is PI of these centers). Both Centers focus on improving the health and wellness of adults and seniors with disabilities including MS through the medium of physical activity, technology, and lifestyle health promotion. The opportunities are provided to individuals with disabilities residing in Alabama and across the country through information, programs, services, and research interventions that target improvements in healthy lifestyles and reduction of secondary conditions. The Collaborative receives federal funding from the National Institutes of Health (NIH), Centers for Disease Control and Prevention (CDC), Department of Defense (DOD), Patient-Centered Outcomes Research Institute (PCORI), and the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR).

**Lakeshore Foundation Facilities:** Lakeshore Foundation maintains one of the nation's premier fitness, recreation, and research facilities for people with physically disabling conditions. The Foundation provides a state-of-the-art universally designed community health and fitness facility to address numerous obstacles associated with physical activity participation for people with disabilities. Lakeshore offers more than 60 ongoing activities and classes each week for children and adults with disabilities, including classes in aquatics, fitness, dance, competitive athletics, general recreation, and transition support. Facility support for these various activities include three hardwood courts, a 200-meter Mondo surface track made of soft materials to ease the impact on joints, an outdoor tennis center, a seven lane archery and marksmanship range, a 23-foot indoor climbing wall, an Aquatics center that houses warm water therapy, an 8-lane 25-yard lap pool, and a 6,000 square foot fitness center.

**Information and Communication Technology (ICT) Support:** ICT manages 40 desktops and 12 laptops, which are connected to a central administrative server run by the School of Health Professions at the University of Alabama at Birmingham or at Lakeshore Foundation, enabling a very secure and stable environment. All computers run on a minimum of a dual core processor and have a minimum of 4 gigabytes of memory and Windows 7 operating system. The computers and the network receive a double layered support mechanism with UAB’s AskIT providing the highest level of network routing, AD authentication, policy administration and a secure file server support. ICT staff provides application level and basic tech support. All files are saved to a secure file server. The collaborative also houses several Linux-based servers where the IT team performs all development operations for the various applications. All production level applications are then hosted from an 8 Gig Ram cloud-based server with a 99.99% SLA, enabling our applications to be able to handle any spike in network and hardware requirements. In addition to regular desktops, ICT also employs professional video processing workstations (Macs) with Adobe Master Collection CS6, which is used by the graphics staff in the collaborative to produce high quality videos

**Regional Networks of Clinical and Translational Research**

**Dental Practice-based Research Network:** The UAB-led Dental Practice-Based Research Network (DPBRN) is a consortium of participating practices and dental organizations committed to advancing knowledge of dental practice and ways to improve it. The Network strives to improve oral health by conducting dental practice-based research and by serving dental professionals and their patients through education and collegiality. It assists in the translation of scientific discovery into clinical practice. DPBRN's major source of funding is the National Institute of Dental and Craniofacial Research (NIH/NIDCR). Clinical studies embrace four approaches: studies that may involve practitioners and/or their patients: retrospective studies using dental records; observational studies of routine care activities, case-control studies, and clinical trials comparing alternative treatment strategies. Practitioner-investigators help design clinical studies, assess the implications of study results for practitioners and patients in different practice settings, and disseminate research results.

**Deep South Network for Cancer Control (DSN):** The Deep South Network for Cancer Control builds on an established community and institutional capacity targeting cancer outcomes by conducting community-based participatory education, training, and research. The goals of the DSN are to improve access to and utilization of proven beneficial cancer interventions in rural and urban areas.

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| CCTS Partner Network Institutions |

**AUBURN UNIVERSITY**

**A picture containing diagram

Description automatically generatedHUDSONALPHA INSTITUTE FOR BIOTECHNOLOGY (HAIB)**

**LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER**

**PENNINGTON BIOMEDICAL RESEARCH CENTER**

**SOUTHERN RESEARCH**

**TULANE UNIVERSITY**

**TUSKEGEE UNIVERSITY**

**UNIVERSITY OF ALABAMA AT TUSCALOOSA**

**UNIVERSITY OF MISSISSIPPI MEDICAL CENTER**

**UNIVERSITY OF SOUTH ALABAMA**

**CCTS Network Partnerships**

In synergy with the resource strengths available at UAB, the CCTS has established Institutional Partnerships to improve and accelerate translational research. The CCTS Partner Network is a Tri-State collaborative effort that includes 11 total institutions. The CCTS Partner Network crosses institutional boundaries to improve human health and health care delivery. This innovative partnership provides the foundation for addressing health outcomes through collaborative research and training efforts. Building on some initial relationships from the Deep South Network for Translational Research, UAB has significantly expanded the Partner Network to create new and more formal partnerships with regional institutions for mutual benefit. Regional partners are working together to facilitate and promote unique opportunities, including drug discovery and development (with UAB, Southern Research, Auburn University and University of South Alabama), integrative genomics (with HudsonAlpha Institute for Biotechnology), advanced magnetic resonance imaging (with Auburn) and substantial experience with participant populations and clinical outcomes (Louisiana State University Health Sciences Center, University of Mississippi, Pennington Biomedical Research Center, University of South Alabama, Tulane University, University of Alabama, Tuskegee University, and UAB).

**CCTS Affiliations**

The CCTS also has established several collaborative relationships across the region to advance clinical and translational science. The CCTS has engaged leadership of NIGMS-sponsored Institutional Development Award Program Infrastructure for Clinical and Translational Research (IDeA-CTR) initiatives in Louisiana and Mississippi as well as RCMI at Tuskegee, Jackson State and Xavier Universities (CTR/RCMI Affiliates) to provide important, mission-oriented guidance and to identify and pursue programmatic synergies that can bring further value to our region. Similarly, the CCTS’ Southeast Health Alliance for Research (SHARe) has engaged Ochsner Health System in New Orleans to advance the translation of discovery to improve health and health care delivery via multi-site studies and clinical trials.

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| AUBURN UNIVERSITY (Auburn) |

The first land-grant college in the South, Auburn University was established in 1856. Over 200 years since its founding, the University has developed into one of the largest institutions in the region with an enrollment of 33,885 selecting from 140 degree options in 12 schools and colleges at the undergraduate, graduate, and professional levels.

**INSTITUTIONAL RESEARCH ENVIRONMENT & EXPERTISE IN CLINICAL AND TRANSLATIONAL SCIENCE**

**Facilities and Resources**

**Auburn Neuroimaging Center:** The Auburn University Neuroimaging Center (AUNIC) is located in the Auburn University Research Park. The AU Neuroimaging Center focuses on the broad application of magnetic resonance imaging (MRI) in basic science research, technology development, and clinical applications in both humans and animals. The AUMRIRC has a 3 Tesla (T) open-bore whole-body MRI scanner and a 7T whole-body MRI scanner with multi-nuclear imaging capability. Faculty and staff at the AUMRIRC have expertise in cardiovascular MRI, image analysis, brain imaging, magnetic resonance spectroscopy, and pulse sequence development. In addition to humans, the AUMRIRC has infrastructure and experience to image animals from rodents to larger animals such as dogs, pigs, and sheep.

**Auburn University College of Veterinary Medicine (AU-CVM):** Auburn University College of Veterinary Medicine (AU-CVM) is now in its 132nd year of service to animal health in the state, region, and nation. In fall semester 2022, more than 500 students were enrolled in the Doctor of Veterinary Medicine (DVM) degree program. Additionally, the college has approximately 100 graduate students pursuing Master of Science (MS) and Doctor of Philosophy (PhD) degrees through the AU-CVM Biomedical Sciences (BMS) graduate program. The College also offers an undergraduate minor in Public Health and is in the process of creating an undergraduate major in that field. In 2014, Auburn opened the Wilford and Kate Bailey Small Animal Teaching Hospital. The 208,000 square-foot complex is one of the most technologically advanced and largest teaching and referral hospitals in the country. Caseloads for the College average in excess of 20,000 animal patients each year.

The AU-CVM is fully accredited by the AVMA Council on Education and AAALAC, International. Details of physical facilities available at the AU-CVM can be provided upon request.

**Auburn University Research Initiative in Cancer (AURIC):** AURIC was established to improve both human and animal health by fostering an environment of excellence in cancer research. An interdisciplinary program, AURIC promotes research that enhances competitiveness in order to advance the understanding of the biology of cancer, and to foster the translation of novel technologies from the laboratory to the clinic.

**Boshell Diabetes and Metabolic Diseases Research Program:** The Boshell Diabetes and Metabolic Disease Research Program at Auburn seeks to enhance opportunities for diabetes research at Auburn University by facilitating cross-disciplinary scientific discussion, supporting the study of new ideas, fostering the development of investigators new to the field of diabetes, and expanding, the overall base of diabetes investigation at the University. More than 50 investigators from across the AU campus are members of the program and actively involved in diabetes research. Specifically, these investigators are addressing many facets of both type 1 and 2 diabetes, with particular focus on the cardiac, neurological, and metabolic aspects of the disease.

**Auburn University Harrison College of Pharmacy:** Established in 1885, the Harrison College of Pharmacy (HCOP)is Alabama’s only public institution charged to educate pharmacists in the appropriate drug treatment of human disease. The HCOP’s primary role is the preparation of competent primary care clinicians who can provide patient-focused, pharmaceutical care. The HCOP’s curriculum is grounded in service-based, community practice that is collaborative with other health disciplines. The HCOP is actively engaged in research programs designed to stimulate scientific discovery and to develop new knowledge and applications in the pharmaceutical sciences and to translate those findings to pharmacy practice. With its state-of-the-art facilities, the HCOP is well positioned to drive novel drug and protein products from discovery to development to clinical trials.

Capabilities and expertise available in the HCOP include high-throughput screening infrastructure (robotics and plate readers) as well as clinical pharmacology resources (operated in collaboration with AU-CVM) that feature a state-of-the-art ultra-performance liquid chromatograph linked to a triple-quad mass spectrometer (UPLC-QQQ-MS), a system ideal for performing PK-PD analyses of experimental agents in pre-clinical and clinical settings. Translational research efforts are led by cancer and neuro drug discovery research groups and a dedicated vivarium housed within our Pharmaceutical Research Building provides support for development of small-animal models used for pre-clinical testing. AU-HCOP also possesses a health care outcomes research group that possesses rich experience in using electronic medical records and payer claims data to evaluate the effectiveness and cost of health care strategies and systems. Finally, AU-HCOP clinical faculty are embedded in practice sites in Columbus, GA and throughout Alabama, making them ideal for participating in multi-site clinical trials.

**Auburn Pharmacy Health Services and the Community Pharmacy Research Network:** The Auburn University Harrison College of Pharmacy operates two ambulatory clinics and three pharmacies to serve the Auburn, AL and Montgomery, AL communities. These facilities are connected to more than 40 full-time clinical pharmacists practicing in regional hubs throughout Alabama, Mississippi, and Georgia. Training is the core mission of these clinics. This Community Pharmacy Research network consists of over 120 community pharmacies in 7 southeastern states and provides a large regional footprint of community research sites that is supplemented by formal agreements with pharmacies. The network provides an extensive cohort of community sites to conduct research providing a unique laboratory for K12 Scholars.

**HCOP Translational Research Acceleration Cooperative (TRxAC):** The HCOP-TRxAC is housed within the Division of Research (DoR) and serves as an organizational hub connecting the efforts of stakeholders engaged in academic-based, drug discovery. The TRxAC integrates pre-IND activities with early clinical/translational research opportunities. The operational paradigm allows for “bench-to-bedside” and “bedside-to-bench” flow of research activities and projects. The TRxAC can catalyze new drug treatment discoveries by connecting the right people with the right projects at the right time. TRxAC fosters commercial opportunities, development of new academic and/or training programs, new extramural grants and contracts opportunities and awards, new partnerships with external pharmaceutical research entities, and enhances existing partnerships in translational research. Areas that are particularly attractive for stakeholder investment and partnering include our in silico/high throughput screening (HTS) operations, our academic program in pharmacogenomic research, and the availability of a clinical-translational research (CTR) support laboratory.

**Center for Pharmacogenomics and Single-Cell Omics (AUPharmGx):** The Center for Pharmacogenomics and Single-Cell Omics Initiative (AUPharmGx) was created in 2019 to facilitate collaborative research in Pharmacogenomics and place Auburn on the cutting-edge of personalized medicine. AUPharmGx offers a broad range of facilities under one roof aimed at -omics research. It is a full-service stop that facilitates collaborative research covering a vast area of -omics research, including free consultation for -Omics-based research studies, high-quality Nucleic acid (DNA/RNA) isolation, Next-generation sequencing - genomics (ExomeSeq and whole-genome sequencing), transcriptomics (mRNAseq), epigenomics (ATACseq), Sanger DNA sequencing, Quantitative Real-Time PCR (qPCR) for mRNA/Gene expression analysis, MicroBiome analysis/Metagenomics; epigenomics (ATACseq, MethylSeq, EPIC), SNP genotyping, and most importantly, Single-Cell multi-omics (scATACseq and scATACseq), in addition to Cell line authentication and access to CRISPR-edited Knockout Cell Pools and data analysis. AUPharmGx currently houses several state-of-the-art technologies, including 10X Genomics Chromium single-cell analysis system, Illumina NGS system, QuantStudio 12k Flex high-throughput RT-PCR system, SeqStudio Sanger DNA sequencer, Bio-rad CFX96 Touch real-time qPCR system, and Agilent 2100 BioAnalyzer.

**Auburn University Rural Health Initiative**: The Auburn University Rural Health Initiative (RHI) is jointly led by Auburn University Outreach and the Alabama Cooperative Extension System in collaboration with Auburn University’s health-related academic units along with multiple community partners.  The RHI was initiated in 2020 followed by community engagement and programming activities implemented beginning 2021; the first pilot site containing an OnMed station was established in the City of Lafayette, Chambers County in 2023.  The RHI’s mission is to “Increase healthcare access and improve health outcomes throughout Rural Alabama while providing impactful experiences for students in health-related fields through unequaled collaboration between resources of Auburn University, the Alabama Cooperative Extension System (ACES) and Alabama communities.” The RHI is promoting faculty-led research and outreach projects, student learning experiences, and community access to health care resources.

**Public and One Health Major**: This is a newly established bachelor of science degree program out of CVM that includes contributions from about eight other colleges and has students from varied backgrounds with broad career goals in research and clinical fields. There is growing interest and capacity for faculty researchers to connect on topics within One Health including a College of Forestry, Wildlife and Environment has certificate and graduate certificate [to](https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbulletin.auburn.edu%2Fthegraduateschool%2Fgraduatedegreesoffered%2Fonehealth_major%2F&data=05%7C02%7Cdennets%40auburn.edu%7Cacd1031f4d3e490fa7ff08dcd296340f%7Cccb6deedbd294b388979d72780f62d3b%7C0%7C0%7C638616789764394100%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=F%2BXzw7WM3vuTUd156S2r9duscS9NlyDESOU4sAQEdLk%3D&reserved=0) name a few.

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| HUDSONALPHA INSTITUTE FOR BIOTECHNOLOGY (HAIB) |

HudsonAlpha Institute for Biotechnology is a nonprofit research institute committed to improving human health and quality of life by bringing genomic medicine into clinical care, developing genomic resources for bioenergy and sustainable agriculture, fostering life sciences entrepreneurship and business growth, and creating a genomics-literate workforce and society. Located in Huntsville, Alabama’s Cummings Research Park, the 152-acre HudsonAlpha campus is home to the nonprofit research institute and more than forty-seven life science biotech companies involved in research, development, or production. Designed to be a hothouse of life science research and innovation, HudsonAlpha's state-of-the-art facilities co-locate nonprofit scientific researchers with entrepreneurs and educators to bring discoveries to market faster. HudsonAlpha is home to the Genome Sequencing Center (formerly the Stanford Human Genome Center), one of few centers in the world that specializes in *de novo* eukaryotic whole-genome sequencing, assembly, and analysis. The CAP-accredited and CLIA-licensed Clinical Services Laboratory, the HudsonAlpha Health Alliance, and the Smith Family Clinic for Genomic Medicine are three limited liability companies wholly owned by the Institute and located on the same campus. HudsonAlpha faculty does cutting-edge and innovative research in human and plant genetics and genomics, and have extensive experience in sequencing and interpreting genomes from people and many species, understanding unexplained diseases in children and adults, and understanding the functions of our genomes at many levels, including understanding the “readout” of the genome for the regulation of gene expression, epigenetic regulation and responses to environmental agents, including drugs. HudsonAlpha’s researchers have worked in collaboration with scientists all over the world, and have special relationships and multiple projects with the University of Alabama at Birmingham School of Medicine. HudsonAlpha has been contributors to the CCTS network since inception.

**INSTITUTIONAL RESEARCH ENVIRONMENT & EXPERTISE IN CLINICAL AND TRANSLATIONAL SCIENCE**

**Expertise**

In mid-2022, Neil Lamb, Ph.D., former Vice President for Educational Outreach, became the new President of the Institute. During his tenure as Vice President, he led HudsonAlpha’s educational outreach from conception, creating innovative teacher training and toolkits, student experiences, public enrichment, and digital resources that shaped how education is delivered. As President, Dr. Lamb drives the strategic vision of the organization. Richard M. Myers, Ph.D., who led the Institute for its first 14 years as its President and Science Director, transitioned to HudsonAlpha’s new Chief Scientific Officer and President Emeritus. His laboratory contributed more than 10% of the results to the original Human Genome Project and pioneered fundamental genomic techniques that continue to yield insights into human health and disease. Under his direction, the Institute has become a national and international leader in genetics and genomics research and assembled a broad-based and highly regarded faculty. Faculty research interests include the genetics of biodiversity, the genetic and epigenetic basis of human diseases such as cancer and neurodegenerative and rare diseases, bioinformatics to correlate genotype to phenotype, immunogenetics, and bioethics. The faculty's experience includes participation in large-scale projects such as The Human Genome Project, The Cancer Genome Atlas (TCGA), the Encyclopedia of DNA Elements (ENCODE) Project, the Clinical Sequencing Evidence-Generating Research (CSER) consortium, The Alabama Genomic Health Initiative (AGHI), and extensive studies of the genetics of Alzheimer disease, Parkinson disease, Huntington disease, ALS and neuropsychiatric disorders such as schizophrenia, bipolar disorder, and major depression, as well as numerous other consortia.

The HudsonAlpha Center for Plant Genomics and Sustainable Agriculture contributes to and expands genomic resources (genome assemblies, transcriptomes, catalogs of population variation) and research in plant biology with a focus on applications to food, bioenergy, and sustainable agriculture. Center contributions include improving knowledge of how plant genes function, developing new computational approaches to genomic analysis, and carrying out extensive target discovery studies to identify useful agronomic genes. Furthermore, the Center is committed to educating future scientists on applying genomics to plants. The program includes HudsonAlpha’s Genome Sequencing Center (GSC), led by Jane Grimwood, Ph.D., and Jeremy Schmutz, which has produced most of the *de novo* plant reference genome assemblies. The team has collaborated extensively with plant researchers worldwide and contributed significantly to Gene Atlas v1.0, Gene Atlas v2.0, Switchgrass Common Gardens, and Open Green Genomes. The program also includes the research laboratories of Drs. Kankshita Swaminathan, Josh Clevenger, and Alex Harkess.

The HudsonAlpha Center for Genomic Health combines the talent and capabilities of several of HudsonAlpha's research programs and faculty. The Center includes the Clinical Services Laboratory (CSL), the Smith Family Clinic for Genomic Medicine (SFC), the HudsonAlpha Health Alliance, and support from Educational Outreach and Economic Development. The program provides an integrated suite of clinical services to healthcare systems, self-insured employers, and healthcare providers. The suite includes patient education and engagement, physician education and clinical decision support, genetic counseling, peer-to-peer support, and access to the Clinical Services Laboratory for clinical whole genome sequencing and genotyping and the Smith Family Clinic for diagnostic genomic medicine. Genomic Health activities focus on rare disease diagnosis, population health and screening, pharmacogenomics, and precision oncology.

The Educational Outreach team, led by Kelly East, MS, CGC, since mid-2022, cultivates a genetically literate citizenry by creating engaging activities that connect scientific concepts to their application in our changing world. The team leverages science and business activities to design innovative experiences, products, and digital applications that educate society and prepare the workforce. These activities include school projects, camps and internship programs, HudsonAlpha-led college courses with university collaborators, online educational resources and apps, and an ongoing series of presentations, tours, and workshops for the adult life-long learning audience. Physicians and nurse practitioners benefit from a series of continuing medical education (CME) Medical Association of the State of Alabama (MASA) approved courses offered by the team. Students enrolled in masters or Ph.D. programs may pursue their thesis work at HudsonAlpha under the direction of research faculty, who hold adjunct faculty appointments at collaborating universities.

HudsonAlpha's faculty maintain a vibrant network of collaborations around the globe with academia, industry, and medical centers. Examples are the Center for Genomic Medicine and the Alabama Cancer Consortium, both with The University of Alabama at Birmingham and a research center focused on comparative genomics and translational research in plant and animal genomics with Auburn University.

A dedicated IT team supports the research endeavors with computing resources that include shared software and hardware infrastructure, the necessary support for high-performance parallel and distributed computing, numerical tools, and computing environments. The team operates essential equipment, including servers, storage systems, clouds (private, public, & hybrid), workstations, laptops, and peripherals for research and production workloads. It ensures high-speed network connectivity and security for the HudsonAlpha campus.

**Facilities and Resources**

The Institute provides an exceptionally high-quality research environment. The main four-story, 270,000 square foot building can serve 500-600 scientists and staff and houses well-equipped state-of-the-art laboratories, numerous small- and medium-sized conference rooms, as well as a library, auditorium, and cafeteria. The flagship building has nine large laboratories with space for 12 to 16 faculty investigators, and the labs have all the standard equipment for molecular biology, genetics, and genomics work, including refrigerators, freezers, centrifuges, incubators, water baths, microscopes, and more. The labs share five tissue culture rooms that house eight laminar flow sterile hoods, sixteen CO2 incubators, two CO2/N2 hypoxic incubators, four Countess FL II automated cell counters, four microscopy workstations and a Nikon AXR Confocal equipped with an Andor iXon 888 EMCCD camera. There is a cold room, a darkroom, computational resources, and conference rooms. One large laboratory, equipped for clinical sequencing and genotyping, is designated to the CAP-accredited and CLIA-certified Clinical Services Laboratory, LLC. A 14,000 square foot space houses the Genome Sequencing Center.

The third addition to the HudsonAlpha campus, an 88,000 square foot facility, houses growth chambers for plant research, the diagnostic Smith Family Clinic for Genomic Medicine, LLC, and tenant companies. The Clinic includes a waiting room, triage room, exam and consulting rooms, lab, classroom, and conference room with telemedicine capabilities.

The Paul Propst Center, a 105,000 square foot facility, houses HudsonAlpha's Educational Outreach and Economic Development missions and several tenant biotech companies. More than 20,000 square feet of space and substantial resources and personnel are devoted to the educational outreach program. The education space includes three teaching/training labs (each holding up to 32 students), several classroom and presentation rooms, a dedicated auditorium, and multiple areas for student group collaboration. Distance learning equipment facilitates access to HudsonAlpha's experts, and high-definition video conferencing throughout the buildings connects scientists and educators with collaborators, colleagues, teachers, and students around the world.

The newest addition to HudsonAlpha’s campus is a glasshouse that includes a headhouse, two laboratory spaces, seed storage, workstations, and nearly 6,000 square feet of growing space across seven rooms. Additional facilities for plant growth include two 480 square feet biosafety level-2 growth houses for controlled plant growth and three A1000 Conviron growth chambers. These are equipped with PDS-1000/He biolistic transformation system, Genogrinder 2010, freezer mill, and three fluorescence microscopes: a Nikon SMZ1500, an EVOS, and a Lionheart.

The Jackson Center, a conference facility on campus, has 13,000 square feet of meeting space.

In addition to the nonprofit Institute, the HudsonAlpha campus is home to 48 tenant companies and their 900+ employees. These tenant companies are all involved in biotechnology research, development, or production. Laboratories and offices of various sizes, ranging from a cubicle to thousands of square feet of space, are available throughout the buildings on the campus. Tenant companies can take advantage of the business expertise of their for-profit biotech neighbors, as well as the proximity of Institute scientists, educators, and other valuable resources. Likewise, the Institute benefits from collaborations and professional exchange with the tenant companies.

**Genome Technologies:** In addition to its extensive DNA and RNA sequencing facilities (including upstream and downstream experimental and analytical equipment), HudsonAlpha has invested in other cutting-edge technologies, which require both equipment and specialized expertise to use these facilities effectively. These include multiple types of robotics, large-scale gene editing, iPS cells and their differentiated cell types, ChIP-seq, single-cell multiomics (RNA-seq and ATAC-seq), confocal microscopy, extensive cell culture facilities and equipment, FACS and others.

**Clinical Services Lab:** The HudsonAlpha Clinical Service Lab, LLC (CSL) was established in 2015 to provide genomic data and analysis to physicians, healthcare providers, and patients to improve healthcare through diagnostic and prevention. The CSL is accredited by the College of American Pathologists (CAP) and certified through the Clinical Laboratory Improvement Amendments (CLIA). It offers whole genome sequencing and genotyping for rare disease diagnostics, precision oncology, and population screening and clinical interpretation by a team of board-certified clinical and molecular geneticists. The CSL is continuously working on expanding its clinical tests.

**Genome Sequencing Center:** The HudsonAlpha Genome Sequencing Center (GSC) has a dedicated 14,000 square foot combined laboratory and office space facility. Led by co-directors Jane Grimwood, Ph.D., and Jeremy Schmutz, a staff of about 25 laboratory and computational professionals generates genome sequence data and creates resources for researchers worldwide. The GSC includes one large laboratory for the library and production groups, a large informatics suite, several storage rooms, freezer rooms, a dishwashing and autoclave facility, several robotics rooms, three dedicated sequencing rooms, and a conference room. The sequencing platforms and data collection pipelines include Illumina (NovaSeq 6000), Pacific Biosciences (Sequel II), and one ABI 3730XL, supported by substantial automated robotic and IT infrastructure.

**Information Technology and Computation**

HudsonAlpha Information Technology (IT) delivers exceptional technology solutions to help further the missions of HudsonAlpha. We drive technology modernization activities to optimize research and institute productivity. We serve as trusted advisors to our institute partners and develop innovative solutions to help advance human health. HudsonAlpha IT ensures the optimization, growth, reliability, and security of not just institute-wide but campus-wide research. HudsonAlpha itself has 227 employees, but IT also supports the life sciences missions of 48 associate companies and their 900+ employees across the HudsonAlpha campus. The systems supporting these missions are monitored and maintained 24x7 and spread across two campus data centers, various colocation facilities, and private/public cloud resources. HudsonAlpha IT maintains an array of technology platforms across its core teams of Research Computing, Infrastructure Services, Enterprise Applications, End User Support, and Cybersecurity.

**Research Computing – High-Performance Computing (HPC):**HudsonAlpha IT provides institute labs and associate companies with dedicated and shared resources to perform their research. These resources are spread across an HPC cluster with 2016 hyperthreaded CPU cores (15.2 teraflops), 17TB RAM, 4 petabytes (PB) of block storage, and 7 PB of object storage. These resources are constantly growing at 20% each year to meet the demand of nearly two million research jobs (10,000,000+ core hours) annually and over 6 petabytes of research data. Furthermore, HudsonAlpha IT maintains the lifecycle of its research computing hardware with hardware refreshes every 3 to 5 years, phasing in new technology to optimize research computing capabilities and evaluate innovative vendors. The current vendors and technologies comprising HudsonAlpha’s HPC cluster include:

* ***HPE Synergy and C7000 blades:***
  + HPE BL460c Gen 9: 6 dual 14 core (336 HT cores), 18 dual 16 core (1152 HT cores) 744 total physical cores 2.30 GHz Intel E5-2695v3 compute nodes with 512/384 GB RAM per node, 2x20 GigE to a high-performance General Parallel File System (GPFS) running disk arrays totaling 3.6PB usable.
  + HPE SY480 Gen 9: 3 dual 22 core, (264 HT cores) 2.20 GHz Intel E5-2698v4 compute nodes with 1 TB RAM per node, 2x20 GigE to a high-performance GPFS.
  + HPE SY480 Gen 10: 3 dual 22 core, (264 HT) 2.10 GHz Intel Gold 6152 compute nodes with 1 TB RAM per node, 2x20 GigE to a high-performance GPFS.
* ***Block (Cluster) and Object Storage:*** Two DDN 12KEX storage arrays running IBM Spectrum Scale (GPFS) with 4 petabytes (PB). Scalable object storage for off-site archival of research data over 7 PB.
* ***Scheduler and other software:*** IBM Load Sharing Facility (LSF) for scheduling, Bright orchestration for provisioning, and a suite of bioinformatics tools.
* ***Network Infrastructure:*** HudsonAlpha supports a collaborative campus with the combined research of our non-profit institute and for-profit life science mission of associate companies. The HudsonAlpha campus has three buildings with 80 Gigabit long-range optics. Core switches (Cisco Nexus 9500 series) with 40 Gigabit connections connect the systems within each building. The campus internet service has multiple fiber paths onto the campus, and redundant network connections provide highly available 20 Gigabit connectivity to a colocation data center in Atlanta. This collocated data center provides private and public peering with cloud providers and federal research networks like Internet2, Amazon/AWS direct connect, Southern Crossroads (SOX), Amazon, CenturyLink, and Cogent. A second collocated data center resides locally in Huntsville, AL hosting archival storage and future burstable resources with 2x40 Gigabit connectivity to the campus.
* ***Network Security:*** Access to the HudsonAlpha network is strictly controlled. As a general policy, all inbound connections are explicitly denied with specific exceptions. Exceptions are handled by IT staff and are only allowed for hosts located in DMZ networks directly connected to a pair of redundant Palo Alto firewalls. Outbound connections are allowed with specific restrictions (i.e., outbound SMTP is controlled). External access to HudsonAlpha networks is allowed via IPSec client or L2L (LAN-to-LAN) IPSec tunnel. Internal VLANs logically separate functional groups and tenant companies in the building. VLAN to VLAN access is strictly controlled, with exceptions allowed via layer 3 ACLs (access control lists). Certain sensitive network segments with Protected Health Information (PHI) have additional safeguards to limit access to only personnel with a demonstrated business need. Wireless access to HudsonAlpha networks is controlled by 802.1x authentication. Public Wi-Fi access is controlled via a pre-shared key and is restricted to the internet only. Critical core network equipment is centrally located in controlled access (badge reader) data centers that are UPS/generator protected. Access to IDF closets is controlled by lock and key and is limited to IT staff and facilities. Login access to critical network equipment is controlled and logged with TACACs. Access to shared data is managed through AD (active directory) authentication. Multiple automated systems regularly scan all devices on the network, reporting vulnerabilities, misconfigurations, missing patches, etc., to our cybersecurity team for remediation.
* ***Office:*** The Faculty Investigators' laboratories have multiple offices and "dry-lab" spaces in addition to “wet-lab” benches. Each Faculty Investigator has an office suite that includes a secondary office and cubical and open space for 5-20 personnel. Office and computer space are available for visiting scientists to work at HudsonAlpha. The campus layout encourages interactions throughout the Institute. Each building has multiple conference rooms and informal meeting areas. The flagship building has a large auditorium, library, lounge, and cafeteria used by all campus occupants. The Paul Propst Center building also has an open concept atrium with a snack area, meeting spaces, and an auditorium. There are additional conference rooms of varying sizes throughout the building.

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| LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER (LSUHSC) |

The Louisiana State University Health Sciences Center – New Orleans includes the Schools of Medicine, Public Health, Dentistry, Nursing, Allied Health Professionals and the Graduate School. The downtown New Orleans campus trains 70% of state’s health care professionals. The School of Medicine, which was just re-accredited by LCME, t manages multiple residency and fellowship programs in New Orleans, Baton Rouge, Bogalusa, Lafayette and Lake Charles. LSUHSC – NO serves patients throughout Southern Louisiana and surrounding areas through the LSUHSC Health Sciences Network of outpatient clinics and its public-private partnership with University Medical Center, a newly opened 446-bed academic hospital located across the street from the main campus, where LSUHSC physicians and staff see patients in a hospital setting. LSUHCS physicians also see patients at other hospitals in the same system, Louisiana Children Medical Center.

**INSTITUTIONAL RESEARCH ENVIRONMENT & EXPERTISE IN CLINICAL AND TRANSLATIONAL SCIENCE**

**Facilities and Resources**

All LSUHSC Schools have active research programs, with the most active being in the Schools of Medicine and Public Health. LSUHSC is part of the NIGMS-funded Louisiana Clinical and Translational Sciences Center, which includes LSU Pennington, Tulane University, Xavier University, Children’s Hospital, LSU A&M Baton Rouge, Ochsner Clinic, the Southeastern Louisiana Veterans Health Care System and University Medical Center (https://lacats.pbrc.edu/). LACaTS provides a shared clinical and translational science infrastructure, including clinical research, regulatory support, biomedical informatics, biostatistics and study design, professional development, health literacy and community engagement.

Specific to LSUHSC, the Clinical/Translational research environment includes:

**The Clinical and Translational Research, Center (CTRC) and the Core Laboratory**, located in the Seton Building and in the LSUHSC campus. The CTRC provides staffing for conduct of research protocols, including nursing staff, nutritional support, administrative assistance, and biostatistician support. The Core Laboratory develops and performs laboratory assays for clinical research projects. The CTRC reports to the Senior Associate Dean of Research – Dr. Miele.

**The GS-MU-NCORP** - Separate from the CTRC, GS-MU-NCORP is the largest and only state-wide cancer clinical trials research consortium encompassing the state of Louisiana and southern Mississippi. The GS-MU-NCORP has three major component sites, LSU Health Sciences Center – New Orleans (which includes the only Children’s Hospital in the state), LSU Health Sciences Center – Shreveport and Mary Bird Perkins Cancer Center (Baton Rouge), each with several subcomponent sites for a total of 49 clinical centers participating in this clinical trial consortium. The major goal of this public-private partnership is to bring cutting edge cancer clinical trials to patients in our state. The integrated leadership team works closely it clinical investigators to ensure a coordinated selection of clinical trials and the implementation of these trials at multiple sites. All sites recognize the NCI’s central IRB as the IRB of record, and for non-CIRB protocols, all sites are under the LSUHSC IRB. This structure allow for the rapid selection and deployment of clinical trials throughout the various clinical sites of this NCORP. This program also discusses and selects investigator initiated trials and pharmaceutical trials. Its ultimate goal is to provide a closely integrated cancer clinical trials program throughout state of Louisiana, in close association with academic and community physicians dedicated to bringing cutting edge trials to their patients. Currently, the NCORP has over 60 cancer-related studies open.

**The LCRC Tissue/Biospecimen Repository, expanded to accommodate COVID19 biospecimens -** The mission of the Biospecimen Core is to collect high quality samples of fluids (i.e. whole blood, cellular blood components, plasma, serum, urine) and tissue from patients with tumors, with the tissue’s corresponding pathological variables. This material is available to qualified researchers at the Louisiana Cancer research Consortium (LCRC) and LSU Health Sciences Center and will enable them to reduce costs and minimize risks associated with alternative banking practices. High quality refers not only to the biological quality of tissue and accompanying pathological data, but also to the ethical and legal status under which donors are enrolled and consented. This core is the primary interface with the clinical sites at which donors are enrolled and tissue samples and clinical data are collected. The core tracks the collection, storage, quality assurance, and distribution of specimens as well as the derivation and aliquoting of new specimens from existing ones. Dr. Arnold Zea is the co-director at LSUHSC. A collaborative effort to construct a clinically annotated “virtual biorepository” from LCRC Biospecimen Repository data is funded by the LACaTS parent grant and led by Dr. Miele. This effort is being pursued in close partnership with the CCTS Hub, with the ultimate goal of developing a regional virtual biorepository with shared data ontology. Recently, the LCRC Biospecimen Repository acquired an additional 4 -80oC freezers dedicated to store samples acquired through our IRB-approved COVID19 biorepository, which includes blood, fecal and virus testing leftover fluids.

**The Louisiana Tumor Registry** - has high-quality data covering the entire State of Louisiana including This cancer types (morphology, grade, and behavior), anatomic location, stage at the time of diagnosis, treatment, and outcomes (survival and mortality). This data is being leveraged by the LACaTS Biomedical Informatics Key Component, directed by Dr. Miele, to construct “virtual cohorts”, limited datasets including clinicopathological information on cancers along with EHR-derived additional clinical information from the PCORI-funded REACHnet clinical data repository (for which Dr. Miele serves as LSUHSC coPI).

**Clinical Informatics Resources** - The LSU Health Sciences Campus uses EPIC throughout its clinical operations within the University Medical Center. EPIC is also used to manage non-cancer clinical trials. EPIC is one of the most commonly used EHR systems in academic medical centers, and readily amenable to health information exchange in the context of clinical/translational research. The LSU Health Care Network of outpatient clinics use the same EPIC instance. A research clinical data warehouse has been established whereby investigators can request clinical, demographic and other health information on patients throughout the LCMC hospital system with IRB approval. LSUHSC has purchased OnCore™, a clinical trial management system (CTMS) from Advarra that integrates with EPIC. OnCore™ will be deployed in early 2025.

LSU as a whole and LSUHSC New Orleans maintain a comprehensive privacy and information security program that protects the confidentiality, availability, and integrity of all information assets (i.e., patient, research, customer, business data). The LSU System Information Security Policy is PM-36, the LSUHSC-NO Information Technology Infrastructure policy is CM-42, our Information Security policy is EIS-100, and the LSUHSC-NO HIPAA policy is CM-53. Our health system follows HIPAA policies and undergoes review by the Joint Commission on Accreditation of Healthcare Organizations. LSU and LSUHSC-NO comply with Family Educational Rights and Privacy Act controls for student information. Our security policies are overseen by an appointed HIPAA Entity Security and Privacy Officer. Compliance with IT Security policies and local and federal laws and regulations is further ensured through review by our institutional health system internal audit organization. The Office of Compliance has additional information on HIPAA and FERPA compliance SOPs.

**Precision Medicine Laboratory** – This CLIA/CAP certified laboratory occupies approximately 2500 square feet in the Clinical Sciences Research Building and is jointly managed by the Departments of Genetics (Dr. Miele) and Pathology. Its medical director is Dr. Gordon Love, Chair of Pathology. The laboratory is equipped with a negative pressure room for sample extraction, a Tecan robot, a pre-PCR library preparation space, ancillary equipment, 14 PCR instruments of which 2 devoted to COVID-19 testing and a NextSeq550Dx which is used to sequence the SARS-CoV2 genomes. The Laboratory is staffed by two Medical Technologists and a Research Assistant, supervised by a PhD faculty scientific director (Dr. Crabtree).

**Bioinformatics Resources** - The newly created Bioinformatics and Genomics Program (https://www.medschool.lsuhsc.edu/bioinformatics/), led by Dr. Chindo Hicks in the Department of Genetics and staffed with two full-time analysts, develops and applies statistically rigorous solutions for the design of studies, analysis and mining a wide variety of "omics" and other biological data, and integration of these data with clinical information to facilitate translation of genomic discoveries to the bedside and to accelerate the realization of Precision Medicine. The BIG program integrates the research, education and service missions of LSUHSC. The laboratory is equipped with up to 15 Dell workstations, A LINUX cluster, mass storage for database and data mining application, graphics workstations for visualization and popular bioinformatics and genomics software packages. The BIG program is connected by high-speed data links (the Louisiana Optical Network Infrastructure or LONI) to supercomputers in the Center for Computational Technology (CCT) at LSU Baton Rouge (https://www.cct.lsu.edu/). Among the services provided by the program staff include but are not limited to:

* Bioinformatics and computational genomic analysis of “omics”, genotype, sequence, methylation and other biological data
* Data analytics with application to analysis of big data in a biomedical setting
* Software development and deployment with application to database design and management of large-scale research data
* Providing education and training seminars on bioinformatics to students, medical professionals and biomedical investigators
* Integration of multiplatform-multiscale biological data with clinical information
* Development and application of novel methods and software tools to emerging biological questions and technologies
* Support in planning and design of grant applications, manuscript and abstracts
* Pathway prediction and modeling gene regulatory networks driving human diseases
* Quantitative modeling and prediction of disease progression and outcomes
* Maintenance of large-scale genomics and other biological databases
* Drug discovery and repositioning

**Innovation and Entrepreneurship resources -** The LSUHSC Office of Technology Management offers comprehensive support to LSUHSC investigators, including negotiating Material Transfer Agreements, Non-disclosure Agreements, Inter-institutional Agreements, licensing agreements etc. The OTM also offers training sessions for investigators planning to commercialize their findings and/or to collaborate with industry partners.

The Bioinnovation Center is a state of the art incubator facility for startup companies in Louisiana, most of which are spinoffs from LSUHSC or Tulane discoveries. The Center, located on Canal Street within walking distance of LSUHSC, Tulane and University Medical Center, provides space and licensing assistance to startup companies. To date, it has raised approximately $93 million in private funding for health care product and technology development.

**TRANSLATIONAL RESEARCH INFRASTRUCTURE**

**University Medical Center (UMC) Clinical Trials Unit**: In addition to the CTRC described above, which primarily serves outpatient clinical studies and trials, UMC supports a broad searchable portfolio of clinical trials and includes a clinical trials unit where LSUHSC physicians can enroll participants for inpatient clinical trials.

**Centers of Excellence**: LSUHSC New Orleans houses 7 dedicated Centers of Excellence in translational research. These include:

* The Alcohol and Drug Abuse Center
* The Cardiovascular Center
* The Epilepsy Center
* The Eye Center
* The Neuroscience Center
* The Oral and Craniofacial Biology Center
* The Stanley S. Scott Cancer Center

**Data Resources available to Investigators and Trainees (examples)**

The LACaTS Biomedical Informatics Core led by Dr. Miele, is the hub of data science serving LSUHSC and the other members of LACaTS. The BMI Core has access to a vast clinical informatics data warehouse, the PCORI-funded Research Action for Health Network (REACHNet). The REACHnet clinical data repository includes over 6 million active records. These data can be accessed through either the BMI or REACHnet teams. The data are currently in the PCORnet Common Data Model 6.2. Data elements not included in CDM 4.0 can be added for specific projects. Both REACHnet and the BMI maintain interconnected i2b2 instances, where research datasets are created. Queries can be submitted through the BMI Core, which has a process for prioritization and optimization of data science projects through the formation of Project Development Teams, including at least a biomedical informatician, a biostatistician and a subject matter clinical research expert. The BMI Core is tasked with creating “virtual biorepositories”, including active records specific to conditions that disproportionately affect Louisiana patients. To date, it has created Diabetes and a Breast Cancer virtual cohorts, with 8 more (4 cancer and 4 non-oncologic conditions) virtual cohorts planned. The time table and prioritization will depend on the needs of new projects, including CCTS projects. In order to harmonize data resources, the BMI Core and the CCTS hub are sharing data ontologies, and Dr. Cimino has agreed to serve as External Advisor for LACaTS. The BMI Core, also in collaboration with the CCTS hub, is also creating “virtual biorepositories” for at least 3 biospecimen collections: the LCRC Biospecimen repository, the Ochsner Biorepository and the Pennington biobank including biospecimens, anthropometric measurements and laboratory values for several thousand participants in diabetes/obesity registries. In 2024, LSUHSC and LCMC have signed an MOU that provides research access to the LCMC hospital system clinical data warehouse – independently of REACHNet.

**Clinical Care**

The Health care enterprise at LSUHSC consists of the LSU Healthcare Network, the LSUHSC partnership with UMC and other Louisiana Children Medical Center (LCMC) hospitals and additional clinical locations throughout Southern Louisiana where LSUHSC providers treat patients.

* Children’s Hospital New Orleans is a 263-bed, not-for-profit pediatric medical center offering a complete range of healthcare services for children from birth to 21 years. Children's Hospital is the first and largest full-service hospital exclusively for children in Louisiana and the Gulf South. Children's Hospital provides the highest level of care for children from all 64 parishes in Louisiana, across the Gulf South, and beyond. In 2022, our expert team provided more than 253,000 clinic visits, 67,693 ER visits, and performed 12,640 surgical cases. Our Helicopter, Abby, brought 408 patients from across the state and region to Children's Hospital to receive vital critical care services. Critical care is provided in the hospital’s 36-bed Neonatal Intensive Care Unit (NICU), 17-bed Pediatric Intensive Care Unit (PICU), and 28-bed Cardiac Intensive Care Unit (CICU). Children's Hospital's Main Campus ED is one of the area’s busiest emergency departments. The ED is staffed around the clock by board-certified pediatric emergency medicine physicians, with the availability of a full range of pediatric specialists. The Emergency Department has a total of 46 exam rooms, including a dedicated Behavioral Health pod and two Trauma Bays. The ED is supported by nurses and other staff who are specially trained to care for children experiencing pediatric emergencies, and their families.
* The LSU Healthcare Network includes 175 providers and 9 clinics in the Greater New Orleans area, offering services for over 30 specialties. Appointments can be made through a web-based patient portal, which also allows for secure communication between patients and providers and the creation of easy to access health summaries for LSUHN patients. LSUHN the same instance of EPIC as the LCMC hospital system, and the systems are linked.
* The University Medical Center New Orleans (UMC-NO). UMC-NO is a 5-years old, 1.1 billion dollar, 2.3 million square foot hospital. Its facilities cover 37 acres across the street from LSUHSC, and include three patient towers with 446-acute care beds including 60 behavioral health beds, 19 operation rooms, 76 pre-op and post-op bays, 56 emergency department exam rooms, nine acute treatment rooms and five trauma rooms. UMC also features a state-of-the-art Conference Center where CME events and research conferences take place.
* Outlying clinical locations served by LSUHSC providers including family medicine clinics and residency programs include Baton Rouge Our Lady of the Lake Hospital, the Bogalusa rural family medicine clinic, Lafayette General Hospital and the Lake Charles family medicine clinic.

**GRADUATE EDUCATION AND POSTGRADUATE TRAINING**

The LSUHSC School of Graduate Studies, directed by Dr. Angela Amedee, awards PhD degrees in Biomedical Sciences, through several distinct Departments and Centers:

* Biochemistry and Molecular Biology
* Cell Biology and Anatomy
* Genetics
* Microbiology, Immunology and Parasitology
* Neuroscience
* Pharmacology and Experimental Therapeutics
* Physiology
* Interdisciplinary Studies (consisting of a one-year integrated curriculum for students who will then choose a specific doctoral program)
* MD/PhD Program, which accepts 6 new applicants per year

Additionally, a M.S. program in Biomedical Sciences is offered, and a new M.S. Program in Bioinformatics will be offered in the fall. Applicants are recruited from the U.S. and other countries through a competitive admissions program that involves a pre-screening followed by in-person or electronic interviews. Incoming Graduate students participate in an orientation program that includes descriptions of each Graduate Program by individual Graduate Program Directors and/or Department Heads.

**Postdoctoral Researchers**: A specific training plan must be prepared and submitted by primary mentors for each postdoctoral scientist. Mentoring committees are highly encouraged. A number of training and career development opportunities are available through the LACaTS Professional Development Core, co-led by Dr. Kapusta.

**EQUIPMENT AND INSTITUTIONAL CORE FACILITIES**

Basic, translational and clinical resources at LSUHSC SOM can be found at the med school website and a searchable database of faculty scientific interests is available on the SOM research portal. LSU Health Sciences Center in New Orleans has numerous laboratory core facilities that are available to our investigators. Dr. Jiri Adamec (Office of the Dean) serves as Core Coordinator for the School of Medicine. Core facilities are available to all LSUHSC faculty and staff on a fee per use basis. These services are also available to outside institutions. The Cores include use iLabs to track usage and log service requests:

**The LSUHSC Clinical and Translational Research Center (CTRC)** provides a unified research infrastructure with an overall theme of “prevention, care and research of chronic diseases.” The clinical research core (LSUHSC-NO CTRC) provides a clinical site located in New Orleans, LA. The CTRC supports research activities, provides assistance with recruitment, and supports a network of clinical investigators, employing a uniform and systematic approach to clinical research. It includes a dedicated laboratory for biospecimen procurement, opening in March, 2024. The CTRC is located in the LSU Healthcare Network Multispecialty Clinic Building at 478 S. Johnson Street, Room 652. It is approximately 2,000 square feet and includes 5 exam rooms, 2 interview rooms, 2 offices, a medical records room, core laboratory, lobby, and a nurse's station. Parking is conveniently located behind the clinic building at no charge to patients.

**The Molecular Histopathology and Analytical Microscopy Core (MHAM),** directed by Luis Del Valle, MD, works in concert with the CIM and TGC Cores (see below). The primary mission of the MHAM is to provide advanced detection, imaging, and analysis of gene and protein dynamics in cellular models of normal and cancer tissues from research animals or from patients. The MHAM has state-of-the-art histochemical and immunohistochemical methodologies to determine protein expression, localization, and interactions between viral and cellular proteins. Molecular histopathology, including in situ hybridization, is used to provide investigators with information regarding cellular and viral DNA and/or RNA. This core is led by a trained pathologist who, in addition to imaging services, also provides histopathological information on patient tissues and provides access to clinical samples that are crucial to investigating the molecular and cellular pathways correlating with human disease. Finally, the MHAM core provides investigators with training on tissue processing and management and helps investigators develop the necessary imaging and data for the submission of manuscripts and grants.

**The Translational Genomics Core (TGC) Facility**, directed by Jovanny Zabaleta, PhD, is a core resource of LSU Health Sciences Center, sponsored jointly by the Cancer Center and the School of Medicine that is dedicated to supporting the research projects of investigators associated with the Cancer Center, the LSUHSC system, the Louisiana Cancer Research consortium (LCRC), and the research community in general. The Core has two very efficient Facilities: (1) The Sequencing Facility dedicated to Sanger-based sequencing requests from our investigators. In this Facility we have access to two 3130X sequencers from Applied Biosystems, which in addition to DNA sequencing, can be used for DNA fragment analysis and SNP validation by direct sequencing. This Facility is also equipped with several PCR machines, centrifuges, heat blocks and other support equipment. The Sequencing Facility is staffed by two dedicated technicians who provide detailed sample analysis and troubleshooting guidance as necessary. (2) The Illumina Facility includes a BeadStation 500 with a BeadScanner that allows the genotyping of DNA from 94 to more than 1 million SNPs from only 200ng of DNA. The format of the chips used for DNA analysis depends on the number of SNP analyzed: the Sentrix Array Matrix or SAM, allows the analysis of 48 up to 1,536 SNPs in a platform of 96 samples simultaneously. In the glass chips more than 1 million SNPs can be investigated with formats of 2 (1 million SNPs) or 4 (660 thousand SNPs) samples per chip, allowing faster results, higher coverage, and higher multiplexing, at a lower price. The DNA analysis also allows the investigation of the methylation status of 1,530 to 27,000 CpG islands distributed throughout the genome. Linkage analysis to study the association of specific markers to disease can also be done using the Linkage Panel from Illumina, using our BeadStation 500. The Admixture Panel is used in our platform when genetic admixture is suspected in a population or to adjust the association analyses of certain studies in one specific population. Our Illumina Core has also a BeadExpress reader which can also be used for most of the analyses described above. Our system also allows the simultaneous analysis of up to 12 samples per chip (two chips per assay) of the whole transcriptome (mRNA, more than 37,000 transcripts) and the continuously growing microRNA (miRNA, up to more than 1,300) panel, in studies aiming to determine the levels of gene expression. Our Facility has a TECAN robot to maximize liquid handling accuracy and reduce hands-on staff time. Two separate rooms are used for the pre- and post-PCR reactions in order to reduce the possibility of contamination. Next Generation Sequencing (NGS) capabilities include a NextSeq, a MiSeq, and a Genome Analyzer 2X (GA2X) from Illumina for sequencing of DNA, RNA, miRNA/lncRNA, bisulfite modified libraries and products of chromatin immunoprecipitation (ChIP). More recent additions include a Geo-Mx spatial transcriptomics instrument and a Lunaphore COMET multi-channel immunostaining instrument to support spatial biology applications. Shakers, incubators, hybridization ovens and heat blocks are also part of the Illumina Core. A NanoDrop and an Agilent 2100 allows the accurate quantitation and the fast determination of the quality of the nucleic acids and generated libraries. The Core also has systems for real-time PCR from both Applied Biosystems and Bio-Rad which are used to confirm the results obtained with the microarray technology of the Illumina system.

**Proteomics.** The LSUHSC Proteomics Core Facility, supported by The LSUHSC School of Medicine and The Louisiana Cancer Research Consortium, offers proteomic services and resources to investigators both within and outside of LSUHSC, and throughout Greater New Orleans. The facility personnel consult in the design and implementation of experiments for the advancement of investigators’ projects. The main laboratory occupies ~1300 sq. ft. of laboratory space to house several advanced mass spectrometers, 2-Dimensional gel electrophoresis and 2-Dimensional Liquid Chromatography. An additional 500 sq. ft. of laboratory space is dedicated to 2-Dimensional gel electrophoresis. 2-Dimensional gel electrophoresis (2DGE) separates proteins in high resolution to survey the proteome of cells or tissues. The Proteomics Core Facility is highly experienced in protein extractions from cells and tissues for 2DGE. Currently, the new generation fluorescence-tag based 2DGE, differential gel electrophoresis (DiGE), is the choice of the Facility. DiGE eliminates gel variations by running differentially tagged control and treated samples in the same gel. The uniquely labeled protein samples are separated using an IPGphor IEF and a Dalt6 PAGE cell from GE Healthcare. Following electrophoresis, a GE 9400 Typhoon scanner image is analyzed with DeCyder image analysis software. This software provides investigators with statistically accurate and sensitive protein quantification. A GE Ettan spot handling workstation cuts and digests gel spots automatically for sequential protein identification by mass spectrometry. In addition, traditional 2-dimensional gel electrophoresis utilizing the Bio-Rad system (PDQuest software, ProteomeWorks spot cutter and GS800 scanner from Bio-Rad and MultiProbe spot handling system from Perkin-Elmer) is also offered for investigators when needed. The Proteomics Core Facility possesses two modern tandem mass spectrometers for a variety of analyses. For protein identification of 2D gel spots, the Proteomics Core Facility utilizes an ABI 4700 Proteomics Analyzer MALDI TOF-TOF mass spectrometer which offers both high throughput (40 samples per hr) and high resolution (< 100 ppm). The 4700 Proteomics Analyzer can analyze the tryptic digest samples at a low nanogram level. For the analyses requiring higher sensitivity, the Proteomics Core Facility uses a Thermo-Fisher LTQ-XL linear ion trap electrospray ionization mass spectrometer coupled with an Eksigent 2d nanoLC, which offers high picogram sensitivity. LTQ-XL LC-MS also is capable of identifying multiple proteins from 1D gel bands of immunoprecipitation samples, pull-down experiment eluates and more. LTQ-XL is equipped with versatile tandem mass analysis, such as single ion monitoring in detecting expected post-translationally modified peptides. The staff works with investigators at all levels, including experimental design, data collection, and data analysis, customizing the experiments to the needs of the investigator. Two additional classic mass spectrometers in the Facility are available to people with samples which require medium sensitivity (ca. sub-mM level). An Agilent 1100 LC-MSD is an integrated LC-MS system; it is excellent for QC and MW determination of synthetic peptides and organic compounds. This system and an ABI classic Voyager DE MALDI -TOF mass spectrometer are excellent for simple MW determinations of larger proteins/peptides. Dionex Ultimate 3000 was recently installed for developing LC-based shotgun proteomics, an alternative to 2DGE-based method. The LC-based method is complementary to the gel-based method. Standardized protocols are in development which will offer the identification of proteins in a wider pI and molecular weight range than 2DGE. An in-house IBM 10-node parallel processor server furnishes the demanding computing speed for database searches. The Proteomics Core Facility has two powerful database search engines, SEQUEST (Thermo-Fisher) and Mascot Server (matrix Sciences, Landon, UK), to analyze data from Thermo LTQ and ABI 4700 mass spectrometers. While The Proteomics Core Facility routinely utilizes NCBInr and SwissProt databases, specific customized databases can be set up upon request. In addition to protein identification searches, these programs also facilitate sequence blast, and modification determination. A programming expert in Biochemistry supports the Facility in bioinformatics in adopting open-source programs, for data validation, integration, etc.

**Cellular Immunology and Immune Metabolism (CIM).** The Cellular Immunology and Immune Metabolism (CIM) Core Facility (Associated with the Stanley S. Scott Cancer Center and the Louisiana Cancer Research Consortium; Director – Dorota Wyczechowska, Ph.D.) is a customer oriented service dedicated to supporting the research needs of the investigators of the Louisiana State University Health Sciences Center. It provides state-of-art instrumentation and expertise for addressing experimental issues related to single cells, nuclei and chromosomes. In addition to the most powerful cell sorter, the BD FACSAria, the facility owns advanced flow cytometry instrumentation, including the BD LSRII and BD FACSCalibur. The Core is able to sort human as well as animal cells under aseptic conditions at high speed with high purity and yield. BD LSRII is suitable for (not limited to) immunophenotyping, intracellular cytokine and signaling pathway study, cell cycle determination and apoptosis detection by several different ways. Additional capabilities include an Auto MACS cell sorter, a BioRad Bio-plex system, and AID Elispot reader. The auto MACS separator is a computer controlled magnetic cell sorter for isolation of virtually any cell type. There are several separation programs available allowing different cell selection strategies. Employing the MACS magnetic cell separation technology the auto MACS separator is capable of sorting more than 10 million cells per second from samples of up to 109 total cells. The BioRad Bioplex system is a fully integrated system combining hardware, Bio-Plex Manager software, system validation and calibration tools, assays, and beads. The system ensures accurate and reproducible results. The AID Elispot Reader System is a combination of classic AID reader unit and the AID EliSpot software to acquire, analyze, and quantify the spots according to the user's settings. In addition to instrumentation, the Facility collaborates with the investigators and contributes to all aspects of the research process. This includes consultation in experimental design, technical assistance in the operation of instruments, troubleshooting, data analysis and storage, interpretation of results and preparation and production of presentation graphics. The Facility is also communicating with investigators in other institutions and is devoted to introducing and developing new applications on our flow cytometers. In this way, investigators are provided with unlimited possibilities to answer questions regarding nature and function of cells by flow cytometry.

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| PENNINGTON BIOMEDICAL RESEARCH CENTER (PBRC) |

Pennington Biomedical Research Center (PBRC) is a model for clinical and translational research since it houses basic, clinical and population research programs in one facility. The description here shall focus on the Clinical Research Unit.

**Facilities Overview**

Clinical Research Building

The outpatient-based clinical research of PBRC is conducted in Clinical Research Building No. 1. Clinical Research Building No. 1 is a four-story, 90,000-square-foot building that connects to Clinical Research Building No. 2. The facilities are primarily dedicated to clinical research trials for PBRC. The unit is designed for easy access and convenience of research volunteers. PBRC’s central location in Baton Rouge, covered drive-up entry and spacious free parking are assets encouraging research subject participation. Accommodations for on-site dining and convenient take-out food service and a food delivery service facilitate feeding studies. The activity of the Clinic over the years since 1992 is summarized below in Table A.

The ground floor of Clinical Research Building No. 1 includes 16 general examination rooms; two EKG procedure rooms; one room equipped for determination of height, weight and anthropometrics; three private interview rooms; a secured pharmacy storage room; one cognitive testing room; and one point-of-care testing room. Also on the ground floor is the phlebotomy area. This area includes six phlebotomy chairs with four connecting specimen collection facilities. The medical records department houses dedicated workspace and a secured storage space for medical records. The clinical unit also contains administrative office space, reception and waiting areas, six recruiting offices and three offices for physician personnel.

An Imaging Core Laboratory with DXA instrumentation, an ECHO MRI, Ultrasound and BodPod testing rooms are also located on the ground floor. In the Imaging Laboratory, there is also office space for two technicians. In addition, a state-of-the-art exercise lab for conducting ECG-monitored maximal exercise testing (i.e., VO2 Max) and strength testing in adults and children is found on the ground floor. The exercise lab has locker rooms and facilities.

The second floor of Clinical Research Building No. 1 has a psychology/behavioral area that accommodates five eating monitors and offices for the personnel. Since the second floor connects directly to the first and second floors of Clinical Research Building No. 2 at the Metabolic Kitchen area, all participant dining and monitored eating is conducted adjacent to the Metabolic Kitchen. There is a participant dining area on the second floor (close to our Metabolic Kitchen) that accommodates approximately 30 people.

The Clinical Research Building No. 1 also contains the following:

* One floor for additional support personnel for expanded clinical activities
* Housing for the home office of the Louisiana Clinical and Translational Science Center (LA CaTS)
* Housing for up to 40 study coordinators
* Office space for five physicians and 15 faculty members and their support staff

The second floor of Clinical Research Building No. 2 contains the following:

* Metabolic Kitchen (described in more detail below)
* Four indirect room-size calorimeters for the Metabolic Chamber Core (described in more detail below)
* Indirect calorimetry suite (seven stations total)
* Inpatient dining area
* 10 inpatient rooms (each with two beds/room)
* Nurses station
* Satellite pharmacy
* Specimen processing room
* Sunroom for participant utilization
* Three rooms for euglycemic and hyperglycemic clamp procedures
* IV procedure room (seven chairs) for FSIGTT, oral glucose tolerance testing and meal tests
* Biopsy room for skeletal muscle and adipose biopsies

Translational Research Clinic for Children (TReCC)

TReCC is a 14,150-square-foot research facility located on the first floor of Clinical Research Building No. 2 and is dedicated for pediatric clinic visits and exercise testing. This outpatient pediatric research unit includes exam and treatment areas, procedure rooms, a metabolic cart room, meeting room and demo kitchen, indoor play and observation area, outdoor play area, exercise room, , lab and phlebotomy area, administrative and other office support. The exercise and activity rooms are arranged and stocked according to active study trials. Exercise equipment sized appropriately for children are available and on-site including treadmills, stationary bicycles and cybercycles. Metabolic testing equipment for both adults and children is set up in the specialized procedure rooms.

Imaging Center

A 30,000-square-foot Imaging Center connects to Clinical Research Building No. 1. This Imaging Center accommodates Magnetic Resonance Imaging, X-ray and other imaging equipment as well as faculty offices and support space.

Exercise Training Facility

Clinical research is also conducted within a 2,300-square-foot Exercise Training Facility on the PBRC campus. The facility offers state-of the-art equipment, professional intervention technicians and optimal training data-capturing capabilities. Staff have the ability to collect and enter data in real time via a standing desk with dual monitors to operate the heart rate software, databases and drive files as needed. The cardiorespiratory fitness training room contains 12 treadmills, six stationary bikes, and two elliptical machines, while the strength training room has an extensive set of machines and free weights. There are three private rooms for intervention-related counseling in a one-on-one or small-group setting. For measurements, there’s a private exam room complete with scale, stadiometer and computer. In addition, there’s a meeting room space capable of outfitting group exercise classes, group presentations, study orientations or introductory sessions, or a child care facility for study participants. The Exercise Training Facility is supported by a trained staff composed of full-time exercise interventionists and students working on exercise-related degrees. The facility is participant-friendly and includes televisions. Further, there are locker rooms with lockers and showers available exclusively for the use of study participants. The facility has a defibrillator, electronic scales and multiple heart rate monitoring systems (Polar and Zephyr BioHarness). There is an outdoor walking track, as well. The scenic walking track is 12 feet wide, paved, lighted and well-maintained. While the track is over half a mile in length, there are three intermediate circle turn-outs that can be used to create shorter walking courses.

Mobile Clinic

A new (2024) 38-foot mobile exam unit is available for community outreach, recruitment, and research activities. The mobile clinic includes a central intake/phlebotomy area that consists of seating for 3-4 people, and has a chair designed for phlebotomy/blood pressure collection. Adjacent to the intake area, there is a bathroom with a pass-through window that can be used for urine sample collection. In addition to the intake area, there are two exam rooms; one exam room is outfitted with a power exam table and sink; the other exam room has removable tables and chairs and can be used for a number of procedures, including consenting, questionnaire completion, collection of anthropometry, etc. A wheelchair-accessible lift provides additional access to the rear exam room and central areas of the mobile clinic. The mobile clinic is cooled by two roof-top air conditioners, and power is supplied by an on-board generator. A medical refrigerator is also available for storage of samples. On-board wifi is provided by a rooftop unit, and several monitors are available for telemedicine activities.

**Clinic Visit Report**

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **New Study Starts** | **Active Studies** | **Studies Moved to Analysis** |
| 2018 | 24 | 79 | 21 |
| 2019 | 22 | 71 | 15 |
| 2020 | 18 | 64 | 10 |
| 2021 | 35 | 90 | 21 |
| 2022 | 24 | 79 | 21 |
| 2023 | 33 | 74 | 22 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Inpatient Procedures Report** | | | | | |
| **YEAR** | **INPATIENT STAYS** | **BIOPSY** | **CLAMP** | **IV PROCEDURES** | **LAB WORK** |
| 2005 | 736 | 603 | 114 | 614 | 946 |
| 2006 | 1,449 | 299 | 151 | 524 | 407 |
| 2007 | 1,031 | 317 | 292 | 804 | 474 |
| 2008 | 677 | 251 | 195 | 504 | 443 |
| 2009 | 1,770 | 233 | 183 | 512 | 1,379 |
| 2010 | 902 | 188 | 79 | 725 | 970 |
| 2011 | 1,168 | 131 | 72 | 579 | 910 |
| 2012 | 221 | 123 | 53 | 426 | 574 |
| 2013 | 185 | 56 | 36 | 583 | 788 |
| 2014 | 666 | 48 | 37 | 662 | 850 |
| 2015 | 297 | 86 | 48 | 536 | 464 |
| 2016 | 347 | 184 | 22 | 329 | 762 |
| 2017 | 539 | 169 | 1 | 407 | 357 |
| 2018 | 401 | 38 | 2 | 387 | 316 |
| 2019 | 133 | 62 | 23 | 228 | 1,312 |
| 2020 | 462 | 281 | 27 | 334 | 1,106 |
| 2021 | 661 | 524 | 33 | 375 | 1,191 |
| 2022 | 277 | 719 | 34 | 301 | 1,310 |
| 2023 | 175 | 353 | 36 | 485 | 2,666 |
| **TOTAL** | **12,097** | **4,665** | **1,438** | **9,315** | **17,225** |

**Experience in Pediatric Research**

Pennington Biomedical is well known for its excellent basic, clinical and population research programs in obesity, diabetes and metabolism. Pennington Biomedical houses the Childhood Obesity and Diabetes Research Program. The pediatric research studies that have been conducted at Pennington Biomedical are summarized in the table below.

**Summary of pediatric studies conducted at Pennington Biomedical**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study Name** | **Dates** | **Sample Size** | **Age Range** | **Type of Study** |
| Baton Rouge Children’s Study | 1991-1995 | 129 | 10-12 years | Longitudinal |
| HipTeens | 2003-2004 | 57 | 11-15 years | Intervention |
| WiseMind | 2003-2007 | 670 | 7-12 years | Intervention |
| LA Health | 2006-2010 | 2060 | 8-15 years | Intervention |
| **Study Name** | **Dates** | **Sample Size** | **Age Range** | **Type of Study** |
| The Effect of Resistant Starch on the Stool Microflora of Children | 2008-2009 | 4 | 7-14 years | Intervention |
| Anthropometric Assessment of Abdominal Obesity and Health Risk in Children and Adolescents (WAIST) | 2009-2011 | 411 | 5-18 years | Cross-sectional |
| International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE) | 2010-2014 | 7806 | 9-11 years | Cross-sectional |
| The Satiating Effect of Eggs in Children and Teens | 2011-2012 | 41 | 4-17 years | Intervention |
| The Food Phone Project | 2011-2014 | 54 | 12-18 years | Cross-sectional |
| Parent-Targeted Mobile Phone Based Intervention to Increase Physical Activity in Children (P-MOBILE) | 2011-2014 | 27 | 6-10 years | Intervention |
| Klub Kinect | 2013-2014 | 42 | 14-18 years | Intervention |
| Protein and Weight Loss in Teenagers (POWER) | 2014-2015 | 32 | 12-17 years | Intervention |
| Female Athlete Body Project | 2012-present | 500 | 18-21 years | Intervention |
| CADENCE-KIDS: Cadence and Intensity in Children and Adolescents | 2013-2015 | 122 | 6-20 years | Cross-sectional |
| Development of a parent training curriculum to address childhood obesity risk factors (DRIVE) | 2014-2016 | 16 families | 2-6 years | Intervention |
| Our Lifestyles, Our Lives | 2014-2016 | 105 | 8-17 years | Intervention |
| GameSquad: Gaming Technology to Encourage Healthy Weight and Activity in Youth | 2015-2016 | 46 | 10-12 years | Intervention |
| Beta Cell Pilot: Assessment of Unmethylated Insulin DNA with Droplet Digital PCR in Children and Adolescents with Type 1 Diabetes | 2016 | 20 | 10-19 years | Pilot |
| BabyEE Pilot: Measurement of Energy Metabolism in Infants | 2016-present | 30  (ongoing) | 1-3 months | Feasibility Pilot |
| Effect of Body Composition with Albuterol and Caffeine versus Placebo in Adolescents: A Pilot Study (CAMP) | 2016 | 12 | 12-17 years | Intervention |
| Translational Investigation of Growth and Everyday Routines in Kids (TIGER Kids) | 2016-2020 | 345 | 10-16 years | Translational |
| Pause & Play | 2016-2018 | 191 | 3-4 years | Translational |
| A Randomized, Double-Blind, Placebo-Controlled, Pharmacokinetic and Pharmacodynamic Study of VI-0521 in Obese Adolescents (VISTA) | 2016 | 19 | 12-17 years | Intervention |
| T1GER: SIMPONI® to Arrest ß-cell Loss in Type 1 Diabetes | 2017- 2020 | 2 | 6-21 years | Intervention |
| TDR14311: Randomized, double-blind, placebo-controlled, dose escalation, study on safety, pharmacokinetics and pharmacodynamics of lixisenatide in pediatric patients with Type 2 diabetes mellitus not adequately controlled with metformin and/or basal insulin | 2016- 2021 | 1 | 10-17 years | Intervention |
| Effect of liraglutide for weight management in pubertal adolescent subjects with obesity: NN8022-4180 | 2016-2019 | 6 | 12-18 years | Intervention |
| TIGER Kids Fitness Ancillary | 2017-2020 | 30 | 10-16 years | Translational |
| Treatment Efforts Addressing Child Weight Management by Unifying Patients, Parents & Providers (TEAM UP) | 2018-2025 | 243 families (728 overall) | 6-15 years | Intervention |
| Shape-Up Kids Fitness | 2018-2021 | 60 | 5-17 years | Translational |
| Measurement of Body Fat in Infants (Baby Fat Pilot) | 2018-2019 | 4 | 14-28 days | Feasibility Pilot |
| **Study Name** | **Dates** | **Sample Size** | **Age Range** | **Type of Study** |
| A Multicenter, Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Efficacy and Safety of Alogliptin Compared With Placebo in Pediatric Subjects With Type 2 Diabetes Mellitus (PedalOn) | 2018-2021 | 5 | 10-17 years | Intervention |
| Shape-Up Kids | 2017-2022 | 225 | 5-17 years | Translational |
| A Randomized, Double-Blind Study with an Open-Label Extension Comparing the Effect of Once-Weekly  Dulaglutide with Placebo in Pediatric Patients with Type 2 Diabetes Mellitus (Award Peds) | 2017-2021 | 5 | 10-18 years | Intervention |
| Painted Playgrounds: a scalable approach to increasing physical activity and motor skills in Louisiana preschool-aged children | 2017-2021 | 72 | 3-6  years | Intervention |
| Measurement of in vivo mitochondrial capacity in infants: a 31P-MRS pilot study | 2018-present | 8 (ongoing) | 10-28 days | Feasibility Pilot |
| Adaptation of SmartIntake for food intake assessment in infants (Infant Smart Intake) | 2018-2020 | 70 | 1-6 months | Intervention |
| Dissemination and Implementation of an Evidence-Based Pediatric Weight Management Program for Use by Low-Income Families: A User-Friendly Package of Family-Based Behavioral Treatment (RYSE) | 2019-present | 108 | 5-12 years | Intervention |
| The Effect of Myelin-Relevant Nutrients in Infant Formula on Brain Myelination and Cognitive Development (CONNECT) | 2019-2022 | 14 | Birth-24 months | Intervention |
| Vitamin D Supplementation in Children with Obesity-Related Asthma (VDORA1) | 2019-2021 | 5 | 6-18 years | Intervention |
| A Phase IV, Multi-Center, Randomized, Double-Blind, Placebo-Controlled, Parallel-Design Study to Determine the Safety and Efficacy of VI-0521 in Obese Adolescents, OB-403 (VITA) | 2019-2021 | 10 | 12-17 years | Intervention |
| A Prospective, Randomized, Double-Blind Comparison of LY900014 to Humalog with an Open-Label Postprandial LY900014 Treatment Group in Children and Adolescents with Type 1 Diabetes (PRONTO PEDS) | 2019-2021 | 8 | 1-18 years | Intervention |
| Efficacy and safety of oral semaglutide versus placebo both in combination with metformin and/or basal insulin in children and adolescents with Type 2 diabetes (PIONEER TEENS) | 2020-present | 5  (ongoing) | 10-18 years | Intervention |
| Validity of the Remote Food Photography Method to measure food intake in adolescents in free-living conditions (FOOD PHONE 2) | 2020-present | 20  (ongoing) | 12-18 years | Intervention |
| Differences in 24-hour energy expenditure, substrate oxidation and appetite in adolescent girls (STRONG) | 2020-present | 20  (ongoing) | 13-17 years | Intervention |
| A Novel Biomarker for Development of Type 2 Diabetes: 11Beta-Hydroxy Steroid Dehydrogenase Type 1 Activity (URCORT) | 2020-present | 8 (ongoing) | 18-21 years | Intervention |
| Infant Formula and Toddler Drink Feeding Intervention through 24 Months of Age (Greaux Baby) | 2021-present | 60 (ongoing) | 0-24 months | Intervention |
| Toddler Outdoor Time (TOT) Study: Modification of Early Childhood Education Center’s Outdoor Setting for Toddler Health | 2021-2022 | 15 (ongoing) | 1-2 years | Intervention |
| A Pilot Study Evaluating Indoor Pursuits for Moderate-to-Vigorous Physical Activity in Preschoolers: INDOOR ACTIVE | 2021-2022 | 35 | 3-4 years | Intervention |
| The SUNRISE Trial: An Investigation on Movement Behaviors in Early Childhood | 2021-present | 100  (ongoing) | 3-4 years | Intervention |
| GamerFit: A Digital Intervention to improve Physical Activity and Sleep in Youth with Psychiatric Disorders | 2022-2023 | 62 | 14-17 years | Intervention |
| GamerFit mHealth/Telehealth Lifestyle Intervention for Youth with Autism Spectrum Disorder | 2021-2023 | 23 | 10-15 years | Intervention |
| PLAY: An Intervention to Improve Motor Skills in Young Children | 2018-2020 | 72 | 3-4 years | Intervention |
| **Study Name** | **Dates** | **Sample Size** | **Age Range** | **Type of Study** |
| A Phase 2/3, Two-Part, Open-Label, Dose-Escalation, Age De-escalation and Randomized, Observer-Blind, Placebo-Controlled Expansion Study to Evaluate the Safety, Tolerability, Reactogenicity, and Effectiveness of mRNA-1273 SARS-CoV-2 Vaccine in Healthy Children 6 Months to Less Than 12 Years of Age (KIDCOVE) | 2021-present | 55 (ongoing) | 2-12 years | Intervention |
| Evaluating the validity of a novel tool to measure children's food intake and improve health (Portion Size Peds) | 2022-present | 40 (ongoing) | 7-12 years | Intervention |
| Shape Up! Keiki | 2022-present | 12 (ongoing) | 0-5 years | Translational |
| NIH RECOVER Peds: A Multi-Center Observational Study: The Recover Post Acute Sequelae of SARS-CoV-2 (PASC) Pediatric Cohort Study | 2022-present | 55 (ongoing) | 0-21 years | Intervention |
| An Examination of Brown Adipose Tissue and Energy Expenditure in Infants (Born2Burn Calories) | 2022-present | 3 (ongoing) | 0-3 weeks | Cross Sectional |
| A State Survey of Louisiana Children’s Health Behaviors and Environments (MAP LA) | 2023-present | 311 | 6-12 years | Survey |
| Fathers and Children Exercising Together (FACEiT) | 2023-present |  |  | Intervention |
| Carpenter Health Network and PBRC Pilot Family Weight Management Program in a Home Health Care Setting | 2023-2025 | 9 (ongoing) | 6-12 years | QI Project |
| BCBS Mixed Reality Project Using Screentime to Increase Student Activity Levels (Screen2Play) | 2024-2025 | 0 (ongoing) | 10-15 years | Intervention |
| The Dose Trial: Dose Intensity for Behavioral Interventions for Childhood Obesity | 2024-present | 0 (ongoing) | 5-17 years | Intervention |
| Phentermine’s Impact on Treatment in Teens (PhITT): A Randomized Placebo-Controlled Trial of Phentermine for Adolescents with Obesity | 2024-present | 0 (ongoing) | 12-17 years | Intervention |

**Community Outreach and Engagement**

Pennington Biomedical is the lead institution and home office for the Louisiana Clinical and Translational Science (LA CaTS) Center (U54GM10494; J. Kirwan, PI). To facilitate community-engaged research and community outreach, LA CaTS has faculty and staff members of the LA CaTS Community Engagement and Outreach (CEO) Core and three Community Advisory Boards (CABs), located in New Orleans, Baton Rouge, and Shreveport. These CABs provide a conduit for bi-directional communication between researchers and our communities. Faculty at Pennington Biomedical often interact with our CAB to consult on community research needs, protocol development, participant recruitment and retention, and interpretation of research results. All Pennington Biomedical faculty have access to the LA CaTS CABs, as well as support from the LA CaTS CEO Core. In 2024, LA CaTS launched a new initiative, the Community Research for Optimal Wellness Network (CROWN), which extends community engagement beyond the LA CaTS CABs and throughout the state. CROWN is led by Pennington Biomedical, with collaboration across LA CaTS institutions. CROWN not only enhances community capacity for engagement in research, but also provides additional infrastructure for bi-directional engagement between Pennington Biomedical researchers and community members. The CROWN infrastructure facilitates community-engaged research activities such as (1) formation of study-specific Community Advisory Boards for Pennington Biomedical researchers and (2) Community Engagement Research Studios (CERS). These CERS are formed at the request of the Pennington Biomedical researcher, facilitated by CROWN staff, and provide the opportunity for researchers to receive constructive feedback on the relevance and/or feasibility of research ideas from community members with experiences relevant to their particular research idea.

**Clinical Research Core Services**

**The following units act as Clinical Research Core Services at Pennington Biomedical Research Center:**

1. Clinical Trials Unit
2. Recruiting Core
3. Communications and Marketing
4. Biostatistics
5. Data Management Core
6. Clinical Chemistry Core Laboratory
7. Mass Spectrometry Core
8. Dietary Assessment Core
9. Ingestive Behavior, Weight Management & Health Promotion Laboratory
10. Metabolic Kitchen Core
11. Energy Metabolism Core Laboratory
12. Imaging Core
13. Exercise Testing Core

**Clinical Trials Unit**

The Clinical Trials Unit is directed by Cody VanMeter, MBA. The unit’s Chief Medical Officer is Frank Greenway, M.D. The CTU’s medical staff includes one additional medical doctor, a physician’s assistant, three nurse practitioners, and two pharmacists. The CTU maintains a full array of research specialists to include registered nurses, licensed practical nurses, registered dietitians, project managers, physical trainers, exercise physiologists, clinical and interventional specialists, study coordinators, scheduling coordinators, and health information management coordinators. The unit is responsible for the development, oversight and coordination of all clinical trials performed at the center and within the community for both adult and pediatric studies.

Outpatient Clinic and Intervention: The Outpatient Clinic of the Clinical Trials Unit is open Monday through Friday from 7 a.m. until 4:30 p.m. Under the direction of Melissa Lingle, the clinic provides services to include but not limited to: screening of potential study participants, completion of protocol-specific clinic visits, regulatory oversight for all studies, study-specific coordinators and backup coordinators, initial study development, program management, dispensing of study medications, completion of case report forms and quality assurance of source documentation. The unit includes the general examination rooms, interview rooms, phlebotomy area and pharmacy previously mentioned.

The intervention arm of the Clinical Trials Unit, also under the direction of Melissa Lingle, provides services seven days a week as required by specific research studies. This department is responsible for providing project management; conducting prescreening assessments, orientations and consenting; collecting assessment data, physical activity or other devices; completing run-ins; and assigning randomization. Additionally, this team is involved in designing and conducting behavioral (nutrition, weight loss, behavior change, app delivery, etc.) and exercise interventions for intervention-based trials. The team has experience in formative and qualitative research including but not limited to lab and field usability of apps, qualitative interviews and focus groups. The work of this group is performed both on the campus of PBRC and offsite in community-based settings.

Inpatient Unit: The Inpatient Unit of the Clinical Trials Unit is open seven days a week including holidays, with the exception of the Christmas break. Under the direction of Celeste Waguespack, FNP-C, APRN, the Inpatient Unit provides the following services but is not limited to: euglycemic hyperinsulinemic clamps, hyperglycemic clamps and hypoglycemic clamps; oral glucose tolerance tests (OGTT); lumbar punctures; frequently sampled insulin glucose testing (FSIGTT); meal tolerance testing; feeding studies; pharmacokinetic testing (including phase I-IV medication trials); muscle and fat biopsies; and overnight stays. The unit can perform extended inpatient testing as necessary. All licensed medical personnel are BLS certified, with MD, NP and PA staff also ACLS certified. The unit has ten inpatient rooms (twenty-subject capacity), three glucose clamp rooms, a large procedure room, biopsy room, satellite pharmacy, blood specimen processing room, and functional nurses station equipped with a telemetry system. The procedure statistics by year are listed above.

Pharmacy: The pharmacy is operated by Claire Hazlett, RPh. When a study medication arrives at the center, the shipment is verified by the pharmacist and all records are kept according to each specific study protocol. Temperature logs are kept to assure all medication is stored under appropriate conditions. If a study medication arrives in bulk form, the pharmacist is responsible for counting and labeling the medication in the study-appropriate fashion before it is dispensed to study subjects. An accountability form is completed when a study medication is packaged to keep a record of which subjects received placebo or active. This form records the amount of medication remaining in the pharmacy as well as expiration dates. Accurate accounting for the dispensing of a study drug is maintained by the pharmacist. When a drug leaves the pharmacy for dispensing to a subject, the study coordinator is required to complete a dispensing log. This record requires documentation of: the subject identification number, subject initials, coordinator who dispensed, number of bottles/tablets dispensed, date dispensed and if applicable, the amount of drug returned. If sponsors require drug accountability and dispensing be kept electronically via an IRT/IWRS system specifically for their study, paper logs are not utilized. When study medication is ready for distribution, it is transported by the pharmacist to the locked pharmacy storage area with restricted access on the ground floor of Clinic Building No. 1. The Pharmacy can source supplies for studies when needed.

The pharmacy can compound non-sterile products into different dosage forms including capsules, liquids and nasal sprays. The pharmacy is equipped with an aseptic suite where sterile compounds can be prepared. The pharmacists stay up to date with all USP 795/797 requirements to assure procedures and facilities comply.

**Recruiting Core**

Recruitment services for clinical trials and other human research studies conducted at PBRC are coordinated by the Recruitment Core and directed by Alison Carville. The Recruitment Core manages all community outreach and recruitment services for human research studies at PBRC, such as screening all incoming calls to determine study eligibility; assisting in partnership development, specifically with local community groups, physicians and healthcare facilities; and serving as the first line of contact for all human research study participation. Incoming calls are directed to a call center that is operated by three full-time recruiters and is equipped with a Uniform Call Distributor (UCD) system. A UCD system expands the capability of a traditional phone system and allows multiple individuals to call simultaneously and be directed to the next available recruiter. The core utilizes an electronic message tracking application that tracks the outgoing phone call activity and a “smart” electronic phone screen system that screens potential participants upon initial phone contact and seamlessly matches them to alternative studies when deemed ineligible for the original study that they called about. In 2012, the core launched a new web screener for screeners to be able to go online, choose a study they are interested in and complete a preliminary screening. The system can tell the screener upon completion whether they are eligible at that point in the screening process, and if they are ineligible, it will alert them to other studies they may be eligible for; at that point, they could continue to screen for those studies. If the screener is eligible, they are then contacted by a live recruiter to complete the screening process and schedule their first screening appointment. In 2023, an average of 1100 web screens were completed each month with almost 8500 phone screeners for the year.

**Communications and Clinical Trials Marketing**

The Communications Department, under the direction of Ernest Ballard, supports the recruiting and marketing functions for clinical research. The team supports the Recruitment Core’s marketing efforts by creating media assets and pursuing earned media opportunities on the local and national level that focus on research studies currently underway. Through earned (unpaid) media placements (such as newspaper, magazines, radio, television and more), the Communications Department garnered a potential reach of over 250 million impressions with stories focused on research studies currently underway or results of research studies done at the center.

The Clinical Trials Marketing function, led by Aryelle Stafford, secures and places paid advertisements for clinical trials, based upon study budgets and regulatory guidelines, and aligned with central marketing strategies. The marketing function also uses social media such as Facebook, Twitter, Instagram and strategic email campaigns to aid the Recruiting Department in targeting the 50,000+ subscribers who have requested regular information and updates regarding clinical trials and research at Pennington Biomedical.

**Biostatistics and Analysis Capabilities**

The PBRC Biostatistics Core is headed by Kimberly L Drews, Ph.D. This core resides in the Population and Public Health Sciences research program at PBRC, which is headed by Peter Katzmarzyk, Ph.D. In addition to Drs. Drews and Katzmarzyk, there are two Ph.D. and three masters-level biostatisticians. Together, this team serves the research design and analysis needs for all faculty members at PBRC. The core is housed in Clinical Research Building No. 1, and there are spacious offices for faculty and adjacent cubicles for masters-level personnel. The core is equipped with Pentium computers, and the email and data transfer needs are supported by the PBRC Technology Services Group. The standard software used for statistical analysis is the most recent version of SAS, presently Version 9.4, and R. Additional analytic software, including STATA and nQuery, is used on an as needed basis. The analytic activities are supported by other software, such as spreadsheets and word processing packages. All computers used by both the faculty and masters-level statisticians are connected to a network HP 990Cse color printer and individual monochrome printers.

The Biostatistics Core seeks collaborations that lead to smooth transition from hypothesis formulation to efficient power analysis and sample size estimation, study design and execution through quality-controlled data management, statistical analysis and summary presentations. Our overarching goals are to create electronic datasets that accurately describe research outcomes, provide state-of-the-art statistical techniques for the objective interpretation of our research discoveries and invoke transparency in our methods to enhance reproducibility of our findings.

**Data Management Core**

The Data Management Core, led by Aimee Ellender Stewart and housed within the Computing Services department, serves as a comprehensive clinical data coordinating facility. Their primary responsibility involves maintaining clinical research databases and developing bespoke applications that interface with them. Collaborating closely with both internal and external researchers, they ensure efficient and accurate data transfer from observations to electronic files for storage and analysis. This includes electronic data capture from other Cores such as Imaging and Clinical Chemistry, as well as creating custom applications to expedite study-specific data set creation. The core also curates Pennington site data, along with data collected from other sites during multi-center trials. Throughout each study’s duration, they monitor data processing and provide investigators with study-specific data sets accessible via web-based desktop tools. The Data Management Core also oversees three local installations of REDCap (Research Electronic Data Capture), a secure web-based application originating from Vanderbilt University. Adhering to Guidelines for Good Clinical Practices related to data handling, the core stays current with HIPAA Security Rule training and collaborates closely with the Director of Intellectual Property, Legal, and Regulatory Affairs. Furthermore, working closely with the Pennington NORC Committee, they have established the Pennington/Louisiana NORC Biorepository —a searchable archive of clinical data collected in human subjects research at Pennington Biomedical Research Center since 1980. Pennington investigators can now deposit their data in this repository to comply with the NIH Data Sharing Policy as well as share Biospecimens.

**Clinical Chemistry Core Laboratory**

The Clinical Chemistry Core Laboratory is directed by Jennifer Rood, Ph.D., DABCC, FAACC. It is accredited by the Centers for Medicare and Medicaid Services (CMS/CLIA) and the College of American Pathologists (CAP) and operates within the guidelines of Good Clinical Practices. In addition to proficiency testing programs required for accreditation, the laboratory also participates in the Lipid Standardization Program offered by the Centers for Disease Control and Prevention.

The Clinical Chemistry Core Laboratory performs analyses for PBRC clinical trials, for basic researchers at the center, for the US Army Institute of Environmental Medicine (USARIEM) and for other contracting clients. The laboratory is staffed by medical technologists and phlebotomists licensed by the Louisiana State Board of Medical Examiners, and by research project assistants. Departments within the Clinical Chemistry Core Laboratory include Phlebotomy, Accessioning, Chemistry, Hematology, Urinalysis, Special Chemistry (RIA, HPLC, Immunochemistry, Automated Immunochemistry) and Point-of-Care Testing.

The laboratory currently offers more than 350 different assays and is well equipped to perform both routine and specialized testing, including the development of new methodologies when required.

The following is a complete listing of instrumentation in the laboratory. Examples of the types of assays for each instrument are also listed. The complete test menu can be obtained from the laboratory.

**Clinical Chemistry Instruments at Pennington Biomedical**

|  |  |  |
| --- | --- | --- |
| **DEPARTMENT** | **INSTRUMENT** | **EXAMPLES OF ASSAYS** |
| **Chemistry** | **Beckman Coulter DXC 700AU** | general chemistry profiles, free fatty acids, HbA1C, Vitamin C |
| **NOVA Biomedical NOVA 1 Electrolyte Analyzer** | potassium |
| **Hematology** | **Beckman Coulter Unicel DxH 690T** | complete blood cell counts and analysis, and reticulocyte counts |
| **Urinalysis** | **Siemens Clinitek 50** | urine microalbumin |
| **Siemens Clinitek 500** | routine urinalysis |
| **Microscopic analyses**  **(urine and blood)** | routine blood cell morphology and urine microscopic exams |
| **BiositeTriage Meter Pro** | urine screen for drugs of abuse |
| **Special**  **Chemistry** | **Bio Rad Plate Reader** | ELISA assays |
| **BIOTEK 405 LS Plate Washer** | ELISA assays |
| **Spectramax Plus 384** | enzyme kinetic and ELISA-based assays |
| **Luminex Labmap 200** | cytokines and other biomarkers |
| **Agilent Technologies HPLC 1100** | amino acids, carotenoid profiles, vitamins, urine sugars |
| **Multitek** | nitrogen (urine, fecal, sweat and saliva) |
| **Siemens Immulite 2000** | automated immunoassays including insulin, thyroids and hormones |
| **IDS-iSYS** | vitamin D assays |
| **Perkin Elmer Wizard 2470 gamma counter** | radioimmunoassays including gut hormones |
| **Varian 240Z Atomic Absorption** | metals |
| **WESCOR VAPRO 5600** | osmolality |
| **POCT** | **Alco Scan** | breath alcohol |
| **Breath Tracker** | breath hydrogen and methane gases |
| **Cholestech LDX** | cholesterol (total, HDL, LDL) triglycerides |
| **DCA 2000** | HbA1C |
| **HemoCue 201 System** | glucose |
| **Manual Procedures** | HCG (urine or blood), occult blood |
| **YSI 2900** | glucose |
|  | **Accula SARS-CoV-2 Dock** | SARS-CoV-2 (NAAT) |

**Mass Spectrometry Core:** The core is directed by Jennifer Rood, Ph.D., DABCC, FAACC, and is divided into two sections: Energy Expenditure/Body Composition and Metabolism.

Energy Expenditure/Body Composition: This section focuses on the measurement of energy expenditure using the doubly labeled water technique. Additionally, measurements of total body water are performed using either deuterium or oxygen 18. This section has three Finnigan isotope ratio mass spectrometers (a Delta XP and two Delta Vs). The laboratory also has automated sample preparation devices interfaced to the mass spectrometers. Three gas benches are used for 18O sample preparation and four H devices are used for the sample preparation of deuterium (2H). With these instruments, we can accurately and precisely measure the amount of heavy isotopes, such as 18O and deuterium, in relation to the common isotopes, 16O and 1H, for the measurement of energy expenditure in studies of obesity. The instruments are also used to measure 18O and deuterium as measures of total body water. The Delta XP is also used for analysis of 13C in breath samples as a marker of gastric motility.

Metabolism: This section focuses on the measurement of stable isotopes that are used to examine lipid, protein and carbohydrate metabolism. This section has three gas chromatograph/mass spectrometers (Agilent 6890 GC/5975 MS, Agilent 6890 GC/5975b MS and an Agilent 7890GC/5975c MS). All three mass spectrometers have EI and CI capabilities, and positive or negative ion monitoring, for measurement of any stable-isotope-labeled (e.g. 2H, 15N, 13C) organic compound. This equipment is used to examine cholesterol metabolism in studies of cardiovascular disease, and glucose, amino acid and fatty acid metabolism in studies of obesity and diabetes.

**Nutritional Epidemiology, Dietary Assessment and Counseling Core:** Directed by Catherine M. Champagne, Ph.D., RDN, LDN, the Nutritional Epidemiology, Dietary Assessment and Counseling Core serves two main needs at PBRC: 1) processing of dietary data collected via food frequency questionnaires, 24-hour dietary recalls or food records; and 2) delivery of lifestyle interventions that follow defined protocols via single-site or multicenter trials. The MENu Database is overseen by Catherine Champagne. The MENu database was donated to the Pennington Biomedical Research Foundation in October 1992 by its owner and developer, Dr. Margaret C. Moore. The Extended Table of Nutrient Values was renamed to honor the name of its developer. The Moore Extended Nutrient Database, now known as the MENu Database, is an appropriate reflection of one of its current uses in analyzing menus and recipes for the PBRC Metabolic Kitchen, for school lunches in Louisiana and for multicenter feeding trials. The MENu Database was selected for use in the National Heart, Lung and Blood Institute multicenter study of diet and lipoproteins and for the DASH and DASH-Sodium Trials. When compared to analytical laboratory values obtained from an outside Food Composition Laboratory, the MENu Database was closer to actual values than the three other databases used to calculate the same menus. Current data from additional menus analyzed still indicates good agreement between values from the MENu Database and the laboratory assays.

Diet Assessment Activities: The current version of Moore’s Extended Nutrient Database is MENu 6, although currently in the works is an update to be launched by late fall 2024 or early 2025. Primary datasets used are from USDA. The total count of foods and recipes contained within the MENu food composition files comes from the following data sources:

1. USDA Nutrient Database for Standard Reference, Legacy (2018). US Department of Agriculture, Agriculture Research Service, Nutrient Data Laboratory. USDA National Nutrient Database for Standard Reference, Legacy. Version Current: April 2018.
2. The Food and Nutrient Database for Dietary Studies (FNDDS 2019-2020. U.S. Department of Agriculture, Agricultural Research Service. 2022. USDA Food and Nutrient Database for Dietary Studies 2019-2020. Food Surveys Research Group Home Page
3. Food Patterns Equivalents Database (FPED for Use with WWEIA, NHANES 2017-March 2020 Prepandemic) Released July 2023. Waller AW, Friday JE, Morton S, Myrowitz R, and Moshfegh AJ. 2023. Food Patterns Equivalents Database for Use with WWEIA, NHANES 2017-March 2020 Prepandemic [Online]. Food Surveys Research Group, Beltsville Human Nutrition Research Center, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland.  July 2023.
4. Healthy Eating Index (HEI) 2020 can be computed from dietary intake data that is referenced to the FNDDS and FPED to determine whether or not the individual is consuming a healthy diet. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion. 2023. Average Healthy Eating Index-2020 Scores for the U.S. Population - Total Ages 2 and Older and by Age Groups, WWEIA, NHANES 2017-2018
5. Supplementary information from the scientific literature or other reliable food composition tables.
6. User-defined foods, allowing the input of nutrient data for foods needed in menus or recipes for which an appropriate food match cannot be found otherwise.
7. Recipes input by users of the system at PBRC, using a unique recipe calculation system.

*Analysis of dietary intakes of individuals using the Food Diary Program.*While menu and recipe analysis is an important activity using the MENu system, several current research protocols use the Food Diary Program. Food Diary utilizes the PBRC’s Nutrient Database to analyze dietary intakes of individuals in research studies, including the most recent food composition files from the USDA as listed above. Often these are dietary records kept by participants in various trials or 24-hour recalls collected by the nutrition staff in the Dietary Assessment Center. Our current Food Diary Program was updated in 2020.

*24-Hour Dietary Recall Collection Using the USDA Automated Multiple Pass Method.* Catherine Champagne and her staff of dietary assessment personnel have been trained by USDA in the use of the Automated Multiple Pass Method (AMPM) and have used this in a number of trials, e.g., the POUNDS LOST Clinical Trial, which was a macronutrient-based weight-loss study involving PBRC and Harvard. AMPM is a computerized method for collecting interviewer-administered 24-hour dietary recalls either in person or by telephone. It is a research-based, multiple-pass approach employing five steps designed to enhance complete and accurate food recall and reduce respondent burden. This method is currently used in “*What We Eat in America,”* the dietary interview component of the National Health and Nutrition Examination Survey, and other research studies nationally.

*Diet History Questionnaire from the National Cancer Institute*. DHQ III is the current version of the questionnaire distributed by the NCI. PBRC has developed an online version of the DHQ II questionnaire and with the Diet\*Calc software developed by NCI can analyze files to interpret the DHQ II data to provide nutrient and food group estimates. This food frequency questionnaire is available in two versions, one that accounts for foods consumed over the past month and one that accounts for food consumed over the last year. The printed version of the DHQ II can be used but it is lengthy at 36 pages and the data can be entered by core staff.

Dietary Counseling Activities: A number of projects at PBRC have involved dietary counseling efforts. The Diabetes Prevention Project Outcomes Study (DPPOS) followed individuals from DPP who successfully made lifestyle changes. The Look AHEAD trial also focused on lifestyle changes in a population of individuals with diabetes. The Weight Loss Maintenance (WLM) trial was designed to determine how weight loss achieved in an intensive six-month initial phase of lifestyle change sessions was best sustained through a second phase, a 30-month period of either personal contact or internet efforts. The POUNDS LOST trial utilized four different diet treatments varying in protein and fat to scientifically test these diets for weight-loss effects. Subjects were asked to follow structured meal plans or exchange options in order to adhere to the dietary targets. The research dietitians/interventionists played a key role in working with these participants by conducting both group and individual sessions utilizing nutrition information and behavior-change messages (a landmark paper was published in the New England Journal of Medicine on February 26, 2009). Additional projects included a lifestyle program for weight loss in cancer survivors, studies on a variety of low-fat and higher-fat Mediterranean diet regimens, and community interventions focused on weight control and diabetes care. Past activities also involved a weight-loss program in individuals with severe obesity called Heads Up – a behavioral intervention that was being compared to an intervention with individuals who opted for bariatric surgery. The dietary counseling activities were extensive and the interventionists involved had a breadth of experience in dietary interventions that include lifestyle/behavioral change. These interventionists received significant training in motivational interviewing and theories of behavioral change. Initially the groups were in-person, but since this project was statewide, the latter groups were web-based. Over the past few years, our dietary counseling team was involved in several studies: 1) one study funded by Weight Watchers called POINTS where a person’s genetic code was believed to affect weight loss from diets that vary in carbohydrate and fat content; 2) another project funded by industry called EXPEND was a weight-loss study patterned after the CALERIE project completed some years ago in which a person reduced calories by approximately 25% and counseled to stay within a zone of weight loss. We are presently involved in a study called Eat-2, an overfeeding study designed to provide new insights into mechanisms that regulate human adipose tissue expansion, distribution and function, which can greatly influence health and metabolism – the individuals are offered a weight-loss program following the short-term overfeeding. In addition, Small Steps is an intervention for cancer patients which is currently ongoing. Another study is called Meditre, a research study designed to look at how two diets with different calories per gram of food affect blood glucose and insulin levels.

**Ingestive Behavior, Weight Management & Health Promotion Laboratory:** The Ingestive Behavior, Weight Management & Health Promotion Laboratory (IBL) is under the direction of Dr. Corby K. Martin, Ph.D., a Licensed Clinical Psychologist in the State of Louisiana. The Dr. Martin’s laboratory specializes in the development and evaluation of lifestyle change interventions, as well as the assessment of ingestive behaviors, namely food intake, and other food-related behaviors and constructs, such as subjective ratings of appetite. The lab has developed and validated assessment methods and tools for use in controlled laboratory settings and free-living conditions.

Behavioral Intervention & Counseling: The Ingestive Behavior, Weight Management & Health Promotion Laboratory includes an intervention team that has designed and implemented numerous lifestyle interventions that modify food intake, exercise, and other lifestyle factors relating to health or weight management. The team has extensive experience with clinic-based (face-to-face) interventions and are on the cutting edge of developing and testing the efficacy of mobile or m-Health interventions that are delivered via communication technologies such as smartphones. The team also performs translational research and disseminates population-based interventions that are evaluated in studies that rely on cluster randomized and implementation science designs. The laboratory and its colleagues have also developed methods and tools to objectively quantify adherence to dietary interventions based on observed body weight. These methods have been used successfully in numerous NIH trials and can be adapted to assist in projects where dietary adherence is a concern. The team has extensive experience developing and implementing screening paradigms and retention strategies minimizing randomized controlled trial attrition.This service is an essential tool in minimizing time and budget loss due to participant attrition or lack of study protocol compliance.

Assessment of Ingestive Behaviors: The laboratory empirically evaluates the effects of dietary regimens and behavioral (e.g., lifestyle) and pharmacological interventions on energy intake, energy expenditure, body weight, and other endpoints. The laboratory has ample resources and has developed many tools and methods to collection data to meet these aims.

The laboratory includes three separate food intake rooms and a taste testing room. Each of the food intake rooms includes closed circuit video cameras for observation and a desktop computer that participants use to complete appetite-related assessments or other questionnaires. The laboratory has a monitoring room, which is located next to the food intake rooms, that houses desktop computers for study staff and closed-circuit video equipment for observing food intake behavior in the eating rooms. The IBL also includes the Preparation (Prep) Kitchen, which is adjacent to the food intake rooms. The Prep Kitchen includes the space and equipment for staff to prepare, weigh, and record the weights of the food items before and after they are served to participants. This provides an valid and reliable measure of food intake and plate waste for each eating occasion. The laboratory assesses subjective ratings of appetite and similar constructs using Visual Analogue Scales (VAS). Further, the laboratory relies on self-report instruments and other testing paradigms to assess constructs associated with food intake and body weight, including dietary restraint, disinhibition, food cravings, reward sensitivity, delayed discounting, etc. These assessments complement objective measures of food intake, and various biological and physiological measurements, that occur in the laboratory or the center.

In addition to laboratory-based endpoint assessment, energy and nutrient (i.e., food) intake can be measured on an individual level in free-living or in cafeteria settings (e.g., cafeterias, schools, etc.) using food photography methods. The laboratory developed and validated the Remote Food Photography Method© (RFPM) and SmartIntake® smartphone app, which accurately measures energy and nutrient intake in near real-time as participants live in their natural environment. The RFPM and SmartIntake app assess food intake using food images, which are captured by participants and transmitted by the app to the laboratory’s server for analysis. The SmartIntake app allows food intake data to be collected with little user burden. Additionally, SmartIntake can provide ecologically valid subjective data surrounding food intake via the integration of ecologically momentary assessment questions into the app (this version of the app is called SmartIntakeQnA).

The laboratory, in close collaboration with colleague John Apolzan, PhD, developed the PortionSizeTM app to address limitations of SmartIntake, namely, the inability to provide users with immediate feedback about their food intake. PortionSize is grounded in food photography methods, and the laboratory developed and integrated innovative features that streamline users’ estimates of portion size. Consequently, PortionSize can quantify food intake and adherence to specific dietary goals in real time and provide this information to users. Importantly, users obtain information about the energy and nutrient content of their meals before they eat, allowing them to adjust how much, or which, foods they eat to better adhere to specific diets. PortionSize is currently undergoing validity testing in a series of three NIH-funded studies.

The laboratory, led by Drs. Martin, Apolzan, and Brian Roe, also developed the FoodImageTM app. FoodImage uses food photography to quantify household-level food waste and collect information about how food waste is discarded (e.g., landfill, compost, etc.) and why food waste is discarded (e.g., food has spoiled or is not liked). The app quantifies and categorizes food waste that occurs when preparing food, cleaning out the refrigerators/freezers and cabinets, and eating. FoodImage also quantifies what and how much food enters the household, as well as the cost of those foods. Further, FoodImage quantifies the amount of food selected and how much food is consumed, allowing researchers to examine the relationship between food selection, food waste, food and nutrient intake, and changes in body mass. Via a collaboration with colleagues from Virginia Commonwealth University and East Carolina University, the laboratory developed an app called eCigTracker to quantify e-cigarette users’ device and liquid characteristics remotely and in real time. These data can be used to calculate nicotine flux and exposure and will serve as the basis for future studies on 1) the effect of vaping on energy balance behaviors (e.g., food intake), and 2) mobile health interventions to reduce and stop vaping while preventing weight gain that can occur subsequent to nicotine cessation.

**Metabolic Kitchen and Food Preparation**: The PBRC Metabolic Kitchen is located on the second floor of Clinical Research Building No. 1 and has 2,622 square feet of working space. The kitchen area is divided into four fully-equipped individual kitchen areas of 130 square feet each. These individual kitchens are ideal for simultaneously conducting various protocols. Each individual kitchen area is equipped with a refrigerator or freezer, and electronic balances. There are several different models of electronic balances to accommodate weighing demands. Commercial microwaves, one-quart blenders, and toaster ovens are located throughout the kitchen. One kitchen area is set up as a bake area, containing a 20-quart mixer. The 440-square-foot large-quantity food preparation area contains state-of-the-art convection and conventional ovens, steam ovens and kettle, gas cooktops, food warmers, food chopper, slicer, and food processor. There is a dish room and approximately 800 square feet for receiving and storage including dry storage, a walk-in refrigerator and a walk-in freezer. Located just outside of the Metabolic Kitchen is the participant dining space. This includes a reception desk where meal trays can be requested by phone or buzzer. Meals that are taken for later consumption are stored in the refrigerator/freezer room. An additional food storage area with space for dry storage, refrigeration and freezer storage is located adjacent to the service road. Approximately 225 meals per day can be prepared in the facility. Study participants consume their meals in the 850-square-foot dining area, and meals may be provided for take-out.

The PBRC Metabolic Kitchen is under the direction and supervision of Renee Puyau Stelzer, RD, LDN. The Metabolic Kitchen has the capability of providing participants with all of their meals, seven days a week, in both inpatient and outpatient studies. The total number of meals prepared per year is shown in Table E. Menus consisting of specific macronutrient and micronutrient composition or incorporating study-specific food products are developed to meet the needs of each study. The Metabolic Kitchen has the infrastructure to observe and document consumption of study foods by participants seven days a week, improving study adherence.

Meals Prepared in Metabolic Kitchen

|  |  |
| --- | --- |
| **Year** | **Meals Prepared** |
| 2005 | 9,817 |
| 2006 | 10,002 |
| 2007 | 10,997 |
| 2008 | 5,961 |
| 2009 | 11,960 |
| 2010 | 9,133 |
| 2011 | 7,602 |
| 2012 | 5,482 |
| 2013 | 14,452 |
| 2014 | 4,265 |
| 2015 | 2,154 |
| 2016 | 5,089 |
| 2017 | 6,559 |
| 2018 | 3,014 |
| 2019 | 4,184 |
| 2020 | 9,441 |
| 2021 | 16,093 |
| 2022 | 6,561 |
| 2023 | 4,833 |
| **Total** | **147,599** |

The Metabolic Kitchen employs a director who oversees menu planning, food production and daily management of the operation. The Metabolic Kitchen manager is responsible for procuring foods, equipment, paper supplies and other products necessary for study-specific criteria. The research dietitians are responsible for managing the dietary component of specific study protocols. Research specialists and a food service worker prepare and serve the research-designated diets. Meal monitors and hostesses sit with participants during mealtime to ensure that participants adhere to the diet during meal times.. Specified food products, if needed, are developed by the Metabolic Kitchen staff. Recipes are selected to include regional food preferences to increase dietary adherence. After taste-testing, the food products can be analyzed for nutrient content and then included in the database for menu planning. The research dietitian reviews the finalized menu with each potential participant before the research project begins. The participant’s food likes, dislikes and intolerances, including food allergies, are discussed. Food purchases are based on specifications outlined during menu development to meet nutrient content requirements. Upon receiving, the product is inspected by the manager to ensure proper quality and weight specifications. When possible, foods to be used throughout the research study are purchased at one time from a single lot to ensure minimum variation, and are stored properly. Bulk food deliveries are stored in adjacent cold, dry or freezer space. Standardized recipes outlining specific ingredients and gram weights, correct mixing and cooking procedures, timing and use of equipment are meticulously followed under sanitary procedures. All ingredients are weighed to 0.1 gram on electronic balances. Mixed foods are prepared in batch quantities. Those foods then are individually portioned, weighed, sealed, labeled and frozen until ready to use. The nutrient composition of study diets may be verified by chemical analysis of aliquots of each menu cycle to ensure that the designed menus achieve the target nutrient values predicted by the nutrient database. Menus of all types, including high and low fat, saturated fat and protein; high, moderate and low sodium; DASH diets; and Standard or Average American diets, have been validated by chemical analysis. A continuous quality assurance program is followed to check food item weights, recipe procedures, packed meal and tray assembly, and food temperatures. Documentation is maintained for each study. Furthermore, operational problems are documented with an appropriate plan of action and follow-up. All Metabolic Kitchen staff members receive training in food sanitation and in research diet preparation.

Daily food production sheets for each participant are used when preparing the meals, listing day, menu cycle, food items required with portion weights and special dietary requirements. Foods are labeled for participant identification. Foods are placed on individual meal trays until service, or are individually packaged for take-out, following tray assembly forms. Meals are served to the participant on test days only after all study procedures have been completed. Additionally, Metabolic Kitchen staff obtains daily checklists from participants that contain information on the participant’s consumption of meals provided. Potential problems with meal acceptance are identified and resolved. Personal attention and encouragement to continue on the diets are provided by all staff members throughout the study.

**Energy Metabolism Core Laboratory:** The energy metabolism core consists of four Metabolic Chambers (whole-room indirect calorimeters) for the assessment of 12- and 24-hour energy expenditure and substrate oxidation, and three portable ventilated hood systems (Omnial RMR Cart, Maastricht Instruments and Q-NRG Metabolic Monitors, Cosmed) for the assessment of resting energy expenditure and substrate oxidation and the thermic effect of feeding. The respiration chambers are located in the inpatient area of Clinical Research Building No. 2. Three of the chambers measure approximately 12’ x 10’ with 8’ ceilings, corresponding to a total volume of about 27,000 liters. The fourth chamber is approximately 7’ x 9’ for a total volume of about 16,000 liters (including sealed ductwork). Each chamber is provided with furnishings and equipment necessary to perform metabolic studies on research volunteers over extended time periods in a precisely controlled environment. The three large chambers are comfortable enough for individuals to live for periods up to one week. They are equipped with a bed, chair, desk, toilet, sink, refrigerator, TV, VCR/DVD, computer with internet access, and motion sensors. The smaller chamber is equipped with a treadmill, roll-away bed and chair, and is used for short-term energy expenditure testing. The respiration chambers and the ventilated hood systems utilize air that is drawn through the unit at a known flow rate. The small, 16,000-liter chamber can be used for exercise studies or studies with sudden change in environmental conditions (temperature and humidity) as well as sleeping studies. The oxygen and carbon dioxide concentrations of incoming and outgoing air are measured for the calculation of oxygen consumption and carbon dioxide production, from which energy expenditure is calculated from the Weir equation. If nitrogen excretion in urine is also measured, substrate oxidation rate can be calculated, as well. Eric Ravussin, Ph.D., is the scientific director and Leanne Redman, Ph.D., oversees the data integrity. In addition, the unit employs a biomedical engineer to ensure accurate data collection and ongoing maintenance and calibration of the equipment. Volunteer testing is performed by trained staff members.

Current services include but are not limited to:

* 12- and 24-hour energy expenditure and substrate oxidation
* Resting energy expenditure and substrate oxidation under basal conditions and during a euglycemic hyperinsulinemic clamp
* Data analysis with correction for urinary nitrogen
* Thermic effect of food

**Imaging Core:** The Imaging Core is designed to provide in vivo measurements of anatomy, biochemistry, metabolism and tissue function for clinical research. Researchers also have access to PET scanners through a collaborative agreement with Mary Bird Perkins Cancer Center.

MRI systems have full multinuclear spectroscopy capabilities (31P, 13C and 1H). A spectrum of coils is available for spectroscopy, as well as standard pulse sequences. Spectroscopy analysis software (jMRUI) is installed on workstations in the scanner suites.

An array of coils is also available on both systems for volumetric imaging including head, head-neck, body, spine and knee coils. A 32-channel phased array head coil is also available on the Discovery system for brain applications. A number of peripheral devices for functional MRI scans are also available. These include but are not limited to a gustometer, foot tappers, finger tappers, a joystick and a BIOPAC system with electrical stimulation capabilities.

A set of volumetric imaging sequences are available for body composition including the IDEAL-IQ water-fat sequence on the Discovery and LAVA on both systems. The increased bore size (70 cm) of the Discovery system and the resulting increased field of view (50cm x 50cm x 50cm) allows the core to accommodate larger subjects for all scan types. The FIESTA sequence is available to evaluate cardiac by acquiring multiple (30) phases of the cardiac cycle at a single location. Common cardiac function views acquired include four chamber, two chamber, and short axis views. With these views and the proper post processing software, the heart can be evaluated for the left and right ventricular mass (LVM and RVM), end-diastolic volume (EDV), end-systolic volume (ESV), left ventricular and right ventricular dimensions, ejection fraction (EF), systolic wall thickening and wall motion. Standard T1-, T2-, T2\*-, perfusion- and diffusion-weighted sequences are available for brain applications. Specific state-of-the-art sequences of interest include high-angular-resolution diffusion imaging (HARDI), echo planar imaging with blood oxygenation level dependent contrast (EPI-BOLD), partial continuous arterial spin labeling (PCASL) for perfusion imaging and fluid attenuated inversion recovery (FLAIR). Visual and audio stimulus presentation hardware and software are available for fMRI studies. Image analysis software includes Analyze (Analyze Direct), a suite of structural brain imaging tools originally developed in the IDEA Lab at UC Davis, and SPM and FSL for structural and functional MRI analysis.

Active, optimized research protocols include but are not limited tothe following:

* 1H (proton) spectroscopy for the measurement of hepatic lipid
* 1H (proton) spectroscopy for the measurement of intramyocellular lipid
* LAVA and IDEAL-IQ imaging for measurement of adipose tissue, muscle and bone abdominally and throughout the body
* 31P for measuring maximal mitochondrial capacity (PCr resynthesis rate)
* 31P for measuring PCr resynthesis rate pre-post lower leg ischemia
* LAVA-based measurement of internal organ volumes
* Brain tissue structure using T1-weighted, FLAIR and diffusion MRI
* Cerebral blood flow and brain activation by PCASL
* EPI-BOLD for brain activation during cognitive, sensory and motor tasks, including food photography viewing, gustometry, risk-taking, stress, aggression and executive control paradigms
* 13C spectroscopy for measuring glial acetate metabolism
* Long-TE 1H spectroscopy for measuring muscle acetyl carnitine concentration
* Magnetic resonance elastography for measuring liver fibrosis
* EPI-BOLD during motor skill learning and distracted foot-tapping using specialized joystick and foot-tapper devices.
* FIESTA imaging for cardiac function and epicardial fat.

The Biomedical Imaging Center includes a subject waiting room, a subject dressing room and a subject preparation room. The center also contains office space for researchers and administrative staff, a conference room, a large medical records storage room, and a computer and data closet.

Core personnel currently includes three licensed radiological technologists, an ultrasound technologist, and a biomedical engineer and core manager (M.S.). Each of these individuals is cross-trained to perform analyses of MRI data; ultrasound data analyses are performed in-house by the ultrasound technologist, as well. Baton Rouge Radiology Group serves as a consultant for interpretation of scans as needed. Analyzed data is entered into a centralized database where it is fused with other participant records analyzed on-site and is directly transferred to the PBRC clinical database when possible.

The following is a complete listing of instrumentation in the Imaging Core:

* 70cm-bore GE Discovery 750 3T MRI System
* 60cm-bore GE Signa HDxT 3T MRI System
* GE Lunar iDXA
* Hologic Discovery DXA
* ECHO MRI [ultra-low field strength NMR]
* Cosmed BodPod system
* Cosmed PeaPod system
* GE Logiq E9 ultrasound system
* Echosens FibroScan
* Thornhill Scientific RespirActTM gas control system
* Itamar Medical EndoPAT 2000
* Tiba Ambulo 2400 ambulatory blood pressure monitors
* Multigon Transcranial Doppler System (TCD)
* GE diagnostic X-ray system

**Exercise Testing Core:** The Exercise Testing Core is directed by Jennifer Rood, Ph.D., and is equipped to perform electrocardiogram (ECG) monitored submaximal and maximal cardiopulmonary exercise performance testing. These assessments can be performed on a treadmill or a cycle ergometer. The treadmills are capable of incremental changes in speed and grade up to 12 mph and 25%, respectively. The adult cycle ergometer is capable of singular wattage increments ranging from 0-2,500 W. The pediatric cycle ergometer is capable of singular wattage increments ranging from 0-1,000 W.

The core can also assess muscle fitness, including muscle strength, endurance, and power. An isokinetic strength dynamometer is utilized to perform constant velocity muscular strength and endurance testing. The system interfaces with computer microprocessors to measure torque, power and endurance for resistance throughout a joint’s range of motion (ROM) of most musculoskeletal joint areas. Resistance is provided using a servo-controlled mechanism and a user-defined constant velocity (including isometric = 0 velocity) or constant force for bothconcentric and eccentric movements.

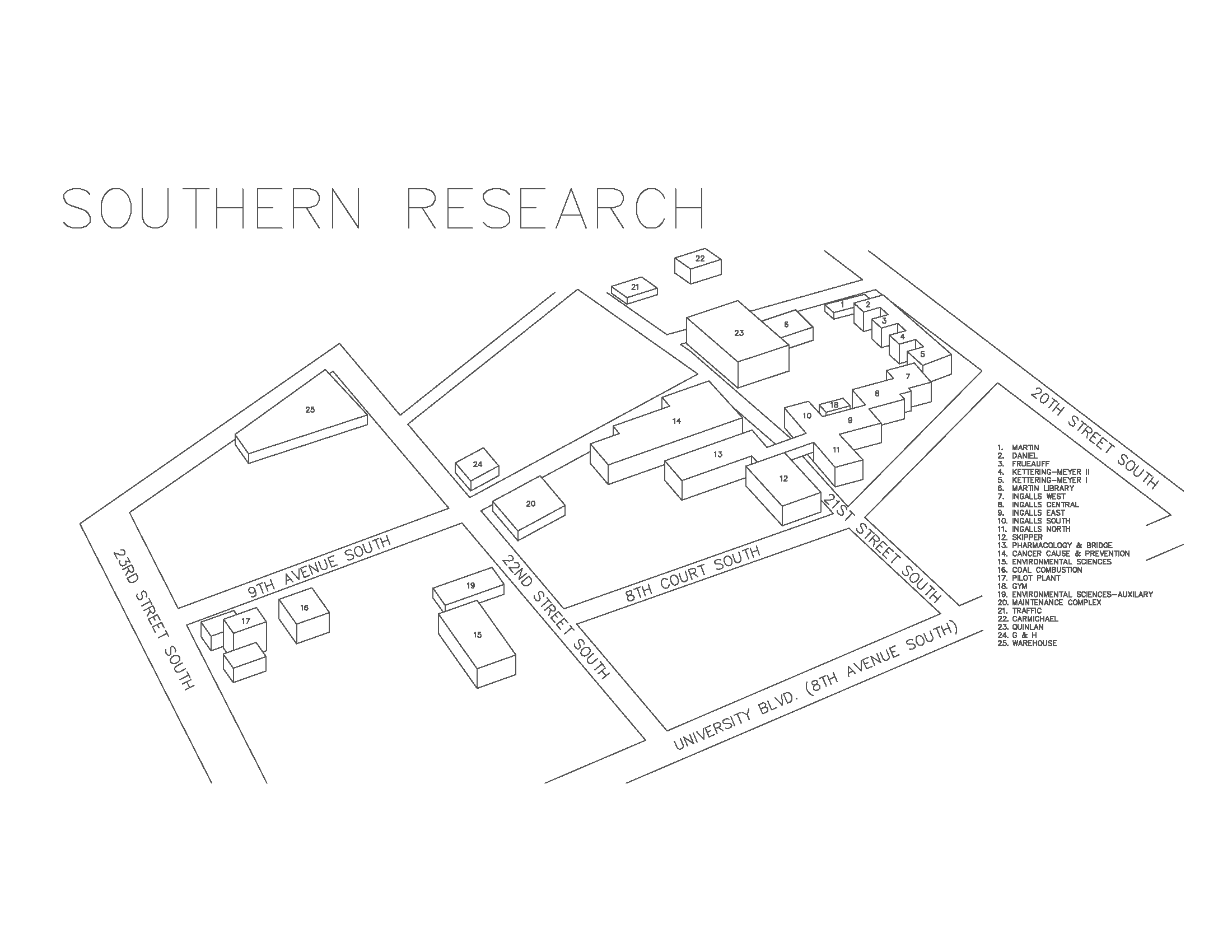
The following is a complete listing of instrumentation in the Exercise Testing Core:

* Four Parvomedics True One™ metabolic carts
* Two Trackmaster treadmills TMX425C
* Lode Excalibur Sport™ bicycle ergometer
* Lode Corival Pediatric bicycle ergometer
* Two Quinton Q-Stress EKG systems
* Mortara X-Scribe EKG system
* Biodex™ System 4 Pro isokinetic dynamometer
* Suntech Tango M2 blood pressure monitor system

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| SOUTHERN RESEARCH (SR) |

Southern Research (SR) (prior to 2015 referred to as Southern Research Institute or SRI) is a not-for-profit research organization that has been in operation since 1941. In terms of drug discovery and development, SR has a proven record of success such as seven FDA-approved anticancer drugs as well as pioneered works in other therapeutic areas including infectious diseases, neurology, rare diseases, metabolic disorders, *etc*. SR is located in Birmingham, Alabama and employs approximately 195 research scientists, technical staff, and support staff, and has a long-standing record of productivity in conducting governmental and industrial research grants and contracts. SR is internationally recognized for its outstanding track record in the discovery and development of antiviral drugs and small molecule cancer therapeutics. For example, six FDA-approved anticancer drugs (lomustine, carmustine, dacarbazine, fludarabine, clofarabine, and pralatrexate) and one cytoprotective agent (ethyol) were all discovered and developed at SR. SR is also a major contributor to the NCI’s Chemical Biological Consortium and was a past member of the Molecular Libraries Probe Production Centers Network, a collaborative research initiative to identify small molecule chemical probes for the biomedical research community.

**Southern Research’s Main Campus located in Birmingham, AL**



**INSTITUTIONAL RESEARCH ENVIRONMENT & EXPERTISE IN CLINICAL AND TRANSLATIONAL SCIENCE**

**Facilities and Resources**

**Information Technology:** Aligned with the NIST Risk Management Framework (RMF), the Information Technology Systems Support Group provides PC and network services to the staff of SR. Services include procuring, maintaining, and repairing all servers, network equipment, desktop and laptop computers, and printers as well as providing secure file, print, and email services and supporting various applications for the administrative and technical staff. The Facilities and Maintenance Department provides maintenance and repairs for all SR facilities. The Institution has excellent administrative support and lab maintenance services. SR’s Human Resources, Contracts, Procurement and Accounting offices, provide additional support through their implied functions. The facilities described in this proposal are currently active and available, as needed, for the proposed research.

**Library Resources:** Literature searches for the development of proposals and creation of manuscripts for dissemination of research findings is supported by a highly-developed library system. As an affiliate of the University of Alabama at Birmingham (UAB), located within walking distance, SR scientists have reciprocal access at UAB libraries, and our staff scientists regularly make use of the Lister Hill Health Sciences Library and the Mervyn Sterne Library of UAB, located a few blocks away. SR researchers also have access to an extensive list of online journals under the subscription list of the Lister Hill Health Sciences Library, Alabama's largest biomedical library, containing the important chemical, biochemical, and biological journals that publish relevant research, searchable using SciFindern. The Birmingham Public Library, as well as the Samford University library, are also available to SR faculty. Complete access to the library resources, including use of photocopying facilities, are available through each of these libraries. In addition, full-time library personnel are available to research and retrieve information through the facility to access online several electronic databases of publications and patents. All library information is available online and accessible from faculty and staff offices as well as from outside the university through the internet. Additionally, UAB Lister Hill Library has an interlibrary loan system that links us to multiple other universities both nationally and internationally.

**Scientific Platforms Division (SP):** SP laboratories and offices include more than 35,0000 square feet of office and laboratory space and are located within close proximity to allow ease of communication between various disciplines, departments and staff. SP is home to scientists working in a variety of fields including Biological Sciences (Oncology, Infectious Diseases, Neuroscience), Chemistry and High Throughput Screening (HTS). A number of core facilities are available for use by the faculty, including BSL-1, -2 and -3 laboratories.

Shared Resources: In addition to small equipment and larger and/or specialized core equipment across the Division is also available an IntelliCyte iQue screener PLUS flow cytometer equipped with 3 lasers (405, 488 and 561nm) that can detect up to 13 fluorescent parameters, a Nikon A1 confocal microscope with image acquisition and analysis software (Harmony, Velocity and Columbus), a Thermoscientific Nanodrop 2000 spectrophotometer for RNA quantitation and quality control, HPLC and FPLC systems, a Beckman RC2B high speed centrifuge with SS34, GSA and HB-4 rotors, a GE ImageQuant gel documentation system, two Evos epifluorescence microscopes with 4-color digital image acquisition capability, and an Octet RED96 System which includes: multiple class II A/B biological safety cabinets, Milli-Q water purification system, gradient and non-gradient PCR thermocyclers, BioRad IQ5 RT PCR system, PCR clean room, sonic dismembrator, Qiagen TissueLyser-LT, Leica DMLB Epifluorescence microscope, Nikon SMZ800N Stereomicroscope, laser capture microdissection system, Invitrogen Countess Cell Counter, Alpha Innotech FluorChem HD2 Imager, GE 2-D gel electrophoresis system, BioRad I-Mark Microplate Reader, a BioTek 405LS Microplate Washer, MagPix Multiplex Instrument and an Eppendorf Biophotometer.

**Chemistry Department:** The Chemistry Department within the SP division houses a team of 8 chemists with extensive experience in both medicinal chemistry and synthetic organic chemistry. Drug discovery programs within the Department cover a large range of various disease areas including oncology, infectious diseases (HIV, SARS-CoV-2, and antibiotics), neurology (Parkinson’s disease, Alzheimer’s disease, analgesic, and substance use disorder treatment), rare diseases (cystic fibrosis), and other areas (diabetes, kidney disease). One of the Chemistry Department’s main goals is to identify and bring forth compounds that can be classified as potential preclinical candidates and then collaborate with partners to advance these compounds into human clinical trials. Additionally, compounds are used as tools to investigate novel targets. The Department has collaborative relationships with not only other SR research teams but also external partners, such as universities, research centers, and the National Institutes of Health (NIH). This includes access to the Central Alabama High-field NMR facility and structural biology facility (equipped with cryogenic electron microscopy) housed at UAB as well as the advanced photon source at Argonne national laboratory. The Department encompasses various disciplines in addition to synthetic chemistry, including computer-aided drug discovery (CADD), bioanalysis, structural biology, biomacromolecule purification and high-throughput synthesis and purification capabilities. Moreover, the Department has data platforms for efficient data management and artificial intelligence (A.I.)/machine learning model development. Synthetic chemistry is performed in laboratories of two contiguous buildings, Kettering-Meyer I (KM-I) and KM-II which are within close walking distance to the Bioanalytical Drug Discovery (BDD) Laboratory (in the Ingalls Central Building) on SR Campus and the University of Alabama at Birmingham (UAB). The Department houses 18 fully-equipped chemistry laboratories to accommodate the team of synthetic chemists. Shared department facilities include two laboratories for microwave-assisted synthesis, one laboratory for parallel synthesis, one laboratory containing two walkup LC-MS, one laboratory with a PrepHPLC (Teledyne AccuPrep) and two walkup HPLC and one laboratory that houses two NMR spectrometers. State-of-the-art CADD facility, a biomacromolecule purification-crystallography laboratory, two walk-in cold rooms, a notebook/records archive, three Repository laboratories for long-term sample storage, and a glassware washing laboratory, all of which are described below. In addition, there are sufficient offices proximate to the laboratory space to accommodate all senior staff, other offices dedicated to specialized project uses, general conference and meeting rooms, and ample storage space. Other units of SP division have facilities reciprocally available to the Chemistry Department as needed. As an aggregate, SR has superb facilities for the design, synthesis, isolation, purification, identification, characterization, scale-up, modeling and assay of synthetic compounds.

*Parallel Synthesis Laboratory:* The KMII Building houses a large laboratory dedicated to automated combinatorial chemistry and chemical library synthesis. These systems permit the implementation of most conceivable chemistry protocols. Analogs can be rapidly and efficiently prepared using any established parallel synthesis methodology (solid-phase, solution-phase, liquid-phase) on a variety of scales and in high purity.

*Microwave-Assisted Synthesis Laboratory:* There are three microwave synthesis instruments: The first is a CEM Discover Labmate System with Intelligent Technology for FocusedTM Microwave Synthesis that is capable of running stirred reactions with operating limits of 250 oC, 300 psi and 300 Watts irradiation. In addition, we have an 80ml Vessel Option (to run larger scale) with accompanying Fiber-optic Temperature Control System. The second system is an Explorer 48 with autosampler which is available to run robotically 48 reactions sequentially. The third is a Biotage Initiator Robot Eight which is capable of automatic vial-handling with a temperature range of 40 – 300oC and a pressure range of 0-435 psi. Two separate racks can accommodate up to eight process vials of up to 5 ml's volume or four large, 10-20 ml, process vials.

*BDD Laboratory:* This laboratory is currently comprised of four individuals and is housed in a 3,000-square-foot, air-conditioned space with capabilities for evaluating ADME properties of both small molecules and biologics, such as microsomal stability, LogD and solubility, permeability, metabolite identification, P450 inhibition, and plasma protein binding. The BDD laboratory also supports NMR, HRMS analysis and plasma/tissue bioanalysis for PK studies. The lab is equipped with major analytical instruments, and also has access to instruments such as an LC-Velos Orbitrap, Sciex 6500+ TQ LCMS, Sciex 4000 Qtrap LCMS, 600 MHz NMR (Bruker Avance III HD 600) which are located at SR’s CRO division and at University of Alabama at Birmingham.

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| **Instrument** | **Description** |
| Waters Xevo QTOF | LCMS system with Acuity UPLC and Xevo QTOF mass spec with a mass range up to m/z 100,000 and a resolving power of 40,000 FWHM |
| API 3200 (LM1) | Sciex API 3200 LC-MS/MS system |
| API 3200 (LM2) | Sciex API 3200 LC-MS/MS system |
| Eppdorf epMotion 5075 | Liquid handler with eight-channel dispensing tools. |
| Agilent 400-MR (main) | 400 MHz NMR with 12 position autosampler |
| Bruker AV4400N | AVANCE NEO 400 MHz NMR SPECTROMETER |

*CADD Laboratory:*Each CADD scientist is equiped with one Windows laptop and one Linux desktop for performing computer-aided drug discovery and design. These terminal computers connect to the CADD servers mounted in the server room in Ingalls Central Building which has uninterruptible power supply, security control and special climate control. The CADD server cluster consists of Schrödinger Small Molecule and Biomacromolecule Drug Discovery server, GPU-accelerated molecular dynamics simulation server, A.I.server (hosting the in-house developed generative and predictive A.I. models for small molecule and biologics drug discovery), Optibrium StarDrop cheminformatics server, Dotmatics data/compound management server and data storage server. Cloud computing utilizing other external computing resources is also available. Moreover, CADD scientists have access to UAB supercomputer Cheaha (with gauranteed allocation) which has a high computing speed of 528 TFLOPS.

Computer: Same as chemists, CADD scientists can use thier Windows laptops to access the client versions of Optibrium StarDrop, electronic notebook system, PerkinElmer ChemDraw, software to view CADD and analytical results, EndNote, SciFinder, digital library and the Dotmatics database.

Space: CADD scientists have individual office space in the KM building in close proximity to other research teams in the SP division.

*PI Laboratories:* The laboratory space is stocked with all standard equipment and apparatus, including glassware (flasks, still heads, condensers of all types, manifolds, traps, dessicators, drying pistols, thermometers, and separatory, filtering, and addition funnels, etc.), vacuum pumps and gauges, rotary evaporators, rheostats, hot plates, heating mantles, fume hoods (one per person), inert gases and gas handling equipment, gravity and flash chromatography columns, sonicators, balances, melting point apparatus, magnetic and mechanical stirrers, ovens, UV lamps, TLC and preparative layer developing chambers, and explosion-proof refrigerator-freezers.

*Structural Biology Laboratory:* The Structural Biology Laboratory is located in the Chemistry Department in the KMI building (KMI 207) at SR. This laboratory provides support for different drug discovery programs at SR and is equipped with several instruments, equipment and tools for molecular biology, cell culture, protein expression and purification, protein crystallization and structural enablement. The laboratory also has the access to equipment and resources in Chemistry Department and other laboratories within SR.

This lab is equipped with three computers which are used for protein purification, protein crystallization, imaging and one workstation (Intel Xeon 3.5G processor, 32G RAM, 2T storage) for X-ray data collection, processing and structure determination. The lab has access to the computer resources at the Molecular Modeling and Cheminformatics Laboratory in the Chemistry Department at SR which include a Dell Precision R5500N server (12 Intel Xeon 3.46 GHz processors, 192GB RAM, 9TB of high performance storage, and a 2.5GB NVIDIA GPU processor) and an Altix XE server (3-node server, each consisting of two Quad-core Intel Xeon 2.33GHz processors, 3.2TB storage capacity)

**High Throughput Screening Department:** The SR HTS Center houses technologies and resources enabling research activities to support investigators in the identification and investigation of pharmacologically active compounds to support basic research and drug discovery efforts. This is achieved through services that include compound distribution, tissue culture resources, assay development, screening and data management. Along with individual workstations allowing walk-up usage (plate readers, liquid handlers, incubators), the HTS Center utilizes two integrated robotic platforms for fully automated screening in 384 and 1536 well formats. Various detectors are incorporated into these systems to enable multimodal optical readouts, laser scanning cytometry and qPCR for primary endpoint measurements (Table 1)**.** Non-contact and tip-based liquid handlers capable of low nanoliter through milliliter dispense volumes further support the wide array of assay formats (Table 2). An informatics infrastructure with a dedicated data analysis team is key for rapid turnaround of results and ensuring data are fully captured and tracked. The SR HTS group has access to both BSL-2 and BSL-3 containment, allowing work with agents such as SARS-CoV-2. Our capabilities support a wide array of assay types for both biochemical and cell-based assays including reporter assays and qPCR readouts that can be valuable in studying rare disease gene expression (Table 1).

**Table 1: Key Detection Technologies**

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| **Instrument** | **Type** | **Signal Detection** | **Assay Technologies** |
| BMG PHERAstar  BMG CLARIOstar  BMG CLARIOstar | Multimodal reader | Colorimetric, fluorescence, luminescence | Absorbance, proximity (FRET, TR-FRET, AlphaScreen), light intensity, fluorescence intensity, fluorescence polarization |
| SPT Labtech Mirrorball | Laser scanning cytometer | Fluorescence | Low resolution imaging, fluorescence intensity (multiplexing), object recognition (cells or beads) |
| Biorad CFX Opus 384 Real-Time PCR System  384-well | 4-color plus FRET, RT-PCR detection system | Fluorescence | PCR, RT-PCR, qPCR |

**Table 2: Liquid Handling Capabilities**

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| **Instrument** | **Description** | **Volume Range** |
| Beckman Echo 550 and 555 | Non-contact acoustic liquid transfer supporting plate-to-plate transfers including stamping and random well access | 2.5 – 1000nL |
| Beckman BioRaptr | Fixed tip dispenser providing rapid dispensing in multiple formats for up to 8 different solutions | 100 nL – 60 µL |
| Beckman Biomek FX, i7 | Fixed 96 or 384 well head enabling full plate transfers and serial dilutions | 0.5 – 60 µL |
| Beckman NX Span-8 | 8 spanning channels and plate mover allowing independent operations such as cherry-picking | 5 – 1200 µL |
| Integra ViaFlo | 96 well head transfer station with semi-automatic capabilities. | 2.5 – 125 µL |
| Various bulk dispensers  (Wellmate, Combi, ViaFill) | Bulk dispensing on a per-column basis | Low µL – mL |

*Automation Platforms*: HTS maintains two automation systems to facilitate our assay process: the Thermo Fisher BenchTrak and a VAL cabinet. The BenchTrak utilizes an Orbitor on a rail in combination with a CatEx multi-directional arm. These two robotic plate movers work in conjunction with multiple liquid dispensers and plate readers to execute a complete assay set up. The VAL works in a similar method, also with a CatEx arm as its primary mover, and also exists within a HEPA-filtered containment cabinet that can be sealed and allows for the safe handling of BSL-2+ biological material. Both systems operate off of the Thermo Fisher Momentum scheduling software platform.

*Compound Management and Library Collections:* Our dedicated Compound Management group provides support for assay plate creation and general compound management. We maintain a collection of over 750,000 drug-like small molecules that may be used in campaigns ranging from small pilot screens to full library screens. The robust libraries. The approved drug and other biologically active compounds are valuable for drug repurposing efforts and target identification in phenotypic assays. By applying the liquid handling technologies in Table 2, our Compound Management group can support an array of assay formats and designs including 96-well, 384-well, and 1536-well plates.

*HTS Informatics:* The SR HTS Informatics group has established a robust system for tracking experimental conditions, analyzing and viewing data, and producing reports. Oracle databases are the central repository for the critical data management systems used by HTS and Scientific Platforms. Both ActivityBase and Dotmatics systems provide front-end (user) interfaces that rely on the Oracle databases to store the information gathered and generated by the respective systems.

IDBS ActivityBase data management suite includes components for Chemistry, Biology, XE (for HTS), and peripheral tools for querying and reporting. Experimental data is imported from plate readers into this system where protocols and templates are created to normalize and calculate appropriate results based on the requirements and best practice for each assay. Biologists use this system to evaluate assay quality and to review plate and compound-level data for anomalous patterns or outliers. Data meeting quality standards is verified and made available for internal review in Dotmatics and for reporting to internal and external clients. IDBS provides query tools that are used to generate most reports, supplemented by Biovia Pipeline Pilot when a more powerful tool is needed for complex queries and export of large SD files. Additionally, Pipeline Pilot allows query workflows to be designed for large reports, specifically those needed for compliance with Data Management and Sharing policies.

Dotmatics Browser is the primary tool used by Chemists to assess how well internal compounds perform in Biological, ADME and other assays. Chemical structures are registered in the Registration module, then distributed to various internal and external sources for testing. While results from HTS/ActivityBase are uploaded through automated means noted above, other types of results can be uploaded to the system using the Nucleus component. Display pages in Browser are flexible and may be edited to include various relevant results.

Dotmatics Studies functions as our electronic lab notebook systems. Both Chemistry and HTS use this system to retain details and metadata associated with each experiment.

The SR HTS LIMS software is an in-house process tracking system grown from our pre-existing UNIFlow LIMS. It uses a mySQL server and does not house any proprietary data. It is used to record equipment, consumables, plates and personnel involved in each step of the laboratory process. The system provides a database of information supporting our quality control and assurance efforts including equipment maintenance, reagent lots and expiration dates, and assay protocols. This system is used by compound management to track compound plate genealogy as assay plates are created and follows those plates as they progress through their designated assay’s workflow. This system architecture (Fig 1) was designed to enable flexibility to accommodate the constant evolution of laboratory techniques and workflows.

Clinical: N/A

Animal: N/A

Computer: All associated offices are fully networked and equipped with multiple computers. Dell PCs, along with multiple printers and scanners, are available to all staff. The PI has a Dell laptop computer with a Pentium processor. All of the computers and printers are connected to the SR LAN, and all of the computers have access to the internet through this network. Computer core services use an Ethernet board network to printers and provide institutional file servers and extensive back-up capacities. The computers have ample storage space with which to enter, process, and analyze all data gathered from this project. In addition, assorted software is available for data analysis and statistical informatics.

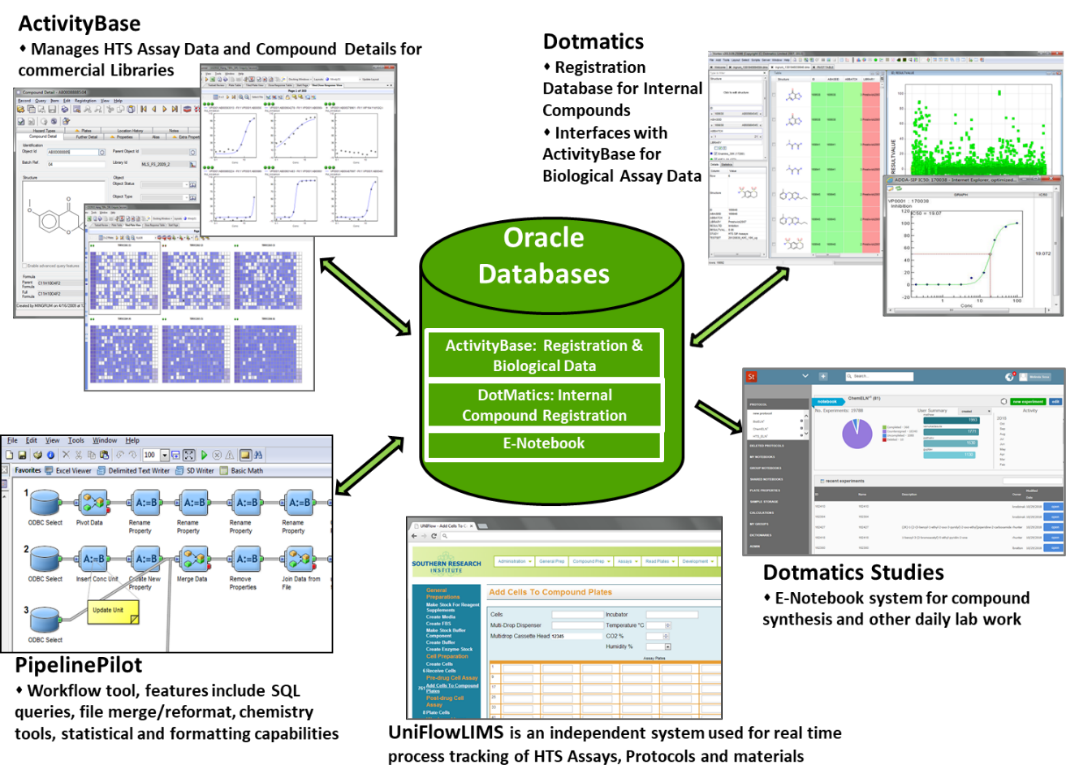


Figure 1

Office: The PI has a standard, secure office located in the Kettering-Meyer (KM)II building in room 601. Standard, secure offices are also available for postdoctoral fellows, graduate students and technical support staff, and are located in close proximity. There is additional office space for administrative and administrative support staff.

**Oncology Department:** The SR Oncology department houses technologies and resources enabling research activities to support investigators in *in vitro* platform development and *in vivo* efficacy studies. This is achieved through services that include fully accredited AAALAC animal facilities, access to BSL-3 laboratory space, a comprehensive immunology core including capabilities for high throughput flow cytometry, cell sorting, multi-plexed cytokine analysis, 3D bio-printing (EnvisionTech Bio-plotter Developer Series), high content imaging and molecular biology laboratories.

*Facilities:* The Oncology Department is located on the main SR campus, and houses a total of approximately 7,000 square feet of fully-equipped laboratory space dedicated to individual investigator’s research agenda. Research is performed in the laboratories of Ingalls West buildings on the 1st floor. Each independent lab has all necessary instrumentation for molecular and cellular biology, and translational research, including all basic molecular biology and biochemical methods.

*Office:* Standard, secure offices are available for the PI and all staff, and are adjacent to the laboratory. There is additional office space for postdoctoral fellows, graduate students and technical support staff as well as for administrative and secretarial support staff.

*Laboratory:* The laboratory space (861 square feet) contains the necessary equipment to conduct a wide array of studies involving tissue and cell culture, microbiology, biochemistry, molecular and cell biology and microscopy imaging for immunological, microbiological, molecular, biochemical and cellular biological research.

*Imaging Systems:* The Oncology Department has at its disposal a Nikon A1 scanning confocal microscope equipped with four lasers (ex. 405, 488, 561, and 615nm) and the ability to detect up to 30 different emission wavelegths. Additionally, we have a Nikon Ti2 Eclipse with High Content screening module for automated capture in the X,Y, and Z dimensions and Zeiss confocal microscopy. There are two Evos epifluorescence microscopes with 4-color digital image acquisition capability for quickly screening and capturing cell images.

*Flow Cytometry Core:* The Department has a flow cytometry core facility including an IntelliCyte iQue screener PLUS flow cytometer equipped with 3 lasers (405, 488 and 561nm) that can detect up to 13 fluorescent parameters and a FACSMelody cell sorter with sorting capabilitys to detect 9 colors and perform purity and single cell sorts into a range of vessels from 3mL tubes to 384-well plates.

*Molecular Biology and Biochemistry:* The molecular biology and biochemistry facilities within the Oncology Department are complete with modern molecular and biochemical equipment for investigating biochemical pathways and immunological effects including Thermoscientific Nanodrop 2000 spectrophotometer for RNA quantitation and quality control, Akta FPLC systems, a LX200 immunoassay system for quantitating both cytokine and chemokine secreted protein levels in multiplex, Beckman RC2B high speed centrifuge with SS34, GSA and HB-4 rotors, Illumina LiCor gel documentation system, two BioRad quantitative PCR systems for quantification of DNA/RNA copy number, and a BMG ClarioStar and Spectramax ID5 multifunctional plate reader to assess FRET, Fluorescence polarization, standard fluorescence and absorbance, and kinetic measurements

*Animal:* SR has fully accredited AAALAC animal facilities. The Department of Laboratory Animal Resources (DLAR), Animal Care and Resources (ACR) and the Institutional Animal Care and Use Committee (IACUC) of SR provide the guide for the animal care and use program. The DLAR and ACR are comprised of a variety of laboratory animal care professionals and specialists that function as a team to provide state-of-the-art care and management for all research animals and facilities maintained by SR. The Attending Veterinarian at each site is responsible for managing the program and reports either directly or indirectly to the Vice President of Drug Development who serves as the Institution Official overseeing animal studies.

The Birmingham facility hosts two facilities that may contain animals. Animal studies are housed throughout the main SR campus based on animal biosafety level (ABSL). The Cancer Cause and Prevention (CCP) Building is where ABSL-1 and -2 work is performed, whereas the contiguous Frueauff (F) and Daniel (D) Buildings contain A/BSL-3 space for the high-containment Tier 1 select agent work. The square footage in the CCP Building is 34,053 square feet and the ABSL-3 space is 4,482 totaling 38,535 of investigative research animal housing space. Support of the animal space is provided for feed, bedding, cage storage, rack storage, autoclaves for sterilization procedures, cage washers for maintaining clean cages, dump stations for animal housing clean-up, janitorial spaces, locker/shower rooms and office space for employees.

*Computer:* All associated offices are fully networked and equipped with multiple computers. Based on preference, a Dell PC or iMac computer, which along with multiple printers and scanners, are available to all staff. In addition, laboratory computers are used to interface with the BioRad IQ5 RT PCR system, LX200 Multiplex Instrument and the Leica DMLB Epifluorescence microscope. All of the computers and printers are connected to the SR LAN, and all of the computers have access to the internet through this network. Computer core services use an Ethernet board network to printers and provide institutional file servers and extensive back-up capacities. The computers have ample storage space with which to enter, process, and analyze all data gathered from this project. In addition, assorted software is available for data analysis and statistical informatics.

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| TULANE UNIVERSITY (Tulane) |

Tulane University is a proud member of the prestigious Association of American Universities, a select group of 71 universities with “preeminent programs of graduate and professional education and scholarly research” and is ranked by the Carnegie Classification of Institutes of Higher Education as a university with “very high research activity,” a classification shared by only 3.7 percent of 3,938 higher educational institutions rated by the foundation nationwide. Tulane is home to an expansive health sciences research community, with a multidisciplinary faculty base from across departments, research centers, and institutes within the School of Medicine, School of Public Health and Tropical Medicine, School of Science and Engineering, School of Social Work, and the Tulane National Primate Research Center. The faculty competes successfully for peer-reviewed grants, with over $200 million in sponsored research funds annually.

Tulane is the only institution in the US that has the combined resources of a School of Medicine, a School of Public Health and Tropical Medicine, a School of Social Work, a National Primate Research Center with a Level 3 Biosafety Laboratory, and an integrated School of Science and Engineering where health is the number one unifying research theme. Tulane’s downtown New Orleans campus is part of the New Orleans BioDistrict, which includes major medical centers, research institutions, universities, and biotechnology companies that collaborate to advance healthcare innovation, education, and research. The proximity to these entities enhances education and research opportunities for students and faculty and provides an excellent environment for research from the bench sciences to population sciences. Frequent opportunities are available for collaboration in research, education, and clinical practice, ensuring dynamic sharing of knowledge, vibrant exchanges of ideas, and the best available medical and patient care.

Tulane has invested heavily in the development of core facilities and making them broadly accessible. Core facilities include instrumentation and capacity for molecular imaging and analysis, DNA sequencing and diagnostics, microarray analysis, laser-assisted microscopy, real-time PCR, flow cytometry and cell sorting, specialized imaging and analysis, and more. Outstanding high-performance computing capacity is available through Tulane’s Cypress supercomputer.

**INSTITUTIONAL RESEARCH ENVIRONMENT & EXPERTISE IN CLINICAL AND TRANSLATIONAL SCIENCE**

This program will build on the research expertise within the Tulane health sciences. The health sciences at Tulane include several main components, i.e., the School of Public Health and Tropical Medicine (SPHTM) and the School of Medicine-SOM (including the Tulane National Primate Research Center). Together, these units provide a broad array of opportunities for education and research from the bench sciences to the population sciences. Tulane SOM is the 15th oldest medical school in the nation and was the first medical school in the Deep South. It has a rich tradition of research excellence, including two Nobel Laureates. The SOM facilities are physically located on the Tulane health sciences downtown campus and provides more than 550,000 square feet of floor space. Included in the medical school complex are research and teaching laboratories, the medical library, a large auditorium, various conference rooms and classrooms, and administrative offices.

**School of Medicine:** The Tulane School of Medicine (SOM) is located on the downtown campus in New Orleans, LA. Established in 1834, it is one of the oldest medical schools in the United States, reflecting a deep commitment to medical education and research. The SOM environment is characterized by its close ties to the local community and a strong emphasis on addressing public health challenges, particularly those unique to the Gulf Coast region. Tulane fosters a collaborative atmosphere where interdisciplinary research and hands-on clinical experience are paramount. The SOM has well-equipped facilities that support research and education, including specialized laboratories, a medical library, a large auditorium, and ample conference, classroom, and administrative space. The SOM operates several research centers and core equipment and service facilities that are available to the university community.

**School of Public Health & Tropical Medicine:** The Tulane School of Public Health & Tropical Medicine (SPHTM) is located on the downtown campus in New Orleans, LA. Established in 1912, it is the oldest school of public health in the United States and is the only one with a Department of Tropical Medicine. Tulane has a longstanding tradition of research and training in global health and tropical medicine, dating back to 1834 when the School of Medicine was founded. The SPHTM continues this legacy through collaborative research and academic programs with the School of Medicine. The SPHTM environment is characterized by its emphasis on interdisciplinary research, education, and community engagement. The SPHTM has research-active faculty with a range of expertise across public health disciplines, research funding portfolios from a variety of federal agencies and private foundations, and well-established research programs in key public health areas including global health, cardiovascular epidemiology, genetics, molecular biology, prevention research, disasters, evaluation and effectiveness research, and health administration. The SPHTM has well-equipped facilities that support research and education, including computer and research laboratories, core facilities, large classrooms, conference seminar rooms, and administrative offices. The SPHTM also houses several specialized research and training centers and has extensive international programs and partnerships.

**Facilities and Resources**

**Libraries:** Tulane University has nine libraries with a total of 2.2 million volumes, 14,000 periodicals, and 1.6 million government documents. The university maintains a computerized integrated library system, affording users both on-site and network access to catalog services and information. The libraries have added subscriptions to electronic versions of major journals, and now allow access to journals from faculty offices. In addition, proxy servers allow off-campus access to the electronic journals, which not only contributes to convenience in using the library, but also provides access to library resources by distance learning. The Tulane Medical Library is a member of the National Network of the Libraries of Medicine and is accredited under the relevant standards of the Liaison Committee for Medical Education, Accreditation Council for Graduate Medical Education, Joint Commission for the Accreditation of Health Care Organizations, and Southern Association of Colleges and Schools. The library supports the teaching, research, and patient care functions of the health sciences center through the acquisition, organization, and dissemination of biomedical information.

**Tulane Office of Research:** Tulane University is committed to the support and growth of the research enterprise via its institutionally funded Office of Research. The Vice President for Research (VPR) is the University-wide senior research officer tasked with growing the research effort by facilitating the development of new interdisciplinary collaborations, supporting promising research initiatives, overseeing and facilitating compliance with federal research regulations, and resolving institutional and administrative obstacles to progress. The Office of Research is institutionally funded to provide high-quality research support services. A University Research Compliance Officer serves to support the research compliance agenda. *The following research support offices report to the VPR and have been expanded to meet the needs of a research-active faculty:*

* ***Human Research Protection Program:*** The Tulane University Biomedical Institutional Review Board (IRB) and Social/Behavioral IRB are administered by the Human Research Protection Office as part of Tulane’s Human Research Protection Program. The Program is fully accredited by the Association for the Accreditation of Human Research Protection Programs (AAHRPP). It maintains a comprehensive set of Standard Operating Procedures that incorporate federal and state human subject protection regulations and AAHRPP accreditation standards. Compliance with applicable regulations, policies, and accreditation standards is accomplished through a rigorous initial review process for all proposed research projects and through the continuing review process, which must occur prior to the expiration date of the IRB approval. Initial and continuing reviews are conducted in accordance with federal guidelines. Additionally, compliance is ensured through for-cause and not-for-cause auditing conducted by the Research Compliance Office.
* ***Research Compliance:*** The Research Compliance Office assists researchers to ensure compliance with applicable regulations, university policies, and accreditation standards. These include the use of human and animal subjects in research, biological safety, pre-award grants administration, export controls, research misconduct, responsible conduct of research training, responding to Freedom of Information Act requests, registering and posting research ClinicalTrials.gov, and using controlled substances.
* ***Office of Research Proposal Development (ORPD):*** ORPD assists faculty in the preparation and submission of complex grant proposals, in the areas of physical and biological sciences, medicine, public health, engineering, information and computer sciences, and social sciences. The services offered by the ORPD are broad, including convening meetings of researchers for multi-investigator funding opportunities, working with investigators and sponsors to understand proposal requirements, developing proposal preparation schedules, creating proposal templates, gathering and formatting commonly required proposal elements, and vetting and editing technical sections of the proposal. Biostatistical support is also available through ORPD.
* ***Research Administration Service Units***: Tulane’s Research Administration Units (RASUs) provide high-quality research administrative services to Tulane schools, centers, and departments. Each school is assigned to a RASU, which provides pre- and post-award administration support. RASUs collaborate with appropriate subject matter experts in central research service offices such as Sponsored Projects Administration, Grants and Contracts Accounting, and Research Proposal Development to deliver services consistently, efficiently, and professionally and to ensure compliance with federal, state, and university policies, practices, and procedures.
* ***Sponsored Projects Administration (SPA):*** SPA assists faculty in identifying sponsors for research funding, provides advice on proposal development, assists in preparing proposal budgets, serves as the Authorized Organizational Representative for proposal submissions and develops and implements policies and procedures involving the post-award aspects of sponsored projects. SPA is also responsible for issuing and monitoring subcontracts and reviewing and approving grant expenditures as needed. The Office of Grants and Contracts Accounting provides both pre- and post-award services to faculty members. Staff members aid investigators in the development of budgets for grant and contract proposals and in filing required compliance documents.
* ***Technology Transfer and Intellectual Property Development:*** The Office of Technology Transfer and Intellectual Property Development translates research and knowledge from the laboratory and classroom into technologies that benefit the public and provides superior services to the university, its faculty, and students, enabling all aspects of the research mission to strengthen the economy of southeast Louisiana through the creative use of Tulane’s intellectual property.

**Tulane Center for Cardiovascular Health:** The Tulane Center for Cardiovascular Health is located within the Department of Epidemiology, SPH. A main component of this center is the widely recognized “Bogalusa Heart Study”. The NHLBI/NIA/AHA-funded Bogalusa Heart Study has been a long-term epidemiologic study. The investigators have identified and followed children for nearly 35 years, and have described the incidence and prevalence of biologic and behavioral cardiovascular disease risk factors in these children. The results from the Bogalusa Heart Study have clearly documented that the genesis of atherosclerosis has its basis in childhood, and that prevention can and must begin at the early ages.

**Tulane Hypertension and Renal Center of Excellence (THRCE):** Tulane Hypertension and Renal Center of Excellence (THRCE) grew out of the significant research in hypertension and renal disease being performed on the basic and clinical levels in the Departments of Medicine, Pediatrics, Physiology and Epidemiology in both the Tulane SOM and the Tulane SPH. This multidisciplinary Hypertension and Renal Center of Excellence is under the directorship of Dr. Jia “Joe” Zhou, Professor of Physiology.

**The Tulane and Xavier Universities Center for Bioenvironmental Research (CBR):** The Tulane and Xavier Universities Center for Bioenvironmental Research (CBR) began in 1989 with a $33 million grant from the U.S. Department of Defense to establish a program of basic and applied scientific and policy research in bioenvironmental research. Under the auspices of the CBR, a wide variety of disciplines (medical, scientific, legal, economic and managerial) work together to better understand how human, industrial and agricultural processes affect the environment with a focus on human health. Featured in the CBR space and occupying 3 floors in the J. Bennet Johnston Health and Environmental Research Building, are state-of-the-art laboratories used for core areas of research, including environmental and occupational diseases, toxicology, environmental health sciences and experimental pathology. The CBR’s faculty and students are drawn from disciplines as varied as anthropology, biochemistry, computer science, disease prevention, ecology, economics, engineering, English, epidemiology, geology, mathematics, molecular biology, philosophy, pharmacology and toxicology, for multidisciplinary basic and applied environmental research and education. Strength of the partnership between Tulane and Xavier Universities is its ability to leverage funds and optimize investments in institutions by combining the research capabilities of Tulane University with educational resources at Xavier University. The value of this partnership has been recognized through numerous grants and cooperative agreements funded by many federal agencies including the U.S. Departments of Energy, Defense, and Agriculture; the National Institute of Environmental Health Sciences; the National Science Foundation; and the national Aeronautics and Space Administration. Current priority areas in research focus on health, ecosystem research, biomonitoring/bioremediation program and a laboratory dedicated to environmental endocrinology.

**Prevention Research Center:** Prevention Research Center is funded by CDC and conducts prevention research, develops partnerships with the local community, communicates research insights within the local community and among communities, and provides training for future prevention researchers and community members. The theme of the Tulane University Prevention Research Center is the Impact of the Physical and Social Environment on Obesity. The PRC has been actively engaged in trying to rebuild New Orleans in ways that promote physical activity and healthy eating. PRC projects are planned jointly with a Community Advisory Board consisting of representatives of health-related, environmental, and community organizations in New Orleans.

**Center for Evidence Based Global Health (CEBGH):** The mission of the Center for Evidence Based Global Health (CEBGH) is to promote and support evidence-based research addressing today’s most critical global health issues. The center supports this goal by providing methodological expertise to Tulane faculty in designing, conducting and analyzing cluster randomization and practical trials, as well as by offering administrative and logistical support to faculty in preparing grant proposals and in coordinating international trials.

**Tulane Center for Aging:** Tulane Center for Aging, established in 2007, is a NIH-funded, university-wide center, physically located at the downtown health sciences campus. Its goal is to harness the multidisciplinary resources at the three campuses of Tulane University on behalf of the aging population. This is achieved through innovative research, education, and service. The purpose of the Tulane Center for Aging is to enhance existing programs and to create new ones where the need and opportunity arises. A Distinguished Lecture in Aging series was instituted, and this was followed by a seminar program. The Center for Aging hosts a monthly Aging Interest Group meeting that alternate between the uptown and downtown campuses. These gatherings have fostered the development of several interdisciplinary research groups and new funding possibilities. The Tulane Center for Aging is dedicated to the strengthening of training and service in the areas of geriatric medicine and gerontology in cooperation with the Section of General Internal Medicine and Geriatrics in the Department of Medicine and the School of Social Work, respectively.

**The Center for Medical Informatics (CMI):** The Center for Medical Informatics (CMI) helps the Tulane Medical Center plan, develop, and implement computer/communications systems to support its missions in medical education, clinical practice, and research. It provides expertise in technologies important in education, electronic publishing, and research and clinical data management. It also provides consultative support, expert assessment of commercial hardware and software, training opportunities, internal software development, and shared equipment and software resources.

**Center for Biomedical Informatics and Genomics (CBG):** The Center for Biomedical Informatics and Genomics encourages, promotes, and supports interactive and collaborative research in various fields, such as biomedical informatics (especially bioinformatics and image informatics, now expanding to health informatics), biostatistics, health informatics, computational biology, data sciences, human genetics, genomics, and proteomics, epigenomics, metabolomics, metagenomics, metabolomics, drug repurposing, machine learning and deep learning, and single-cell sequencing-based research. The Center was created in 2020 and is directed by Hong-Wen Deng, PhD.

**Tulane Stress and Environment Research Collaborative on Health (SERCH)**: Basic, biomedical and social science research methods are applied to increase mechanistic understanding of the pathways through which stress, defined at multiple levels and across the life course, is biologically and behaviorally embedded to affect health. The goal is to foster novel prevention programs that build on psychosocial strengths of individuals and communities with an aim is to alter these negative trajectories with a focus on sustainable implementation and successful dissemination of such programs, using community-based participatory research (CBPR) and ownership as a key ingredient to successful sustainable programs. The interdisciplinary team brings select skill sets and experiences that are highly synergistic. Specifically, the team has expertise in social epidemiology, environmental epidemiology, reproductive epidemiology, genetics and epigenetics, allergy and immunology, psychology, social work and community health sciences, with a focus on violence prevention. This new collaborative was made possible through an NIH Interdisciplinary Infrastructure Development grant (NIH 1C06RR029949-01) that supports renovation for interdisciplinary research.  This specific collaborative includes 19 faculty representing Tulane University Schools of Public Health and Tropical Medicine, Social Work, Medicine, Science and Engineering.   The SERCH collaborative is housed in the J. Bennett Johnson Building on Tulane‘s downtown campus.  The J. Bennett Johnston Health and Environmental Research (JBJ) Building, located on Tulane Avenue, is a seven story, state-of-the-art facility which houses the Center for Bioenvironmental Research and other Tulane research activities. The 184,000 square foot building is designed to encourage interdisciplinary collaboration. The laboratories are configured in 360 square foot modules. Modular design permits economical reconfiguration of the lab space as research activities and needs change.  The SERCH research space, located on the first floor and with approximately 1500 square feet of space, includes a biophysiology lab, observation and interview rooms, focus group room, and a GIS computing lab.

**Tulane Brain Institute:** Tulane Brain Institute represents a new of era of discovery, learning, and public influence in the brain sciences at Tulane. Researchers are working to understand differences in the brain and how hormones such as estrogens and androgens impact the brain across the lifespan. The Tulane Brain Institute, founded in 2016, builds upon the over 30 years of success of the Tulane Neuroscience Program. The University-wide Brain Institute, created as a transdisciplinary entity to coordinate and oversee neuroscience-related endeavors at Tulane, brings together over 400 faculty and students from across the University including from the Main Campus, the Health Sciences Campus, and the Tulane National Primate Research Center. The three pillars of the Brain Institute are research, education and training, and community outreach and engagement.

**Tulane Building Interdisciplinary Careers in Women’s Health** (BIRCWH K12): The BIRCWH Program provides mentored career development for junior faculty to increase the number of highly trained independent investigators in women's health in the field of cardiovascular and related diseases.  The program is dedicated to promoting research and the transfer of findings related to Women's Health by promoting research independence among junior investigators.  In order to improve the quality and increase the quantity of Women's Health research, Tulane BIRCWH bridges the period between advanced training and research independence, as well as links professions, scientific disciplines, and areas of interest for selected scholars.  The common theme running throughout the various research areas is interdisciplinary research on cardiovascular disease, hypertension, and renal disease. In addition to our long-term goal of increasing the number of skilled, independent interdisciplinary investigators, we are also committed to promoting, through the BIRCWH Program's illustration, the awareness of the need to ensure a strong pipeline when fostering entities; establishing institutional  and individual renown both nationally and internationally for the BIRCWH Program's findings on CVD and Women's Health and improving the cardiovascular health of Louisiana women across the lifespan, by effectively training the next generation of conscientious, competent and independent academic Women's Health researchers.

**Women’s Health Resource Laboratory (WHRL):** The WHRL It provides technical support, guidance and mentoring in the areas of study design, data collection instruments, maintaining and updating study databases and statistical analyses. Lydia Bazzano MD, PhD, Associate Professor of Epidemiology and Medicine directs the WHRL. WHRL is housed at the SPH and has space that includes a data training “laboratory” with computers and fosters interdisciplinary interactions of Tulane and other investigators. The WHRL serves not only as a service laboratory for Women’s Health research at Tulane, but also a nexus of integration of sciences such as epidemiology, biostatistics, economics, and behavioral and basic sciences.

**Animal (Department of Comparative Medicine):** The Department of Comparative Medicine ensures high-quality, humane care and use of all laboratory animals at the vivarium located on the 9th floor of the Building for Environmental Research, accredited by AAALAC and under the supervision of veterinarians and trained staff. All faculty and staff with access to the vivarium are trained in accordance with related laws and guidelines of all federal and state agencies. All precautions are taken regarding the safety of animals and staff, and to maintain the integrity of scientific experiments. Appropriate transportation regulations and quarantines are strictly observed, and import/export and anesthesia/euthanasia procedures are performed according to the specific guidelines approved by the Institutional Animal Care and Use Committee (IACUC). In addition, animal care practices are based on the NIH Guide for Care and Use of Laboratory Animals. Access to the vivarium is restricted to qualified personnel, each with a unique security entrance code in the Edstrom Watchdog system. Codes are not shared by departments, and each individual’s code is restricted to those areas in which he or she has documented expertise.

**Shared Facilities and Research Cores**

**Clinical Laboratory:** The clinical laboratory in the Tulane University Office of Health Research is approximately 500 square feet and is equipped with a chair for phlebotomy work, facilities, and supplies for the appropriate storage of blood and urine specimens, a protected disposal for sharps, and two refrigerated centrifuges for processing blood and urine specimens. It occupies 800 square feet of space in the Tulane SPH building (23rd floor). The laboratory is equipped with an Olympus AU400e Chemistry-Immuno Analyzer (Olympus America Inc. Melville, NY), a Perkin Elmer 1470 Automatic Gamma Counter (PerkinElmer, Waltham, MA), an ASYS Expert Plus Microplate Reader (Biochrom, UK), Dionex Ultimate 3000 HPLC Systems (Thermo Fisher Scientific Inc., Sunnyvale, CA), an Abbott Laboratories IMX Automated Immunoassay Analyzer (Abbott Laboratories, Abbott Park, IL), a Hitachi 902 Chemistry Analyzer (Roche Diagnostics, Holliston, MA), an Abbott AxSYM® System (Abbott Laboratories, Abbott Park, IL), a Helena QuickScan 2000 (Helena Laboratories, Beaumont, TX), Beckman L5-75 and 1-2-60 Ultracentrifuges (Biostad™, Québec, Canada) and regular centrifuges. In addition, a TM Analytical Gamma Counter, a Tecam Microplate Washer and Reader, an electrophoresis apparatus, a colorimeter, and analytic balances are available.

Available laboratory services include sample processing, storage, shipping, molecular analyses, and multiplex biomarker assays. The laboratory also uses radioimmunoassays (RIA), enzyme-linked immunosorbent assays (ELISA), and high performance liquid chromatography (HPLC) analysis for many special assays, such as cytokines, hormones, and adipokines. The Biochemical Laboratory routinely measures complete chemistry panels, blood and urine electrolytes, IgG, IgM, urine micro-albumin, cystatin C, HbA1C, CRP, endocrinology panels (estradiol, FSH, hCG, LH, progesterone, prolactin, testosterone, anti-Tg, anti-TPO, free T3, free-T4, T-uptake, total-T3, total-T4, ultrasensitive hTSHII), hepatitis panels, metabolic panels (active-B12, anti-ccp, B12, cortisol, ferritin, folate, glycated hemoglobin), homocysteine, troponin-I, PSA, BNP, CK-MB; protein and amino acids, ADMA, Larginine; insulin, C-peptide, adiponectin, leptin, e-selectin, SHBG, ICAM-1, vCAM-1, IL-6, 8-Isoprostane,TNF-α, and other traditional and novel CVD risk factors. The laboratory has served the Bogalusa Heart Study and other large-scale epidemiology and clinical research projects. As part of the clinical laboratory that supports storage of samples, Tulane also has a Freezer Farm with 12 ultra-low freezers (-85oC) for biological sample storage are available at the Tulane SPH. After Hurricane Katrina, the school invested sufficient funds to set up this freezer farm, which is located at the Tulane National Primate Research Center, an inland research facility which is protected from hurricane damage. All freezers have 24hour emergency power support, as well as CO2 back up.

**Molecular Genetics Laboratory:** There are several faculty mentors at Tulane University with molecular genetics laboratories. These laboratories are usually 300-500 square feet and used for molecular genomic studies and high-throughput genotyping. Some laboratories are also conducting studies in functional genomics and epigenetics.

**Molecular, Imaging, and Analytical Core Facility:** The Molecular, Imaging, and Analytical Core Facility was developed to provide cell, molecular and biochemical services to researchers of the Tulane Hypertension and Renal Center (THRCE) that would make the performance of their research programs more efficient, convenient, and cost effective. It is a state-of-the-art facility that provides research infrastructure support to all Center investigators encompassing molecular biology, semi quantitative imaging, immunohistochemistry, genomics, HPLC, and RIA of angiotensin peptides. The Molecular, Imaging, and Analytical Core Facility has three separate components:

* ***Molecular component:*** DNA, RNA, protein, and tissue culture work are primarily performed in this laboratory. These include DNA and RNA extractions, purification, concentration, quantification, amplification, cloning, and detection procedures using PCR and real time qRT-PCR. Protein analyses include extraction, quantification and detection of target protein expression and activity using Western blot, EMSA and ELISA. Tissue culture work includes primary cultures and cultures of cell lines, transfection using RNA silencing technology and analyses of specific cells using microscopy and flow cytometry.
* ***Imaging component:***This facility provides support for immunohistochemistry and immunofluorescence using an automatic robot immunostainer or manual immunoperoxidase techniques. High resolution upright light and fluorescent microscopes including an inverted microscope with an imaging capturing system and time-lapsed and chamber-incubator functionality to facilitate the evaluation of specific changes in protein expression in live cells, fixed tissues, and the evaluation of histopathological alterations.
* ***Analytical component:*** This facility provides assistance with the harvesting and collecting of tissues, including plasma, urine, and tissues such as heart, kidney, and brain, among others. This core performs the partial purification of samples by solid phase extraction along with HPLC separation with a major focus on the measurement of different angiotensin peptides and proteins by radioimmunoassay (RIA). In addition, it provides instrumentation support for measuring other fundamental parameters such as hematocrit, Na+ and K+ concentrations and osmolality in plasma and urine, various ELISAs and Luciferase assays.

**Center for Advanced Medical Simulation and Team Training (Sim Center)**

The Tulane Center for Advanced Medical Simulation and Team Training gives medical students, residents, practicing physicians, nurses, technicians, first responders, and other healthcare providers the opportunity to learn and perfect the latest techniques and best practices for patient care and safety. An integral benefit of the Sim Center's effectiveness is the ability to take training beyond individual tasks to incorporate team and multidisciplinary full system training. The real-life environment allows healthcare providers to move as a team through initial assessment in an emergency, to procedures in the operating room or labor and delivery, and end with long-term care in the intensive care unit or patient hospital room. The Sim Center features 14,000 square feet of real-life environments and meeting space for hands-on training, instruction, and skills assessment. The facilities include an emergency room, intensive care unit, operating room, labor and delivery room, three hospital patient rooms, four clinic exam rooms, and a nurses station. The simulators and trainers feature high-fidelity technology, such as a 3D Sytems GI-Bronch Mentor II endoscopic simulator, 3D Systems U/S Mentor ultrasound simulator, Mentice Vascular Intervention simulator, CAE Human Patient Simulator (adult and pediatric), birthing and gynecological simulators, two SimMan 3G manikins, two SimMan Classic manikins, SimBaby and SimNewB patient simulators, and Stryker High Definition Laparoscopic trainers.

The Center offers a multidisciplinary approach to medical education and research that includes skills/task training, team training, integrated Standardized Patients, surgical and non-surgical simulations, disaster training and emergency and trauma care training, Life Support training, and long-term care.

**TRANSLATIONAL RESEARCH INFRASTRUCTURE**

**School of Medicine Research Pharmacy:** Located on the first floor of the SOM’s Hutchinson Memorial Building, is a licensed pharmacy that provides Tulane faculty with support and guidance for the safe and efficient conduct of clinical drug trials. The Lead Research Pharmacist on staff is specially trained in the research process to ensure the delivery of high-quality pharmaceutical care by adhering to federal and state regulations, accreditation standards and institutional policies for investigational drug control.

**Tulane Center for Clinical and Translational Research (TCCR):** The TCCR provides research facilities with equipment, exam rooms, and support areas; regulatory, monitoring, and audit support for protocols; research nursing support for recruitment and protocol implementation; financial and contract support for negotiations with industry-supported studies; and core laboratory support for specimen processing, shipping, and/or analysis for investigators at Tulane University conducting clinical research. The TCCR staff maintains credentials and a collaborative relationship with the Louisiana State University Health Sciences Center-New Orleans’ Clinical and Translational Research Center (CTRC) at the University Medical Center (UMC), sharing facility and nursing staff as needed and the core laboratory at Tulane and LSUHSC-NO protocols. The core laboratory functions play a major role in providing assistance for routine and special processing, storage, and shipping of all cellular and serologic samples; performing molecular assays including DNA, RNA isolations and genotyping, and gene expression analyses for various protocols; assisting investigators in identifying new methods that will support their research as well as in the proper validation of these new methods; training investigators, fellows, residents, medical students, and technical staff in molecular techniques, which includes both theoretical and practical training in molecular techniques in the lab.

The TCCR serves as a point of contact for sponsors and investigators and enhances and facilitates high-quality clinical and translational studies with a specific emphasis on recruiting populations.

The TCCR hosts a well-equipped clinic space for many types of clinical research visits, including minor invasive procedures, with seven exam rooms, five consult rooms for adult and pediatric research visits, and a waiting room with two televisions that show customized health programs for our population. The laboratory has two blood drawing chairs, two centrifuges, a refrigerated microcentrifuge, a -20° freezer, two -80° freezers with backup systems, and a regular refrigerator with freezer, which allow for real-time specimen preparation and processing, storage, and shipping of study-related biological specimens. Bone density and body composition analysis are available via DXA Lunar Prodigy Advance. An infusion suite with four infusion chairs and pumps and nursing services are available for blood draws, ECGs, injections, and other clinical tests.

**Clinical Neurosciences Research Unit (CNRC):** The CNRC is a translational and clinical research enterprise with educational and community science components. The CNRC works to develop novel therapies for stroke, dementia, and traumatic brain injury and to translate these therapies from bench to bedside to improve patient outcomes. The CNRC plans to serve as the integrating point and driving force behind the development of cutting-edge multidisciplinary science, state-of-the-art clinical services, innovative community outreach improving health and care, and engagement with hospital partners. The CNRC also partners with other institutes and departments at Tulane University to develop innovative multidisciplinary neuroscience programs and to achieve international recognition as a top-tier neuroscience research center.

**Hayward Genetics Center:** This Center, directed by Dr. Hans Andersson, is an interdepartmental, multidisciplinary program providing state-of-the-art service, education, and research in the full spectrum of diagnosis, counseling, and management of genetic disorders. The faculty of the Hayward Genetics Center includes clinical and basic scientists specializing in various areas of human genetics who are board-certified by the American Board of Medical Genetics in all subdisciplines of medical genetics (clinical genetics, clinical biochemical genetics, clinical cytogenetics, clinical molecular genetics, and PhD medical genetics). Additional faculty members include research and basic scientists with expertise in biochemistry and molecular biology and physicians who are board-certified in various other medical specialties, including maternal/fetal medicine, pediatrics, neurology, and internal medicine. The Hayward Genetics Center is accredited as a training program by the American Board of Medical Genetics. It is also accredited by the Accreditation Council for Graduate Medical Education (ACGME) to provide postdoctoral training (years four and five) in MD clinical genetics. The Hayward Genetics Center also offers a range of clinical and laboratory services.

The **Biochemical Genetics Laboratory**, established in 1978, was the first such laboratory in the Gulf South and remains the most comprehensive biochemical laboratory in the region. It has been the referral laboratory for the Louisiana State Genetics Disease Program for confirmatory analysis of newborn screening in inborn errors of metabolism for over 20 years. The lab is committed to the quality and timely performance of testing. The Human Genetics Program is unique in providing the most comprehensive spectrum of genetic services to the medical communities of Louisiana and the Mississippi Delta region. Board-certified biochemical genetics specialists always perform the interpretation of the diagnostic testing.

The **Cytogenetics Laboratory** was established in 1960, one of the first such labs in the country. This lab is currently the only regional laboratory performing a comprehensive list of cytogenetic testing, including chromosome analysis and fluorescence in situ hybridization on peripheral blood, bone marrow, amniotic fluid, products of conception, skin biopsies, and solid tumors.

The **Molecular Diagnostic Laboratory** performs various molecular-based genetic tests. This lab is accredited by the College of American Pathologists and certified by the Clinical Laboratory Improvement Act 1988. The laboratory participates in regular internal and external quality assurance programs, including sample exchanges and proficiency testing. The molecular lab offers genetic testing on clinical samples from the following list, custom panels for targeted next-generation sequencing (NGS), and quantitative PCR projects.

**DATA RESOURCES AVAILABLE TO CCTS INVESTIGATORS AND TRAINEES**

**Computing, Technology, & Data Support Resources**

Louisiana Optical Network Initiative (LONI): Tulane faculty have access to systems via LONI, a state-of-the-art fiber optics network that runs throughout Louisiana, and connects Louisiana research universities to one another as well as Internet2 with the availability to the National LambdaRail. LONI connects Louisiana's academic institutions, allowing greater collaboration on research that produces results faster and with greater accuracy. LONI provides Louisiana researchers with one of the most advanced optical networks in the country and the most powerful distributed supercomputer resources available to any academic community with over 1,500 teraflops of computational capacity.

Cypress Cluster: Tulane University High-Performance Computing maintains a Cypress supercomputer and large-capacity short-term and long-term storage for use by the Tulane research community. It is a 124-node cluster, with each node providing dual 10-core 2.8 GHz Intel Xeon E5-2680 v2 CPUs, 64 GB of RAM, and dual Xeon Phi 7120P coprocessors. Nodes are interconnected on a 40 GB Ethernet network using a single Dell Z9500 Ethernet Fabric Switch. Cypress is designed to provide a powerful but flexible design, suited to the computing resource demands of computational scientists and researchers. The design of Cypress is very similar to larger machines that are deployed or being deployed at the LONI and the Texas Advanced Computing Center, making it easy for our researchers to port their code to larger environments as their models grow larger and more complex.

Tulane Network Services: Tulane Network Services operates and maintains the university’s data (wired and WIFI) and video networks, which include the underground fiber and video cable plant; fiber and wiring plant for data and video networks in each building; routers, switches, and hubs; and various other network components. Network Services also designs and implements data and video networks in new construction and renovations to existing facilities. Other services include maintaining the university's connection to the Internet, Internet II, and remote access services. All Tulane schools, colleges, administrative units, academic departments, and research centers have full, secure access wherever necessary via the Tulane network fiber optic backbone. Network Services is also responsible for operating the wide area network that ties together the uptown and medical campuses, Primate Center, and other remote sites affiliated with the university.

Tulane Information Technology: Tulane IT provides services that meet the needs of the university community and enables Tulane’s mission by delivering technology solutions that support achieving institutional goals and objectives. IT offers a range of communication services, classroom and presentation services, equipment rental, media duplication, on-campus broadcasting, special event services, and satellite downlinking. In addition, all staff and faculty have access to Zoom videoconferencing software, which allows for multisite calls of unlimited duration with up to 100 participants. Through Technology Services, Tulane manages more than 70 Oracle instances and 80 SQL Server instances with more than 600 processes, 400 GB of RAM, and half a PB of data.

Research Data Center (RDC): The RDC specializes in the areas of data capture, management, security, and storage and seeks to establish Tulane as a global leader in these highly practical areas to facilitate large interdisciplinary research proposals and meet the demands for enhanced scientific rigor and transparency requirements. The GRDC consolidates data capture and management resources into a core facility and provides a restricted access location for data management activities. The RDC works with SPHTM-IT to provide infrastructure, technical support, and a network of researchers and technical staff with expertise in data capture and management. Services and areas of specialization available for both domestic and international research projects include setup and oversight of mobile data collection systems; setup and oversight of online and offline data capture and management systems; questionnaire and case report form design (paper-based and electronic); data curation, management, and integration; study design, sample size assessment, and rigor and transparency requirements; data monitoring and reporting; GPS data collection; mapping and spatial analysis; and data sharing, archival, storage, and preservation. The RDC supports the development and implementation of secure electronic capture and storage of research data in a HIPAA-compliant environment, including technical support and consultation for the set-up and maintenance of secure research data and web servers. Facilities: The RDC manages a secure server room in a controlled-access space with state-of-the-art security measures, including climate control, backup power, swipe card access, video monitors, and the option for remote off-site data back-up. The RDC has controls in place to ensure HIPAA compliance for data collection and storage. Data Security: To minimize risks to sensitive research data, the RDC provides dedicated space on a secure server with virtualized access that employs encryption, firewalls, user-defined access and roles, and the option for 2-factor authentication. This allows data to be collected in a virtual environment via a virtual private network (VPN) connection with direct entry into a secure server, such that no database is housed on a local desktop, laptop, or tablet. Data Collection: RDC provides access to data capture systems designed to comply with HIPAA regulations and developed as open-source or non-proprietary software, including Research Electronic Data Capture (REDCap) (Vanderbilt University, 2013). REDCap is a non-proprietary consortium-led software application developed and distributed at no cost by Vanderbilt University to consortium members for use in non-commercial research projects. REDCap data collection projects rely on a thorough study-specific data dictionary defined in an iterative self-documenting process, with planning assistance available from the RDC. The REDCap system provides secure, web-based applications that are flexible enough to be used for a variety of types of research, provide an intuitive interface for users to enter data, and have real-time validation rules (with automated data type and range checks) at the time of entry. These systems offer easy data manipulation with audit trails and reporting, monitoring and querying patient records, and an automated export mechanism to common statistical packages (SPSS, SAS, Stata, R/S-Plus).

**The Bogalusa Heart Study (BHS) Clinic:** The BHS Research Clinic is a 7,000 square foot clinical research facility located in the community of Bogalusa, LA. This 7,000 square foot clinical research facility is organized into 4 clinical suites arranged around a large central reception area with a waiting room, laboratory, and storage area. Each clinical suite consists of a separate administrative/reception area of 150 square feet equipped with a reception desk, task chair, telephone and computer for study personnel, and a waiting area of 200 square feet featuring local art and equipped with magazines, a coffee table, and upholstered chairs for participant comfort. Each clinical suite contains several exam rooms of 75 to 100 square feet in area, a kitchen equipped with refrigerator, a staff lavatory, and a private office space of 115 square feet. Each clinical exam room is equipped with an examination table, supplies, a desk, a mobile stool and chairs for participants. In addition, stadiometers, digital scales, and sphygmomanometers are present for use during participant clinical visits. Each office is equipped with a desk, chair and hutch and serviced by a fast access internet connection and telephone connections and shares access to a private fenced courtyard. A variety of non-invasive cardiovascular measurement instruments are available including a Toshiba Digital Ultrasound instrument (Toshiba Xario, SSA-660A, America Medical Systems) with multiple probes (Toshiba PSK25AT, 2.5 mHz, Toshiba PCK703AT, 7.5 mHz), a SphygmoCor® XCEL system (AtCor Medical Inc North America, Itasca, IL), multiple Non-Invasive Blood Pressure Monitors (Omron HEM907XL, Omron HealthCare CO, LTD, Kyoto, Japan), and a HDI/Pulsewave CR2000 Research Cardiovascular Profiling System (Hypertension Diagnostic Inc., Egan, MN). The 290 square foot laboratory and freezer space is equipped with a phlebotomy chair, facilities and supplies for the appropriate storage of blood and urine specimens, a protected disposal for sharps, a centrifuge for processing blood and urine specimens (Eppendorf 5810R, Eppendorf AG, Hamburg, Germany), and includes a lavatory for obtaining urine specimens. The common central waiting area, of approximately 260 square feet in size, includes chairs and can be converted to a meeting/conference area with tables and seating for approximately 20-25 persons. Two copy machines, two fax machines, and multiple network and PC printers are available to the staff in the clinic. All study staff have PC computers. The remainder of the complex consists of storage areas. Secure information storage rooms are approximately 250 square feet in size and furnished with cabinets and racks for participant binders and paper forms. These rooms remain locked unless study staff must access the participant information for study visits. Eight staff members currently work in the BHS clinic complex, including a registered nurse coordinator, experienced and certified phlebotomists, a laboratory technician, and field research assistants. The attached in-front parking area has 45 available parking spots with an additional 17 in the rear of the clinic complex. The Bogalusa Heart Study, an NHLBI/NIA/AHA funded study, was initiated in1972 and continues to be funded by NIH.

**CLINICAL CARE**

**East Jefferson General Hospital (EJGH):** In January 2023 Tulane University and LCMC Health partnered together, shifting the majority of clinical services provided at the Tulane medical center to East Jefferson General Hospital. Established in the late 1960s (opening their doors in 1971), EJGH is a 407-bed, full service, acute care hospital and employs over 1800 employees, with 132 active volunteers. With recent reinvestments of infrastructure and clinical equipment, EJGH offers the most advanced medical and surgical technologies in state-of-the-art facilities available to residents of the Jefferson and Orleans Parishes. Priority service-lines include neurosciences, cardiovascular, lung biology, orthopedics, transplant services, and oncology.

**Lakeview Regional Medical Center:** Established in 1977, Lakeview Regional Medical Center is a 167-bed, full service, acute care hospital. It offers the most advanced medical and surgical technologies in state-of-the-art facilities available to St. Tammany Parish residents, including Lacombe, Abita Springs, Mandeville, Madisonville, and Slidell. The Lakeview Regional Physician Group employs over 30 physicians who see patients at 11 convenient locations on the Northshore providing care in family medicine, general surgery, heart care, internal medicine, orthopedics, and vascular care. Lakeview Regional Medical Center’s emergency department is the only level II trauma center in St. Tammany Parish and the only local ER staffed with all board-certified physicians. Lakeview Regional Medical Center continues to reinvest in its facilities and staff to better meet the needs of the growing community and provide the latest in medical innovations in diagnostic and treatment services and state-of-the-art medical equipment.

**Tulane Lakeside Hospital****:** Tulane Lakeside Hospital has a bed capacity of 119 and is home to over 600 physicians and 450 employees. The Tulane-Lakeside specialized healthcare team concentrates on awareness, prevention, diagnosis and treatment to meet the health challenges of women from general gynecology to robotic surgery for Hysterectomy. Lakeside Hospital has delivered over 100,000 babies and treated well over 300,000 patients. Tulane-Lakeside Hospital's commitment to treating women and their babies has grown by expanding services and offering a wider range of healthcare options for the entire family.

**GRADUATE EDUCATION AND POSTGRADUATE TRAINING**

**Masters of Science in Clinical Research:** The School of Medicine has a structured program leading to either a Master of Science in Clinical Research degree or a Certificate in Clinical Research. The MSCR program includes: 1) formal didactic training providing tools to conduct modern clinical and translational research; 2) a clinical research and molecular medicine seminar series, providing peer interaction and mentor guidance on research topics; 3) a mentored clinical research project; and 4) an annual MSCR retreat. The goal of the program is to identify, recruit, and train the best possible candidates from broad academic backgrounds for sustainable careers in clinical research (academia, industry, foundations, etc.)

**Tulane Inter-American Training for Innovations in Emerging Infectious Diseases**: This post-doctoral training program funded by the Fogarty International Center provides post-doctoral trainees with mentored training experiences and opportunities to work together as a team to identify problems in the diagnosis, management, or control of infectious diseases in the Americas. The program effectively integrates the four distinct disciplines of public health, science and engineering, social sciences, and medicine to provide interdisciplinary training in innovative approaches to infectious diseases for eight post-doctoral level participants from consortium institutions. The dissemination of activities associated with this program will provide broad perspectives to the PCOR/LHS trainees.

Masters in Clinical Investigation. The SPHTM Epidemiology Department offers the MS in Clinical Investigation to prepare students for advanced research careers solving patient-centered health concerns. During the Program, students become grounded in biostatistical and epidemiological methods to be successfully able to work with medical researchers and practitioners to address contemporary health problems. The Program emphasizes the understanding of clinical issues and prepares student to apply epidemiological methods in clinical and translational research settings. All students complete a research internship as well as a thesis, both of which will help them to employ skills learned in academic settings.

**Certificate in Clinical and Translational Research.** The Tulane SPHTM offers a Certificate in Clinical and Translational Research to prepare master’s level students (including MD/MPH students) for research readiness in conducting clinical and translational research. The program, led by Dr. Lydia Bazzano, provides epidemiology or biostatistics students with an in-depth exploration of epidemiologic methods within the context of clinical research. Students learn clinical research methods, clinical trials, and meta-analysis, and the program is useful both to those with a clinical background and to those without prior clinical training.

**School of Public Health & Tropical Medicine Research Centers, Institutes, & Core Laboratories**

**Center for Applied Environmental Public Health (CAEPH):** The CAEPH uses a multidisciplinary approach to assess the impact of environmental agents on human health. CAEPH researchers utilize computing technology as a tool to analyze data and to assess the health impact of environmental contaminants. Areas of study include: community-based prevention and intervention research methodology; childhood lead poisoning; application of surveillance methodology and data analysis to environmental health issues; the Mississippi River Water Quality Database and development of technology-mediated teaching methods for environmental health education. CAEPH leads the Academic Partner of Excellence in Environmental Public Health Tracking, a CDC-funded national initiative.

**Center for Lifespan Epidemiology Research (CLER):** The CLER is a collaborative effort between several senior investigators within the Department of Epidemiology. CLER investigators provide expertise in maternal–child health, genetics and epigenetics, chronic diseases, and cardiovascular health, as well as cognitive and physical aging outcomes. CLER was established in 2014 to support enhanced collaboration in connection with the Bogalusa Heart Study and to manage data and biological specimens collected during the study’s 35-year history. Like the study itself, CLER is housed within the SPHTM and is supported by resources, personnel, and office space in the Tidewater Building on Tulane’s downtown campus.

CLER maintains several working groups with interrelated areas of scientific focus: genetics and epigenetics; early life risk factors, pregnancy and social factors; hypertension, renal and blood pressure; cognitive and physical performance; sleep; obesity and diabetes; lung function; and diet and nutrition. These working groups are managed by both senior and junior investigators in the Department of Epidemiology under the guidance of the Bogalusa Heart Study Steering Committee.

The mission of the CLER is to gain and develop knowledge that can be used to improve health over the lifespan. Key areas of research include the following: the association between maternal cardiovascular risk and birth outcomes, the impact of childhood secondhand smoke exposure upon long-term cardiovascular health, the role of vascular aging in cognitive and physical function, and the evolution of cardiovascular risk with normal aging. Biological specimens, stored DNA, and existing data sets gathered in these areas provide promising avenues of inquiry for further research. These resources, as well as support from investigators and administrators, comprise a vital asset for research on the physiological and cognitive effects of aging across the lifespan.

**Health Systems Analytics Research Center (HSARC)** HSARC is a collaboration between the Louisiana Public Health Institute and the Tulane University Department of Global Health Management and Policy, and offers the capacity to design, collect, and analyze statistical data and the strategic expertise to define how those analytic outcomes can be applied given the context of our multi-level health care system.

**Mary Amelia Center (MAC):** The MAC was established in 2003 as part of the Tulane–Xavier Center of Excellence in Women's Health in downtown New Orleans. The Center takes an innovative, multifaceted approach to its mission of conducting interdisciplinary research that identifies and disrupts obstacles to knowledge, opportunity, and health for women and their communities while addressing health outcomes across the lifespan through community capacity building, health education and prevention, leadership development and interdisciplinary women’s health research. It hosts several research projects ranging from basic science to community research in public health. The MAC houses the Women’s Health Resource Laboratory (WHRL). It is uniquely positioned to aid in the dissemination and translation of scholars’ findings—both locally and globally—and to serve as a point of interface with the community. In addition to the website and social media sources, the Center currently partners with (1) employers and hospitals throughout Louisiana (e.g., lactation support program), (2) the Department of Health and Human Services Office of Public Health and City Health Department, (3) community-based and neighborhood organizations on capacity building and health promotion programs (e.g., to reduce stress, improve diet and physical activity), (4) local university partners (e.g., Louisiana State University Health Sciences Center Comprehensive Alcohol-HIV/AIDS Research Center, Xavier University’s CMHDRE, and Dillard University), (5) local public health partners (e.g., the Louisiana Public Health Institute and RAND Gulf States, (6) global organizations such as the Birthing Project and international university partners such as University of West Indies in Mona, Jamaica and the Norwegian Institute for Health and Society at the University of Oslo, Norway.

Office of Global Health (OGH): The Tulane OGH is a university-wide center, with representation from across Tulane University, including all of the schools and colleges: Newcomb-Tulane College, the School of Architecture, the A.B. Freeman School of Business, the School of Liberal Arts, the School of Medicine, the School of Professional Advancement, the School of Public Health and Tropical Medicine, the School of Science and Engineering, and the School of Social Work. The mission of the OGH is to foster interdisciplinary, collaborative research opportunities for faculty across Tulane University, and to promote global health research training opportunities for Tulane students. The OGH also has collaborative relationships with international organizations from a variety of countries, including Argentina, China, Democratic Republic of Congo, Honduras, Peru, and Zambia.

The OGH hosts global health networking events to bring faculty interested in global health together and formulate working groups able to respond to global health initiatives. Expertise in global health at Tulane spans multiple schools, including SOM, SPHTM, SSE, and SSW. It provides guidance for faculty on developing research and training program proposals with global health partners, special considerations for international research, and how to create a viable implementation plan for research overseas, as well as supplemental administrative support for multidisciplinary global health training grants for NIH, the Bill & Melinda Gates Foundation, and other major agencies. The OGH provides seed money for short-term travel or meetings to facilitate new global health research collaborations or grant applications. It also sponsors University-wide presentations on global health topics for faculty and students.

**Tulane Violence Prevention Institute (TVPI):** The TVPI was established to address the siloed efforts of faculty working on understanding and preventing violence as well as to demonstrate the depth of Tulane University’s commitment to tackling violence in New Orleans and beyond. The TVPI is an infrastructure for streamlining interdisciplinary research collaboration among university faculty, resourcing relevant internships with interested students, and forging meaningful partnerships with community organizations that also aim to prevent violence. The TVPI is housed in the School of Public Health and Tropical Medicine on Tulane’s downtown campus but involves cutting edge researchers from the schools of Law, Social Work, Psychology, Medicine, Neuroscience, and Sociology as key contributors. The TVPI seeks to build capacity for anti-violence research in order to develop comprehensive approaches to the complex problem of violence. In this way, the TVPI is actively moving toward disrupting the long-standing cycles of violence that only serve to decrease quality of life and exacerbate negative health outcomes.

**Tulane University Obesity Research Center (TUORC):** The TUORC is a university-wide group of investigators dedicated to excellence in obesity research using systems epidemiological and clinical approaches. Established in 2016, its primary mission is to facilitate interdisciplinary efforts to integrate systems epidemiology with research on the diet and lifestyle risk factors, etiology, consequences, treatment, and prevention of obesity and its metabolic complications, such as diabetes, hypertension, cardiovascular, and kidney diseases. One of the Center’s primary focuses is to increase our understanding of the complex interactions of human genomics, metabolomics, epigenomics, and gut microbiome with diet and lifestyle in determining obesity risk and weight management in the context of population cohorts and intervention trials. TUORC’s overall goals also include improving nutrition and obesity education at multiple levels and facilitating personalized nutritional and lifestyle management of patients.

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| TUSKEGEE UNIVERSITY (Tuskegee) |

Tuskegee attained University status in 1985.  Tuskegee University’s academic programs are organized into five Colleges and three Schools: (1) The College of Agriculture, Environmental and Nutrition Sciences; (2) The College of Business and Information Science; (3) The College of Engineering; (4) The College of Veterinary Medicine (TUCVM), (5) The College of Art and Sciences (6) The School of Education, (7) The Taylor School of Architecture and Construction Sciences and (8) The School of Nursing and Allied Health.  The colleges and schools offer 49 degrees: 35 Bachelor’s, 11 Master’s, Doctor of Philosophy in Engineering and Materials Science, Doctor of Philosophy in Integrative Biosciences, Doctor of Veterinary Medicine, and a Doctor of Philosophy in Interdisciplinary Pathobiology.

**INSTITUTIONAL RESEARCH ENVIRONMENT & EXPERTISE IN CLINICAL AND TRANSLATIONAL SCIENCE**

**Facilities and Resources**

**TU CBR/RCMI Research Infrastructure Core:** The National Institutes of Health established the RCMI Program in 1985 after Congress noted stark health outcome differences. At TU, this funding has been used in multiple ways, most notably was the establishment of The Center for Biomedical Research (CBR)/RCMI Research Infrastructure Core (RIC). RIC enhances multidisciplinary research infrastructure for TU faculty by making available capital-intensive resources, and by providing the services and technical support required for research. This is helping the researchers at TU not only to stay on the cutting-edge of biomedical research but also establish cross-disciplinary and multi-institutional collaborations that are essential in the current increasingly multidisciplinary research environment our faculty find themselves in. This primary goal is achieved by providing researchers access to 1) an inventory of major capital instrumentation, 2) basic laboratory equipment and spec for routine experimental needs, 3) professional development in the areas of bioethics and responsible conduct in research, and 4) experienced and knowledgeable research support personnel that can assist with experimental design, instrument training, data analysis, bioinformatics, and data visualization. Core Goals are:

* To provide **instrumentation, technical, methodological, and personnel support** for faculty-led research supported by the TU CBR/RCMI, under Research Project or Pilot Project categories. Here, we plan to support the design, execution, analysis, and reporting of specific projects proposed in this application by providing support and by identification of appropriate resources through collaborative networks such as the RTRN and the CTSA/CCTS.
* To maintain a modern and reliable **shared instrumentation facility** for biomedical research at TU that enhances the competitiveness of the TU research faculty and to provide opportunities for collaborations. Here, we consider the maintenance and extended usage of shared major research equipment utilized by the biomedical research faculty.
* To provide project-specific mentoring and service on **Bioethics and Responsible Conduct of Research** (RCR).
* To encourage and improve **access to and utilization of TU RIC resources** by the broader community by providing services, training, and informational sessions. This aim is expected to enhance the visibility of our RCMI program and to increase the overall research activity and collaborations across the TU campus and beyond.

**Williams-Bowie Research Building (WBRB):** Resources within WBRB offer the following capabilities: Digital Wide-field Microscopy (Inverted and Upright), Gene Expression Analysis, Flow Cytometry, Absorbance and Luminescence Plate-Reading, Gel Imaging, Tissue Culture, HPLC, GC/MS, Pulsed Field Gel Electrophoresis, Electroporation, Ultra-High-Speed Centrifugation, Film Processing, Western Blot Scanner, and InVivo Imaging.  Supplementary equipment includes two large capacity autoclaves, two 4oC walk-in cold rooms, two refrigerators, two -80oC freezers, one liquid N2 tank, three incubators, two incubator/shakers, two centrifuges, one reagent-grade water system, one ice machine, one pH meter, two spectrophotometers, and other common lab items.  WBRB also has a Small Animal Facility and Pathobiology department, which provide access to diagnostics and board-certified veterinarians and pathologists.

* ***Microscopy****:* Two Olympus microscopes (BX53F and IX71) with fluorescent lamps and digital cameras are used for wide-field fluorescent microscopy.  CellSens software, installed on a Dell Precision TX500 computer, is used to acquire and manipulate microscope images.  Additionally, a second BX53 (also running CellSens) is set up for the quantification and sorting of immunohistochemical staining. Three extra visible light microscopes (Olympus, Meji, and Omano) are also available for visible light microscopy.
* ***Gene/Protein expression:*** Researchers needing to investigate gene expression have several systems at their disposal within WBRB.  These systems include two Stratagene QPCR systems (Mx3000P and Mx3005P), two Eppendorf thermocyclers (Mastercycler Pro and Mastercycler Gradient), one AlphaImager HP (Innotech), and one CHEF Mapper system (Bio-Rad).  The Mx3000P system is connected to a Dell Optiplex 380 PC and the Mx3005P system is connected to an HP Compaq 8000 Elite SFF PC.  Both systems use MXPro software.  Lastly, a Li-Cor Digiblot scanner is available to image and quantitate western blots.
* ***Flow Cytometry:*** A FACSCalibur and an ec800 cytometer are available.  Both platforms offer robust analytical capabilities.  On the FACSCalibur, FloJo CE is used to manage data acquisition and FlowJo for data analysis.  The ec800 system uses proprietary software called ec800 1.3.1.  Additionally, the ec800 software allows users to acquire sample data successively without handling samples individually.
* ***Plate-reading:*** Two Bio-Tek readers provide absorbance and luminescence plate-reading capabilities. The Powerwave XS is used for absorbance and the Synergy 2 is used for luminescence.  Both units are controlled using a Gateway E-4500D computer and Gen5 software.
* ***Chromatography:*** A Beckman Coulter HPLC System Gold and Perkin Elmer Autosystem XL Gas Chromatograph/Turbo Mass Spectrometer with headspace sampler are utilized for chromatography.  The HPLC is controlled with an IBM PC 300PL using 32 Karat.  The GC/MS is controlled using Turbo Mass on a Dell Optiplex GX110.
* ***InVivo Imaging:*** Housed inside the TU Animal Facility, the IVIS Lumina XR (Caliper LifeSciences) provides InVivo imaging capabilities.  This system can provide small animal imaging using fluorescence, bioluminescence, and/or X-ray.  Living Image software on a Dell Precision T3500 computer is used to operate the imager.
* ***Tissue Culture:*** A dedicated tissue culture room contains a Nuaire Class 2 biosafety cabinet, two water-jacketed incubators, and one inverted visible light microscope (Olympus).
* ***Electroporation, Film Processing, and Ultra High-Speed Centrifugation:*** A Bio-rad Gene Pulser 2 is available for electroporation; film processing can be done using a Konica Monilta processor and a Sorvall RC2-B ultracentrifuge (with multiple rotor options) is on-hand for applications that require ultra-high-speed centrifugation.

**Carver Research Building (CRB):**  Resources within CRB offer the following resources: Digital Pathology Scanning, Multiplex Spatial Immunofluorescent Imaging, Cell Sorting, Digital Wide-field, and Confocal Microscopy, Time-Lapse Microscopy, Dark-field Microscopy, Molecular Modeling, Gene Expression Analysis, Absorbance, Fluorescent and Luminescent Plate Reading, Gel Imaging, Tissue Culture, Liquid Nitrogen Storage, Ultra-High-Speed Centrifugation and Film Processing.  Supplementary equipment includes one large capacity autoclave, one 40C walk-in cold room, two -800C freezers, one -1300C freezer, ten incubators, one incubator/shaker, thirteen centrifuges, one ice machine, a transfection system, a sonicator, distilled/deionized water system, three pH meters three spectrophotometers and other basic lab devices.

* ***Microscopy:*** Two Leica microscopes (DM5000B and DMIRE2) with fluorescent lamps and digital cameras are used for wide-field microscopy.  The DMIRE2 is an inverted microscope and the DM5000B is an upright microscope.  CellSens, installed on a Lenovo Thinkcentre M72e computer, is used to acquire and manipulate microscope images.  Additionally, two confocal microscopes are available to users.  An Olympus IX81 with a Fluoview FV 1000 accessory provides confocal laser scanning microscopy, using a DDI computer running Fluoview 10 software to acquire and analyze images.  A second Olympus IXB1 with an IX2-DSU accessory provides confocal spinning disk microscopy.  MetaMorph software run on a Velocity Micro ProMagix computer is used to acquire and analyze images.  Additionally, confocal setups allow for darkfield and time-lapse microscopy.  Five extra visible light microscopes are also available for visible light microscopy.
* ***Gene expression:*** Available systems for gene expression include two Applied Biosystems RTPCR systems (StepOne and 7500 Fast), an Eppendorf Mastercyler, one AlphaImager 2000 (Innotech), and a FluorChem E unit (Cell Biosciences).  The StepOne system is connected to a Dell Latitude D520with StepOne™and the 7500 Fast RTPCR system is connected to a Dell Latitude E-6500 using 7500 software.
* ***Plate-reading:*** One Bio-Tek and two Molecular Devices (MD) readers provide absorbance, fluorescence, and luminescence plate-reading capabilities.  The ThermoMax (MD) is used for absorbance, the SpectraMax Gemini EM (MD) is used for fluorescence and the Synergy HT (Bio-Tek) can provide multimodal functionality. The MD systems are controlled using a Lenovo Thinkcentre M72e computer and SoftMax software.  A Gateway Pentium 4, with Gen5 software, is used to control the Synergy HT.
* ***Digital Pathology Scanner:*** The Leica Aperio CS2 can be used to identify, scan, and digitize entire slides for downstream staining quantification and pathological scoring. The scanner digitizes images up to 40x magnification. ImageScope software provides quantification algorithms that can identify staining intensities by cellular location (membrane, nuclear, and cytoplasmic). Using the cloud-based eSlide Manager service, users can remotely analyze and/or share all server stored images with collaborators.
* ***Tissue Culture:*** A dedicated tissue culture room contains two Nuaire Class 2 biosafety cabinets, four Thermo Scientific water-jacketed CO2incubators, and a Labovert microscope.
* ***Transfection System and Ultra-High-Speed Centrifugation:*** The Lonza 4D-Nucleofector facilitates reproducible cell transfections and a Beckman L7-55 ultracentrifuge (with multiple rotor options) is on-hand for applications that require ultra-high-speed centrifugation.
* ***Molecular Modeling:*** Two dedicated workstations provide molecular modeling capabilities. Utilizing Chimera, Schrodinger, PyMol, Discovery Studio, and other software packages, researchers can investigate known molecules, generate novel molecules, and investigate molecular interactions. Both workstations have Xeon E5 processors, at least 10MB Cache, run at 3.10-3.90 GHz, and have high capacity TB HDDs, this provides all of the computational power necessary to perform in-depth investigations.
* ***Cell Sorting:*** The BD FACSAria IIu provides ~98% pure 4-way event sorting capability, using 3 excitation lasers (violet, blue and red) and 14 fluorescent detectors. Event detection sensitivities range from 0.5 to 100um with a maximum collection rate of 70,000 events/second. DIVA 8 software is used for data acquisition and FlowJo X is used for data analysis.
* ***Multiplex Spatial Immunofluorescent Imaging:*** Using 40+ marker panels the Akoya Codex allows core users the ability to spatial resolve cell populations in fixed tissue slides. The system is incorporated into a Keyence BZ-X800 microscope which provides automated image acquisition across 4 excitation filters (DAPI, GFP, TxRed, and CY5). Codex Instrument Manager software allows users to design and run Codex experiments.

**Computer IT and Statistical Support:** Tuskegee University has a strong IT support team.  In addition, two units in the CVMNAH supplement the institution-wide IT support. CCEBRA research team is supported by the Biomedical Information Management Systems IT team (BIMS).  The expertise of the team members includes network engineering, tele-media conferencing, database development, and website design which empower researchers for both on-campus and off-campus support. The BIMS team is also responsible for all IT and statistical needs at Tuskegee University’s College of Veterinary Medicine (TUCVM). This includes technical support and training for both hardware and software as well as troubleshooting. Moreover, as the college is in the RCMI network, computing support is also available from other institutions and RTRN, if necessary.

**Genomics/Bioinformatics Support**: All Genomic sequencing, Whole Genome, Whole Exosome, Whole Transcriptome, and 850K methylation ChiP is performed at Hudson Alpha Genomic Institute.  The RIC staff also provide bioinformatics support services. These services include sequencing project design, primary data analysis, secondary data analysis, data visualization, statistical analysis, and training seminars in R, online data repositories, HPC resources, and command-line navigation. Core staff has extensive knowledge across multiple omics platforms, including RNA-seq, ChIP-seq, WES, miRNA-seq, and microarray.

**Complementary Non-RCMI Resources at TU**

**NMR Spectrometer:** A 400 MHz Bruker BioSpin Avance III with a 5mm BBFO 400 MHz Z-gradient high-resolution probe with automatic tuning and matching. The probe is capable of performing H1, C13, F19, and P31.  The 400 MHz magnet provides the ability to perform complex 1D and 2D experiments that are necessary for structure elucidation. The range of disciplines and applications include organic chemistry, polymer chemistry, physical/biochemistry, biology, agricultural sciences, and engineering. The NMR is housed in Samuel C. Armstrong Hall, Room 101, and managed by Mohamed A. Abdala, Ph.D.

**Agilent Q-TOF HPLC-MS:** An ultra-high pressure HPLC system with a binary pump, autosampler, two-column modules, and a diode array detector.  The mass spectrometer is capable of being operated in either MS mode or MS-MS mode.  Compounds can be run by Electrospray or APCI, in both positive and negative ion mode, with a mass measurement accuracy within 2 ppm. This unit is located in Samuel C. Armstrong Hall, Room 101, and managed by Marilyn Tourne, Ph.D.

**Animal Facility and Pathology Services:** The Veterinary College (located on the 1st floor of Williams-Bowie Hall) has a modern animal facility capable of accommodating from rodents to large animals and a well-organized Comparative Medicine Resource Center (CMRC) for research involving laboratory animals and small ruminants. The facility provides all services to researchers who have projects approved for animal use. The animal facility serves the biomedical research community in the university and is fully equipped with, among others, offices, garment changing areas, animal isolation/quarantine, housing rooms (for both conventional and special accommodations), and rooms for feed storage, cold holding, and necropsy. A designated attending veterinarian, a facility manager, a center director, and adequate non-technical support personnel are available. Facility usage can be coordinated through Benjamin Datiri, Ph.D.

*Pathology services are provided to the clinical and research community on a fee-for-service basis. A fully equipped and man-powered tissue processing service facility is located in the Williams-Bowie building. One board-certified veterinary pathologist and three faculty (with a Doctorate degree in Anatomical Pathology) are available for consultation. Interested users can contact Thomas Graham, Ph.D., DVM.*

**Tuskegee Partner in the *UAB Center for Clinical and Translational Science (CCTS)***

The CCTS moves scientific discoveries into practical applications that enhance health by increasing interaction between UAB researchers and the community and researchers at UAB and other health centers to provide advanced medical treatments to patients. CCTS offers many resources and support for faculty, clinician-scientists, trainees, students, staff, and community members.

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| UNIVERSITY OF ALABAMA AT TUSCALOOSA (UA-Tuscaloosa) |

The University of Alabama (UA), founded in 1831, was the first public college in Alabama and is the state's premier academic institution. UA’s mission is to advance the intellectual and social condition of the people of the state, the nation, and the world through the creation, translation, and dissemination of knowledge with an emphasis on quality programs for teaching, research, and service. UA has been ranked among the top 50 public universities in the nation by *U.S. News and World Report’s* annual college rankings for more than a decade–ranking 51st in 2017. The cooperative atmosphere of the campus and proximity of departments fosters the integration of research across schools and programs of study, thus ensuring assistance with project interventions are readily available and encouraging the academic/community partnerships that will be created through this project. UA supplies each investigator with a personal computer of sufficient capability to perform all tasks necessary for this project. These computers are connected through a network to all other University networks, the internet, and the University's mainframe systems. UA has a fleet of vehicles available for travel to visit rural communities.UA employees more than 7,000 faculty and staff. The University has more than 50 research centers, institutes, and bureaus with many direct and indirect relationships with CCTS programs.

**INSTITUTIONAL RESEARCH ENVIRONMENT & EXPERTISE IN CLINICAL AND TRANSLATIONAL SCIENCE**

**UA Office of Research and Economic Development - Bryan W. Boudouris, Ph.D., Vice President:** In support of the research endeavors of a dynamic institution, the administration reporting to the Office of the Vice President for Research and Economic Development creates and improves processes and services that promote research and scholarship by faculty, staff, trainees, and collaborators that foster an environment of integrity in research and scholarship, that improve the quality of research, and that enhance economic development. The Office of Research also works with the University, school administrations, and city and state leaders to establish new programs and research directions that promote and enhance the University of Alabama’s contribution to new knowledge and the growth of the economies across the city, state, and nation.

***ORED Program Description:*** The mission of the Office for Research and Economic Development (ORED) is to facilitate the growth and impact of The University of Alabama’s (UA) research enterprise and to ensure compliance with University, System, State and Federal Regulations related to research. ORED champions the pursuit and dissemination of knowledge through research, technology transfer, and economic initiatives. Its mission is to enhance the university's research enterprise while ensuring compliance with relevant regulations. ORED achieves this mission by:

* expanding and supporting the University’s academic and research programs by promoting the research, scholarly, creative, and collaborative activities of faculty, staff, and students
* enhancing the research infrastructure within ORED to support those The University serves in an ever-changing world
* encouraging and facilitating national and international partnerships for research and academic opportunities, workforce development and talent retention
* translating university discovery and innovations into viable business opportunities, commercialization, and economic development
* engaging communities in mutually beneficial research, education, and outreach programs
* creating policies, training programs, and initiatives that educate and develop the necessary skills of students, trainees, and researchers to ensure compliance with University, System, State and Federal Regulations related to research.

In recent years, UA has invested $2.5 billion in campus construction, and infrastructure, including over $400 million in world-class research facilities. Part of that investment has been the acquisition of the Peter Bryce Campus, which has significant land and facility holdings that are used and available, when justified, for allocation to the research mission.

In part because of this investment, research awards have grown by 85 percent over the last five years. In fact, for fiscal year 2022, UA was awarded a total of $211.4 million in sponsored research awards. UA was also ranked in the top ten out of all 146 R1 universities in the National Science Foundation’s 2020 Higher Education Research and Development (HERD) Survey. The HERD Survey is an annual census of U.S. colleges and universities that expended at least $150,000 in separately accounted-for R&D in the fiscal year.

Building on this momentum and opportunity, The University of Alabama now has plans to increase the size and impact of The University’s research and scholarly activity enterprise significantly, with an eye toward synergies and addressing state, national, and global challenges. The University of Alabama’s forward-looking focus will be on growth in faculty (both in terms of numbers and in terms of development of current faculty) and in research and scholarly prominence. Thus, the University is uniquely positioned to become one of the premier comprehensive research institutions in the southeastern United States over the next five years and in so doing translate research productivity and innovation to economic and societal development.

***OREC Program Description:*** To support the University’s research ambitions, the Office for Research Ethics and Compliance (OREC) works to foster a culture that supports ethical research and innovation. The research compliance program promotes ethical decision-making by partnering with the research community to develop pragmatic solutions designed to promote the responsible conduct of research. These solutions include:

* Developing clear policies and efficient procedures
* Offering relevant, useful, and insightful training
* Valuing continuous improvement
* Actively engaging with the UA research community and key stakeholders to support the responsible conduct of research

OREC is committed to the implementation of policies and procedures that prioritize and ensure ethical and compliant research at The University of Alabama. As part of this commitment, the OREC continuously works with the research community and campus partners to improve the processes that ensure adherence to all applicable federal, local, and institutional regulatory policies and guidelines for research.

The Office for Research Ethics and Compliance is comprised of essential administrative programs that support the research oversight committees. The goal of these programs and committees is to enhance compliance, integrity, and safety of the research being conducted throughout The University of Alabama. With these areas of support, researchers can focus more on their research activities while maintaining compliance.

***The Animal Care and Use Program:*** The Animal Care and Use Program of the University of Alabama (UA) is responsible for the care of all animals at The University of Alabama campus in Tuscaloosa, Alabama. The Institutional Animal Care & Use Committee (IACUC) oversees all vertebrate animal research and instruction at UA to ensure that ethical regulatory and policy mandates governing the use of animals in research and instruction are met. The Committee is comprised of members, including representatives of the public, qualified to oversee the animal program, facilities, and procedures.

***Human Research Protections Program:*** The purpose of the University of Alabama’s Institutional Review Board (IRB) is to ensure the safe and ethical treatment of humans as subjects in research, public service, and training programs. In accordance with federal and university regulations, it is required that the IRB review all research involving human subjects conducted at or sponsored by The University of Alabama regardless of the funding source. The University of Alabama’s IRB has a moral duty and obligation to protect human subjects prior to the commencement of any research study and to discontinue any protocol upon notification of irregular activity warranting such action.

***Biological Safety Program:*** The Biological Safety Program (BSP) oversees all University of Alabama (UA) research involving biohazardous materials, recombinant DNA/RNA, and synthetic nucleic acids. The BSP works closely with the Institutional Biosafety Committee (IBC), the Institutional Review Board (IRB), and the IACUC to ensure that UA researchers using these biological materials have the necessary approval and employ appropriate safety measures. The Biosafety Officer (BSO) has an extensive research background and is a voting member of the IBC. Our group also works closely with EHS to provide guidance on all matters related to biosafety, biosecurity, and compliance.

***Research Integrity and Conflicts of Interest Program:*** The mission of the Research Integrity and Conflicts of Interest Program (RICIP) is to ensure that the integrity of research is maintained during all phases of research (e.g., design, conduct and reporting), and preserve the public trust in the University while also promoting entrepreneurship among the research community. RICIP also oversees OREC responsible conduct of research (RCR) training program. RCR training plays an important role in ensuring that UA generates and disseminates knowledge with integrity and rigor.

***Additional Support Programs:***

The Research ASSIST Office provides vital support to faculty in developing high-quality grant proposals, offering project management, proposal guidance, and managing internal funding opportunities. Their aim is to facilitate strategic, large-scale research initiatives.

Office for Sponsored Programs (OSP) oversees the administration of externally sponsored grants and contracts. OSP ensures compliance throughout the grant process, assisting faculty with proposal preparation, submission, and award management.

Office for Research & Technology Agreements (ORTA) specializes in drafting and negotiating research-related contracts. ORTA protects the university’s interests by ensuring all agreements comply with legal and institutional policies, thereby facilitating technology commercialization and sponsored research.

Office for Research Security & Export Controls (ORSEC) ensures compliance with export control laws and fosters a global perspective within the university. ORSEC aids in navigating international research challenges while supporting the university's mission of education and service.

Contract & Grant Accounting (CGA) manages the financial aspects of externally sponsored projects, ensuring compliance with fiscal regulations. CGA supports faculty and staff in post-award financial administration, promoting effective stewardship of research funds.

Office for Innovation & Commercialization (OIC) is dedicated to bringing university innovations to market. By fostering partnerships with faculty, industry leaders, and entrepreneurs, OIC maximizes the impact of UA’s intellectual property through licensing and startup creation.

Together, these offices drive research excellence and innovation at The University of Alabama, impacting local and global communities.

**Interdisciplinary Research Institutes and Centers**

**Drug Delivery Laboratories - Ravi Majeti, Ph.D., Director**

**Facilities and other Resources**

The laboratories for the rational design of drug delivery systems, led by Dr. Majeti, are located on the second floor of the AIME Building. Spanning over 8,000 square feet, these state-of-the-art labs are well-equipped for various research areas, including bioanalytical techniques, polymers, molecular biology, histology, and experimental therapeutics. The facilities offer ample bench and desk space, along with multiple fume hoods. Key equipment includes a particle sizer, freeze dryer, water purification system, high-speed ultra-centrifuge, probe and bath sonicators, an inverted fluorescence microscope, speed vac, -80°C freezer, refrigerator, magnetic stirrers, tissue homogenizers, microcentrifuge, stability testing chambers, and a BSL-2 approved lab for working with human cells, as well as CO2 incubators. Additional sophisticated instruments such as LC-MS/MS, HPLC, GPC, FTIR, CD spectrophotometer, rheometer, and bioindenter enhance our research capabilities. Furthermore, there is a satellite animal facility that can accommodate 50 cages, along with a surgical suite (Rooms 239/240) comprising approximately 1,500 square feet on Level 2 of the AIME Building.

Major Equipment housed in the drug delivery laboratories

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| **Bioanalytical and Polymer Suite** | **Molecular Biology & Experimental Therapeutics Suite** |
| * ​6470B Triple quadrupole LC/MS * 1260 Infinity HPLC * 1260 Infinity II GPC * 630 FTIR * Circular dichroism Chirascan V100 * EmulsiFlex-C5 High Pressure Homogenizer * Environmental Test Chambers * FreeZone Triad Benchtop Freeze Dryer * MCR 302 Rheometer * UNHT³ Bio Bioindenter ​ * Zetasizer Nano ZS | * Attune NxT Flow Cytometer * Axio Vert.A1-Inverted Microscope * BeadBlaster 24R Refrigerated Microtube Homogenizer * Bio-Plex® 200 System with High-Throughput Fluidics * C1000 Touch Thermal Cycler * CFX Opus 384 Real-Time PCR System * CFX Opus 96 Real-Time PCR Detection System * ChemiDoc MP Imaging System * Cytation 5 Multi-Mode Reader * GentleMACS™ Octo Dissociator * Noninvasive Blood Pressure System for rats/mice * Pictor plus full hit handheld camera retina, anterior, derma * QIAcube Connect System * ZEISS LSM 900 Confocal |
| **Histology Suite** | |
| * ASP6025 S - Advanced Smart Tissue Processor * BioGenex Xmatrx® Infinity-IHC Station * HistoCore Arcadia H Modular Tissue Embedding System * HistoCore Arcadia C Cold Plate for Embedding System * HistoCore MULTICUT R - Rotary Microtome * HistoCore PERMA S Slide Printer * HistoCore SPECTRA CV Coverslipper * HistoCore SPECTRA ST Automated H&E Slide Stainer * Leica CM1860 UV Cryomicrotome * Leica IP C Cassette Printer * Vet Axcel Chemistry Analyzer * ZEISS Axiolab 5 * ZEISS Axioscan 7 Slide Scanner * ZEISS Primostar 3 * Zoetis VETSCAN HM5 | |

**Other Facilities and Resources available:**

Other UA facilities available as core facilities and in the Department of Biological Sciences and Chemistry include:

Central Analytical Facility (CAF): The CAF is a shared user facility and provides guidance, technical assistance, and training to researchers across campus. The major instruments include:

* Philips XL-30 scanning electron microscope
* JEOL 7000 FEG source scanning electron microscope
* JEOL 8600 electron microprobe
* FEI Tecnai F-20 transmission electron microscope
* FEI Quanta 3D dual beam FIB
* Tescan FEG source dual beam FIB
* Kratos Axis 165 Auger/X-ray photoelectron spectrometer
* Bruker D8 Advance powder X-ray diffractometer with GAADS

Optical Analysis Facility (OAF): The OAF is a central service laboratory housed in the Department of Biological Sciences. The OAF specializes in electron and light microscopy of biological samples and soft materials. The following equipment are available at the OAF:

* Hitachi SU3500 Variable Pressure Scanning Electron Microscope
* Hitachi H-7650 Transmission Electron Microscope
* Nikon C2 Laser Scanning Confocal Microscope
* Nikon Fluorescent Microscope

Additional equipment and facilities such as Leica RM2135 Microtome, Histology embedding and staining equipment, Leica Ultracut UC6 ultramicrotome, Anatech Hummer 6.6 sputtering system, Denton DV-502 vacuum evaporator, Denton DCP-1 critical point dryer, negative and print darkrooms are also available. In addition, the Core Molecular Laboratory in the Department of Biological Sciences is a shared facility housing Packard Tri-Carb Liquid Scintillation Counter, Sorvall RC6 Centrifuge, Molecular Dynamics PhosPhor Imager, and various other bench top equipment.

Department of Chemistry Analytical Facilities: The Department of Chemistry is in the adjacent building (Shelby Hall), where the PI has access to:

* 360, 500, and 600 MHz NMR spectrometers. These instruments are maintained by a full-time PhD spectroscopist, Dr. Ken Belmore, who is available for consultation and assistance.
* Mass spectrometry facilities including gas chromatograph, and inductively coupled plasma mass spectrometry (ICP-MS) analysis
* Bruker Matrix-assisted laser desorption ionization (MALDI)-time-of-flight (TOF) MS mass spectrometry (MALDI-TOF MS)
* Vibrational and optical spectroscopy facilities including two Fourier transform infrared spectroscopy (FT-IR) and a V-1000 Laser Raman spectrophotometer
* Ellipsometer
* Imaging facilities including a scanning tunneling microscope, atomic force and magnetic force microscope
* Electrochemical and magnetic facilities including a Quantum Design MPMS2 SQUID magnetometer, a BAS-100 and two BAS CV-27 potentiostats with Hewlett- Packard X-Y recorders and a PAR-273 with model 96 potentiostat/galvanostats and equipment for inert atmosphere electrochemistry.
* Thermal analytical equipment including thermogravimetric analysis (TGA) and *Differential scanning calorimetry* (DSC).

UA Micro fabrication Facility: This is a clean room facility housing equipment for:

* Photolithography (Solitec 5110 Spinner, Karl Suss MA6 Mask Aligner)
* Thin film deposition (SFI Shamrock System, Denton Vacuum Explorer E-beam Evaporator, ST Systems PECVD)
* Thin film etching (ST Systems Advanced Silicon Etcher, ST Systems Advanced Oxide Etcher, Intelvac Ion Mill, 4-Wave Ion Beam Etcher, Yield Engineering Systems YES-R3 Plasma Asher)
* Thin film metrology (Veeco Dektak V220-Si stylus profilometer, 4 Point Probe station, Zeiss Axioplan 2 optical microscope, Nanometrics Nanospec 212 Film Thickness Measurement System, Rudolph Auto-EL III ellipsometer)

**Main Animal House**

Consulting Veterinarian: John Jackson, DVM, jsjackson10@ua.edu

Animal Care Facility (ACF) Manager: James W. Ramage II, jramage@as.ua.edu, Phone: (205) 348-7218

Animal Care Facility Technician: Abigail Goode, agoode1@ua.edu, Phone: (205) 348-7218

Standard hours of operation for the Animal Care Facility are Monday- Friday 8 a.m. to 4:45 p.m.

In the event of an after-hours animal-related emergency, Principal Investigators (PIs), students, or UAPD will contact the Facility Director, Manager, or Technician. All emergencies are addressed promptly, adhering to established protocols.

The on-call consulting veterinarian conducts regular health rounds at the animal facility and is available as needed. An on-call schedule is maintained, with Dr. Jackson visiting the facility weekly. In case of an emergency, he will either come to the facility or request that the animals be transported if appropriate. The veterinary staff is responsible for the general health of the animals and offers investigators consultation on veterinary medical, diagnostic, and pathology services.

All animals are housed in specific pathogen-free ("barrier") facilities within the Animal Care Facility (ACF) at the University of Alabama, in compliance with NIH guidelines. The facility is fully accredited by the American Association of Accreditation of Laboratory Animal Care. Handling of mice and experimental studies follows protocols registered with the University of Alabama Institutional Animal Care & Use Committee (IACUC) and aligns with NIH policies on humane care and use of laboratory animals. This includes using autoclaved food, water, bedding, cages, and accessories. Cages are routinely cleaned or changed twice a week for mice; if excessively soiled, they are changed more frequently. Mice have ad libitum access to food and water and are examined daily for signs of distress or illness. If any issues are observed, cages will be marked, and the veterinarian and PI will be notified to implement a treatment plan. Non-study-related health problems are also addressed by the veterinarian, who will consult with the PI before any treatment is administered.

Animals in the ACF are monitored twice daily on weekdays and once daily on weekends. Rodent housing is changed bi-weekly, with additional changes as needed. During holidays and extreme weather, staff are present daily to monitor the animals. Daily checks include recording temperature and humidity in each room. All caging is sterilized in our cage or rack washers and can be autoclaved. The facility is also equipped with The Niagara System, which alerts staff via text message if any room deviates from set temperature parameters.

**The Institute for Rural Health Research (IRHR)** **- James Geyer, M.D., Director, CCTS Co-PI and Site-PI:** Established in 2001, IRHR seeks to raise standards of attainable health and quality of life for rural citizens. The IRHR pursues this mission through the combined strengths of scientific knowledge, community involvement, and informed public policy. The Institute’s research focuses on health issues that impact people’s lives in rural and other areas. IRHR's efforts to reduce negative health outcomes in rural communities is exercised through research, clinical trials, screenings, and health education that is participatory and mutually beneficial to communities.

In partnership with UA colleges, institutes, and rural communities, IRHR has participated in federal and state grants totaling more than $25 million. IRHR investigators have access to an outstanding research infrastructure including office space, research lab space, conference rooms, state-of-the art computers, specialized research software (NVivo, SPSS, SAS etc.), printing and reproduction capabilities, administrative support, etc. IRHR computer equipment is configured for key personnel to work with large data sets, conduct advanced research analysis, and have adequate processing and graphic capabilities. Specialized software and software licenses allow for statistical, data management, and GIS applications. IRHR's desktop and larger computers utilize SAS, SPSS, and SUDAAN software packages. IRHR has its own password-protected server that allows for complex study and GIS mapping. IRHR has multi-point video-conferencing capability for up to 15 sites. Distance conference is also available using the ITBA System. IRHR has use of UA's Center for Business and Economic Research, Alabama State Data Center (a U.S. Census Bureau repository), and the Cartographic and Geographical Information Systems Lab. IRHR also provides a wealth of resources and infrastructure to support faculty research including: (1) Proposal development administrator; (2) Editor and writer; and (3) Data analyst; and (4) Administrative assistant. Additionally, IRHR is closely affiliated to UAB’s CCTS as part of the CCTS partner network.

IRHR hosts an annual Rural Health Conference that provides a platform for academic researchers and community members to partner and share research ideas. These programs include health outcomes mitigation programs, artificial intelligence programs, and public policy support. The IRHR houses multiple academic and clinical programs.

***Division of Clinical Investigation****:* This program includes the Division of Clinical Investigation which houses the Experimental Pharmaceutical and Medical Technology Program, the Clinical Trials Program, and the Rural Sleep Research Initiative. This program is supported by physicians, clinical trial nurse coordinators, trial development staff, and site coordinator and development staff. The medical technology program has active collaboration with a variety of large, small, and start-up bioengineering ventures, participating in medical device development and the applications for rural health.

***Emergency Medical Services Program****:* Since 2007 our Emergency Medical Services Program in collaboration with the Alabama Department of Public Health has provided EMS oversight by providing continuing education and updated technology to emergency medical services personnel across 14 counties in West Alabama. The EMS program will continue to provide all its present services and will be more actively incorporated into epidemiology studies and research funding opportunities.

***Housing Optimization Technology Association****:* The Housing Optimization Technology Association is a new program based on prior work with novel engineering approaches to housing outcomes. This will yield a multi-departmental and multi-collaborator association with potential for IP generation and product/corporate development.

***Bioengineering and Technology Group****:* The Bioengineering and Technology Group creates bridges between rural health, data analytics, engineering, and artificial intelligence both within UA such as the Alabama AI Center and with external collaborators. The success of the NSF Proto-OKN (open knowledge network) program is one example of this fruitful collaboration.

***National Center on Forensics****:* The National Center on Forensics (the Center) within the IRHR has developed a partnership with the Alabama Department of Forensic Sciences and UAB. Ensuring the Center will effectively leverage the existing strengths, facilities, and expertise from each of the strategic partners of this unique collaborative partnership and position the Center to provide specialized training in these three specific purpose areas:

* Scientific and technical learning opportunities for the medico-legal community specifically targeted medical students and focused on key rural areas,
* Providing forensic science and legal training, information, and support to law enforcement, district judges, and other appropriate agencies, and
* Developing, consolidating, and providing access to resources and opportunities for education, training, and best practices in the forensic science community, structured to benefit current and future practitioners in the field.

**Alabama Center for the Advancement of Artificial Intelligence (ALA-AI) - Jiaqi Gong, Ph.D., Director:** The new research center, recently approved by the University of Alabama System Board of Trustees, is supported in part through a $2 million donation in honor of former chair of the department of computer science, Dr. Marvin A. Griffin. It unifies new and existing work across campus, greatly expanding research, education and outreach activities related to the development and application of artificial intelligence. Serving as a pivotal hub for the study of AI’s core mechanisms and its myriad applications, ALA-AI will focus on five fundamental themes:

* Advancing the science of AI and its machine-learning methodologies
* Promoting human-centered applications of AI that benefit society
* Ensuring the ethical development, dissemination and utilization of AI technologies
* Cultivating a workforce and society that is proficient in AI through lifelong learning initiatives
* Fostering a vibrant AI research and education community, nurturing unique collaborations between academia and industry

ALA-AI unifies AI collaboration between the College of Engineering, College of Arts and Sciences, Culverhouse College of Business, Capstone College of Nursing, College of Communication and Information Sciences, College of Education and School of Social Work. A strategic alignment with the recently approved High Performance Computing and Data Center, the Alabama Cyber Institute, and the Institute for Rural Health Research uniquely positions ALA-AI for close collaboration with industry partners and bolsters UA as a leader in computational and AI research. Affiliates of the ALA-AI are participating in the NSF Proto-OKN developmental program.

**Alabama Life Research Institute (ALRI) - Sharlene Newman, Ph.D., Director:** The ALRI is committed to providing research support for the project on equipment usage, supplies, human resources, and laboratory space. The ALRI is one of five leading university-wide institutes at the University of Alabama. It provides support for interdisciplinary research related to the human condition and offers research training and funding for pilot data collection and statistical analysis consultancy. The scientific environment of the ALRI not only greatly facilitates the implementation of the project, increases the probability of its successful completion, but also contributes significantly to the research and professional development of trainees.

* Office Space: The ALRI in the UA Northeast Medical Building has ~5,000 sq. ft. of office space, housing twelve private offices, each equipped with a computer, Wi-Fi access, a network-connected printer, office furniture and other supplies. The PI’s office is a part of the open floor plan of about ~150 sq. ft. The institute has three conference/workshop rooms with a video conference function, ~ 550 sq. ft. student workspace with 16 booths and one meeting space. The space is dedicated to research assistants to make material preparations, data entry and management, and hold group discussions on research projects. Each booth has four secure locked filing cabinets to store study materials.
* Faculty and Staff: The ALRI also includes interdisciplinary research scholars from across the University, other research affiliates, centers, and universities across the U. S. on multiple large-scale federally funded projects focusing on neurodevelopment and intervention, cancer prevention and community health. The institute holds both local and national scientific seminars and symposia on cognitive and computational neuroscience to facilitate the dissemination of new scientific research.

University of Alabama MRI Research Facility (Managed by ALRI): The new magnetic resonance imaging (MRI) research facility (funded by NSF FAIN201920), located adjunct to the University Medical Center with a spacious parking lot accessible to visitors with disabilities, and houses a Siemen’s Prisma 3T scanner. The facility is more than 9,500 sq. ft. designed to host two MRI scanners, a mock scanner, and bio-specimen collection.

* MRI: The core MRI area in operation now consists of the MRI suite, a control room, an equipment room and two preparation rooms. The scanner is installed with an InRoom Viewing 40’’ LCD Monitor (Nordic Neurlabs) to present visual stimuli, MRI compatible BOLDfonic headphones (Cambridge Research Systems Ltd.) to provide audio stimuli isolated from scanner noise, an FOMRI-III + NC microphone system (Optoacoustics Ltd.) to collect vocal responses of participants and a fORP response recording system (Current Designs Inc.) to record the participants’ responses via button boxes. The magnet room also contains two closets to store MRI accessories, including head (64, 32 and 20 channels) / body (body matrix, flex, wrist, foot, ankle, knee, and shoulder) coils, straps, cushions, wedges, sponges, towels, blankets, and phantoms. The facility is also equipped with a Fully Integrated Real time MRI Monitoring system (FIRMM, Nous Imaging Inc.) to monitor the participant motion during scanning. The whole-body scanning provides the possibility for correlational studies like aging (Alzheimer’s disease, Parkinson’s disease, and stroke), diabetes and osteoarthritis. The 3T scanner is outfitted with an MRI-EEG compatible EyeLink 1000 Plus Eyetracker (SR Research, Ottawa, Canada) and Etymotics MR-compatible ER-30 sound isolating insert earphones to deliver sound stimuli.
* Behavioral assessment and others: The center contains testing rooms designated for conducting various behavioral assessments/prescreening, a conference room, a break room and a ~150 sq. ft. open office space for research personnel to discuss their projects. Each area is equipped with comfortable modern furniture with Wi-Fi access for visitors.

**Institute for Social Science Research (ISSR) - Despina Stavrinos, Ph.D., Director**

ISSR at The University of Alabama (UA), established in 1984, serves as a dynamic interdisciplinary hub dedicated to advancing research in the social sciences. Through its initiatives, ISSR not only fosters impactful research and program evaluation but also offers valuable graduate training opportunities in social science research methodologies. Our collaborations extend beyond the university, forming research partnerships with various agencies and organizations throughout the state.

***Faculty and Staff***: ISSR is supported by a Director (Stavrinos) with a PhD in Developmental Psychology and 3 additional faculty. Faculty members have access to dedicated office space and the support of ISSR’s Administrative Core. The Administrative Core includes a full-time administrative assistant, a part-time grant and contract specialist, a part-time accounting assistant, and a part-time research dissemination specialist. Each member of the staff also has access to dedicated office space. ISSR’s administrative structure ensures a well-organized and efficient research environment.

***Program Evaluation Unit***: ISSR Program Evaluation Unit (PEU) has expertise in all facets of program evaluation research. Staffed by 4 full-time and 1 part-time PhD-level evaluation specialists, the team is experienced in evaluating a variety of local, state, regional, and national programs. ISSR PEU staff can assist in all aspects of evaluation, including evaluation planning, research methodology and design, grant proposal development, statistical analysis, data management, and report writing. The PEU partners with entities inside and outside of The University of Alabama community.

***Interdisciplinary Research Domains:*** At ISSR, our research is organized around two primary research domains: Health and Well-being Across the Lifespan and Safety, Security, and Technological Innovation. We recognize that complex societal challenges – such as those found in health outcomes, mental health, public safety, and the ever-evolving landscape of technology – demand interdisciplinary collaboration. This collaborative spirit is at the very heart of our mission at ISSR. We work closely with faculty and partners across the UA campus and beyond, integrating insights from various disciplines to bring a comprehensive social science perspective to these pressing issues. Through our collaborative efforts, we foster an environment where social scientists can share their knowledge, expertise, and methodologies, ultimately driving meaningful progress in both research and real-world applications.

**Domain 1: Health and Well-being Across the Lifespan:** Within the Health and Well-being domain, ISSR addresses critical issues such as occupational health and safety, sleep health, women’s reproductive health, and traumatic brain injury, particularly among multiple populations. Geographically situated in the west Alabama region, ISSR is well-positioned to investigate rural health challenges and leverage community engagement partnerships. Collaborations with regional and community partners enhance the research relevance and impact, enabling the development of effective interventions tailored to local needs. ISSR’s strong partnerships with other major UA entities, such as the Institute for Rural Health Research and the Alabama Life Research Institute, amplify its capacity to tackle these pressing issues. Relevant social science questions in this area include:

* How does occupational health influence the overall well-being of workers in rural settings?
* What are the factors affecting sleep health and reproductive health outcomes across different demographics?
* How can translational health research be effectively implemented to benefit multiple populations, such as veterans?
* In what ways do community partnerships enhance the effectiveness of health interventions?

**Domain 2: Security, Safety, and Technological Innovation:** In the domain of Security, Safety, and Technological Innovation, ISSR explores vital issues surrounding human security, including food and water security, transportation safety, and the human factors influencing decision-making in high-risk environments. Faculty members collaborate with key partners, such as the Alabama Transportation Institute, the Alabama Cyber Institute, and the Alabama Water Institute, to address complex social challenges and develop effective behavioral interventions. Key social science questions in this area include:

* How can interdisciplinary approaches improve our understanding of international conflict and security challenges?
* How do technological advancements in transportation systems impact driver behavior and safety outcomes?
* In what ways can social science research inform policies aimed at enhancing community safety and resilience to water-related challenges?
* How do societal attitudes toward emerging technologies like quantum computing and AI influence their adoption and integration into existing systems?

**Within Domain 2 exists the Translational Research for Injury Prevention (TRIP) Laboratory directed by Dr. Despina Stavrinos:** The TRIP Lab was established in 2009. It is led by Dr. DespinaA white car parked on a road

Description automatically generated Stavrinos, Director, and Dr. Benjamin McManus, Assistant Director. Supporting Drs. Stavrinos and McManus are 4 additional full-time staff (a computer engineer, program manager, project coordinator, and outreach manager), 1 part-time staff member (a research dissemination specialist), 2-4 graduate students, and 6-10 undergraduate students. The TRIP Lab became part of ISSR at The University of Alabama in 2023 and is in Quad D of the Northeast Medical Building (NEMB). The TRIP Lab strives to help the nation achieve a significant reduction in the rate of transportation-related deaths, injuries, and resulting disabilities, particularly in the southeastern United States. It is committed to gaining a better understanding of the psychological aspects of transportation-related injury through multi-disciplinary research and translating those findings to the practice of injury prevention and control. The TRIP Lab has well-respected research and community outreach programs.

Figure 2. TRIP Lab Driving Simulator

* ***Community Outreach***: The TRIP Lab’s award-winning Outreach Program reaches students and young people statewide. The TRIP Lab is dedicated to community outreach to build relationships with teen drivers and community leaders; to make a positive impact on the lives of at-risk driving groups; and to increase awareness of safety on our roadways. A typical outreach event consists of an instructional discussion of safe driving practices and the dangers of distracted driving led by the TRIP Lab Outreach Manager followed by an opportunity to drive the portable driving simulator. Our portable driving simulator allows us to bring a unique, enlightening event to schools and other transportation safety events. It measures reaction times, realistically simulates distracted driving scenarios, demonstrates driver attention to driving laws, measures brake reaction time, and reveals how quickly hazards can occur. The portable driving simulator is an integral part of actively engaging students and other populations in a fun, yet informative, exercise where teens and young adults can “drive” while wearing impaired goggles, talking with friends, or playing on their phones. Simulating these distracted driving scenarios is vital for conveying the need for safe driving practices to at-risk groups in a manner that is harmless and ethical.
* ***Driving Simulator Facility****:* The Driving Simulator Facility is an over 2500 square footage facility dedicated to data collection operations involving the state-of-the-art high-fidelity driving simulator. The 12-room facility includes a 660 square foot space housing a full-cab 2021 Mercedes GLE 63S SUV with an adjacent 376 square foot control room and 110 square foot dedicated server room housing driving simulator and eye tracking computing hardware. The driving simulator room includes a large observation window for visitors to see the driving simulator in operation from outside of the facility in a dedicated 110-square-foot space. This observation window can be shaded during data collection. Two additional data collection rooms with observational windows are adjacent to the control room for networked driving simulator expansion applications. The space houses two dedicated survey and cognitive testing rooms. All data collection rooms were constructed with isolated venting and dampening insulation for noise reduction to avoid external distraction. A series of over 338 square feet of corridors connect the data collection and simulator rooms. All corridors and data collection rooms have dimmable lighting to reduce potential experimental confounds related to light levels and are behind electronic keycard access for security and participant privacy. The facility also has three private offices, a restroom, and a storage room for facility personnel.
* ***Driving Simulator****:* The fully immersive state-of-the-art driving simulator runs on Realtime Technologies, Inc. (RTI) hardware and software utilizing a full cab 2021 Mercedes GLE 63S. The simulator cab includes all the functional controls found in the actual vehicle, such as a gearshift, brake, throttle, steering wheel, turn signal/indicator, and dashboard. The simulated environment is displayed across five projectors on a large cylindrical screen with a viewable area measuring 80" x 463.82" and a curvature radius of 118.11, providing a 225° field of view to the front and sides of the driver. A sixth projector and screen positioned behind the vehicle allow the driver to view the simulated environment behind the vehicle through the rearview mirror. The side mirrors feature LCD screens that display rearward environment views. The driving simulator cab features a 3-Degree of Freedom (DOF) motion system that pitches the vehicle backward, forward, and side-to-side to replicate physical cues experienced during braking, acceleration, and turning. A surround sound system delivers realistic driving sounds with full Doppler effects for ambient traffic. Simulated vehicle dynamics (e.g., speed, acceleration, steering angle, braking) are recorded at 60 Hz and aligned with integrated interior observation cameras and microphones that record driver behavior.
* ***Eye Tracking****:* A Smart Eye Pro 3-camera system is integrated with the driving simulator. These 2.3-megapixel cameras are mounted on the vehicle's dashboard and utilize infrared flashes to detect glints on the driver’s eyes to track head and eye position and measure visual behavior (e.g., eye closures, blinks, gaze direction coordinates) at 60 Hz. A 3D world is modeled by laser-measuring the physical environment (i.e., simulator screen, simulator cab interior) and gaze tracking within this 3D world model is utilized to detect when the driver gaze intersects with coordinates of key objects in both the physical environment (e.g., looking at speedometer, looking in rearview mirror) and simulated scenario environment (e.g., vehicle cutting into traffic, pedestrian entering roadway).

***Office Space***: ISSR's main building on the UA campus has 13 offices, each containing personal computers and essential software packages for word processing, data management, and statistical analyses, including SPSS, SAS, and AMOS. Our dedicated copy room features two high-capacity copiers, and our meeting room is outfitted with advanced conferencing technology to facilitate collaboration. This space is in addition to the space occupied by the TRIP Lab in NEMB, described above.

***Computational Resources***: Support from the University Office of Information Technology (OIT) ensures we can access comprehensive technical resources, including campus-wide licenses for critical software such as Microsoft products, SPSS, and Qualtrics. The OIT provides 24-hour user support, available online, in-person, or via telephone, and offers cloud storage solutions through UA+BOX, which includes unlimited storage and backup services. This secure platform allows for proper access controls and safeguards the retention of data collected during our research.

**Alabama Research Institute on Aging (ARIA) - Rebecca S. Allen, Ph.D., ABPP, Director:** The University of Alabama Research Institute on Aging (ARIA) is a campus-wide, multidisciplinary research center whose mission is to develop new knowledge, assess new interventions, and disseminate information related to mental health and aging. The Institute has 65 faculty associates from multiple departments and colleges at The University of Alabama. Its core faculty collaborate with more than 50 other institutions around the country. Through applied interdisciplinary research, ARIA promotes improved quality of life for older adults.

Faculty and students from the College of Arts and Sciences, the School of Social Work, the Capstone College of Nursing, the Culverhouse College of Commerce and Business Administration, the College of Engineering, the College of Human Environmental Sciences, and the College of Community Health Sciences are involved with ARIA. Research projects currently span ARIA’s three focus areas:

* **Biology/Gerosciences:** Promote collaboration among UA researchers who study diseases that have an aging component, to identify commonalities.
  + - Nutritional & dietary patterns
    - Toxic exposures
    - Epigenetics
    - Resilience
    - Stress
* **Behavioral Health:** Collaborative group of multidisciplinary researchers with an interest in behavioral health
* **Falls Prevention:** Identify areas of synergy across a multidisciplinary group of researchers with interest in falls research defined broadly.

All of these focus areas are represented by ongoing or recently completed research projects funded by the National Institutes of Health, including the National Institute on Aging and the National Institute of Nursing Research; the Agency of Healthcare Research and Quality; the United States Department of Veterans Affairs; and national aging research funding agencies such as the Retirement Research Foundation, the Alzheimer’s Association of America, and the John A. Hartford Foundation.

**Integrative Center for Athletic and Sport Technology (I-CAST) – Tim Haskew, Ph.D., Director:** An interdisciplinary center drawing on expertise in engineering, kinesiology, health science and athletic training, the Integrative Center for Athletic and Sport Technology (I-CAST) is devoted to the development of new technologies and the application of existing technologies for the primary purpose of reducing injury, accelerating recovery from injury, enhancing human performance and optimizing nutrition in performance and recovery.

I-CAST brings together people from across campus with a passion in this niche topic who already are collaborating on innovative research. The center is supported by the College of Engineering, College of Education, College of Human Environmental Sciences and Crimson Tide Athletics. Divisions represented in I-CAST include:

* Intercollegiate Athletics Sports Medicine
* Kinesiology, Exercise Science
* Human Nutrition
* Adapted Athletics
* Health Science, Athletic Training Program
* Electrical and Computer Engineering
* Civil, Construction and Environmental Engineering

**Center for Interconnected Behavioral and Mental Health Systems (CIBMHS) - Sara McDaniel, Ph.D., Director:** The Center for Interconnected Behavioral and Mental Health Systems (CIBMHS) is a research center housed in the College of Education. The work of CIBMHS is to develop interventions and conduct rigorous trials on interventions preventing and targeting social, emotional, and behavioral issues in the k-12 classroom. Our work crosses over between students, educators, and caregivers. CIBMHS also hosts the Alabama Positive Behavior Support Office (APBSO), a technical assistance provider for Positive Behavioral Interventions (PBIS) training and coaching in Alabama. The Center and Office have partnered with more than 250 schools, most of which have been rural, across all regions of Alabama. Currently the CIBMHS works on four research grants from the National Institutes of Health and a federal 5-year training grant for special educators and school psychologists from the Office of Special Education Programs. This federal training grant is for special education and school psychology students who want to focus on integrating mental health in education in rural school settings. Regular programming includes webinars from national experts, the new Science Bites lunch and learn series, and free training programs such as Youth Mental Health First Aid.

**Alabama Cyber Institute (ACI) - Allen Parrish, Ph.D., Director:** The Alabama Cyber Institute (ACI) is a university-wide research institute dedicated to computational research. The centerpiece of ACI is a High-Performance Computing (HPC) and Data Center that is a 40,000 square foot facility being constructed on the campus of The University of Alabama. The project addresses the academic and research needs of the university, the Office of Research and Economic Development, and strategic partners. The HPC center is designed to support a wide range of research, workforce development, and economic growth in Alabama by providing world-class computing capabilities to our entire research enterprise, with a particular emphasis on the portfolio managed by our five university-wide research institutes (Cyber, Life, Materials, Transportation, Water).  Through the HPC center, ACI will house a leadership class supercomputer, with scientific computing, AI computing, and visualization capabilities.

**Institute for Communication and Information Research (ICIR) - Kenon A. Brown, Ph.D., Director:** The Institute for Communication and Information Research (ICIR) is an independent research institute within the College of Communication and Information Sciences. Housed in the Office of Research, Scholarship and Creative Activity, the ICIR is dedicated to conducting communication and information research that addresses contemporary issues. The ICIR collaborates with businesses, non-profit organizations, government agencies, foundations, and other entities to produce high-impact research that informs and improves our evolving communication and information landscape. Centered around four research initiatives – sports, information policy and ethics, internal communication and engagement, and mis/disinformation - the ICIR strives to provide insights that are comprehensive, interdisciplinary, and impactful to society.

**Alabama Transportation Institute (ATI) - Steven Jones, Ph.D., Director:** The Alabama Transportation Institute (ATI) at The University of Alabama (UA) is at the forefront of transforming transportation through cutting-edge research and innovation. By merging a 40-year research portfolio of over $200M in awarded projects, ATI tackles pressing challenges in infrastructure, safety, and emerging technologies. Key successes include playing a pivotal role in the Rebuild Alabama Act, helping unlock nearly $100M in federal funds for vital state projects. ATI also leads the groundbreaking USDOT-funded ACTION project, leveraging $16.3M to reduce congestion and improve safety with advanced traffic technologies. Additionally, ATI’s expertise in public safety has revolutionized tools for traffic citations, crash reporting, and more. Through these initiatives, ATI is shaping the future of transportation, providing innovative, data-driven solutions that enhance mobility, boost Alabama’s economy, and improve quality of life across the state and beyond.

***Connectivity:*** At the heart of ATI’s mission is to act as the hub of transportation research on The University of Alabama’s campus. ATI seeks to engage faculty and staff whose research interests align with any aspect of transportation and innovation, cultivating impactful collaborations across its community. By joining the program, affiliates can collaborate on a wide range of transportation-related research efforts. ATI serves affiliates by actively promoting research, projects, awards, and publications through various channels, including social media, newsletters, and its website. Currently, there are 89 faculty members across seven colleges, 19 departments, and 11 labs, centers, or institutes.

**Hard assets/Centers**

***Center for Transportation Operations, Planning and Safety (CTOPS):***CTOPS is a leading research center driving transportation innovation in Alabama. Focusing on cutting-edge digital systems, data analytics, simulations, and safety, CTOPS advances real-world applications, such as the integration of connected and autonomous vehicles into transportation networks. Its interdisciplinary research enhances road efficiency and safety using novel data sources. Backed by a distinguished faculty, CTOPS has a strong track record of securing funding and building impactful collaborations. Aligned with the Alabama Transportation Institute’s mission, CTOPS supports the Alabama Department of Transportation and key US Department of Transportation initiatives.

***Alabama Mobility Power Center (AMP):*** The AMP center (UA) is a recently formed consortium with ATI, Alabama Power, Mercedes Benz USI, and other partners. In addition to its aggressive workforce development initiative aimed at supporting electrification among the many automotive manufacturers and suppliers important to the state economy, AMP is organizing faculty researchers in strategic EV-related areas.

***Transportation Policy Research Center (TPRC):*** The TPRC at UA conducts interdisciplinary research and service through its staff of transportation engineers and planners complimented by a staff of legal researchers, economists, psychologists, and strong collaborations with the UA School of Social Work. It recently led the long-term transportation financing study that contributed to the *Rebuild Alabama Act* which included the first gas tax increase in the state since 1992.

***Center for Advanced Public Safety:*** The Center for Advanced Public Safety (CAPS) is a leading interdisciplinary research center focused on innovative technology to improve public safety. CAPS specializes in analytics, software development, data integration, GIS, mobile apps, and website design. It has played a key role in developing Alabama's public safety IT infrastructure, including systems for traffic citations, crash and DUI reporting, and commercial vehicle inspections. CAPS’ software is used nationwide, transforming operations in law enforcement and government, while its analytics tool, CARE, supports state agencies and law enforcement by providing critical crash data analysis to enhance traffic safety.

***Institute of Social Science Research:*** The Institute for Social Science Research (ISSR) at the University of Alabama promotes interdisciplinary research in the social sciences and offers valuable training opportunities for graduate students. Established in 1984, ISSR partners with state and national organizations to conduct policy-relevant research, provide consultation on statistical and behavioral research methods, and evaluate programs. It supports collaborative projects and infrastructure, including statewide and national surveys. ISSR also fosters student involvement in research and builds partnerships with communities, businesses, and agencies, driving impactful research that serves both the University and the broader community.

**Research & Action**

While many of our researchers focus on the engineering side of transportation issues, ATI has made significant impact through projects focused on the human side of transportation. Through collaborations with the College of Arts and Sciences, Culverhouse College of Business, and School of Social work, ATI has contributed to interdisciplinary research that impacts all facets of transportation innovation.

**Laboratories**

*Lab for Intelligent Sensing and Computing (LISC)* – LISC is focusing on solving unique environmental sensing challenges in connected and autonomous vehicles with multi-modal sensors (radar, camera, LiDAR). Research projects include automotive radar signal processing, physical-aware radar machine learning, multi-modal sensor fusion, multi-vehicle-based collaborative sensing, and computationally efficient algorithm innovations in signal processing, sensing, and fusion.

*NextGen Transportation Lab – NextGen (UA)* brings a unique perspective to understand the roles of travelers, vehicles, infrastructure, and policies in future transportation systems. The Lab conducts data-Driven and simulation-enabled research. The research outcomes lead to actionable solutions to transportation challenges related to planning, operation, safety, and environment.

*Mobi-X Lab – The Mobi-X Lab (UA)* focusses on translating knowledge from high-fidelity modeling and large-scale mobility data to the development of sustainable, efficient, and resilient transportation systems. The Mobi-X Lab is especially interested in the interdependency between transportation systems (Mobility) and other social, cyber, and physical dynamics (X). Particular examples include the shift of public transportation usage, the adoption and charging of electric vehicles, and the coupling with the power grid, and the transmission of infectious diseases.

*Complex Spatial Systems Lab (CSSL)* – The Complex Spatial Systems Lab advances understanding of transportation systems as ‘systems of systems’ with a focus on the interdependent challenges of security and sustainability. Transportation systems intertwine these challenges in salient issues like social vulnerability, infrastructure resilience, and other impacts. CSSL integrates the perspectives and tools of geographical, location, and socio-ecological system sciences to investigate (in)accessible transportation systems as both the causes of and solutions to economic, social, spatial, and security concerns.

*Translational Research for Injury Prevention Laboratory (UA TRIP Lab)* – The University of Alabama’s TRIP Lab, researchers utilize a state-of-the-art driving simulator, built from a Mercedes GLE 63S AMG, to study human behavior in immersive driving conditions. Directed by Dr. Despina Stavrinos, this innovative setup combines realistic driving elements with virtual environments, allowing participants to engage in naturalistic behaviors. The lab’s research addresses critical community safety concerns by replicating complex driving environments, enabling the development of strategies to reduce risks at dangerous intersections in six Alabama counties. This work directly advances both academic understanding and public safety initiatives throughout the state.

**The Alabama Materials Institute - Gregory Thompson, Ph.D., Director:** The Alabama Materials Institute (AMI) addresses cross-cutting research activities in materials research and education for energy, defense, transportation, human health, and environmental sciences. The institute, one of five on the campus of The University of Alabama, leverages teams of researchers, faculty, and students working collaboratively to identify and advance new materials, understand their fundamental properties, and develop novel processes for synthesis, fabrication and manufacturing using advanced experimental and computational approaches. The institute maintains a Core Analytical Facility which houses a multitude of electron, ion, and X-ray instrumentation. These instruments provide more than a million orders of length scale characterization, from the atom to several hundred microns, in multiple dimensions with *in situ* testing platforms. In addition, a Powder Processing Facility to produce novel builds, from billets to complex parts through additive manufacturing, is available for its researchers. AMI is supports technical staff for workforce training to executing applied programs for its stakeholders.

**UA Center to Address Substance Use Disorder - Mercy Mumba, Ph.D., Director:** The University of Alabama School of Nursing houses the UA Center to Address Substance Use Disorders. Dr. Mercy Mumba is the director of this research center dedicated to the prevention, treatment and management of substance use disorders. Dr. Mugoya assists in this program. The Board of Trustees of The University of Alabama System approved the Center for Substance Use Research and Related Conditions to focus across the lifespan of conditions to include integrated behavioral health, mental health and more.

Housed in the Capstone College of Nursing and in collaboration with the Alabama Life Research Institute, the mission of the CSURRC is to promote the health and well-being of individuals and communities affected by substance use disorders in Alabama and beyond through innovative, state-of-the-science and research that reduces negative health outcomes.

**Behavioral Sleep Medicine Training Program and the Sleep Research Project:** The Behavioral Sleep Medicine Training Program at the University of Alabama is one of a small number of such training programs in the United States. The training program promotes excellence in the preparation of pre-doctoral, doctoral, internship/residency, and postdoctoral trainees who enter the professional practice of behavioral sleep medicine. James Geyer, MD is the medical director and clinical supervisor for the training program and directs the Comprehensive Insomnia and Behavioral Sleep Medicine Clinic. Matthew Cribbet, PhD and Heather Gunn, PhD are the academic directors of the program, collaborating and providing supervision in the clinical setting. He has expertise in behavioral sleep medicine.

**Institute of Data and Analytics - Jason Parton, Ph.D., Director:** The Institute of Data and Analytics (IDA) is a multidisciplinary research organization at The University of Alabama (UA) that focuses on the science of data and analytics for evidence and methodological-based research. Given that data and analytics are vital to almost all investigations, be it in the academic, corporate, or government arenas, the IDA activities include internally led research, cross-campus/cross-university collaboration, and developing and supporting industry partnerships. As stated by the National Institute of Health (NIH), data science is “the interdisciplinary field of inquiry in which quantitative and analytical approaches, processes, and systems are developed and used to extract knowledge and insights from increasingly large and/or complex sets of data” (NIH, 2019). The capacity to harness, analyze, and interpret vast amounts of data has become a vital and essential part of operations in almost every field. Technologies such as machine learning, deep learning, artificial intelligence, and virtual-reality are examples of data-related innovations that may yield transformative changes offering a profound impact on daily lives (NIH, 2019). As a teaching and research university dedicated to service above self for our community, region, state and nation, the IDA leads in advancing data science knowledge and application across the University of Alabama and beyond.

Additionally, the IDA manages all funded research activity and serves as a nexus point for faculty, research staff, and students. The multidisciplinary team at the IDA seeks to develop and cultivate data and analytics expertise through evidence-based research via communicating applied research discoveries and approaches with technically focused students, faculty, and various corporate, community, and government partners with underutilized data. IDA projects range from focused academic investigations to major corporate partnerships to servicing the needs of our State and Nation (e.g., methodological and evidence-based studies, Lockheed Martin and Protective Life, Alabama State Opioid Repository).

**Alabama Entrepreneurship Institute (AEI) - Theresa M. Welbourne, Ph.D., Executive Director:** The Alabama Entrepreneurship Institute (AEI) was founded to promote and support entrepreneurship in the Culverhouse College of Business and across The University of Alabama. Our goal is to grow businesses, create jobs, and provide students an opportunity to engage in real-world experiences. You can consult with existing businesses or build your own start-up.

AEI delivers learning that accelerates the growth of businesses and creates new jobs. AEI provides students with unique opportunities to move beyond the classroom and learn by doing. They work on entrepreneurial projects with both new and established businesses as part of consulting teams. They also start up their own businesses or become part of teams working on startups. Students participate in competitions, attend networking events, are part of boot camps to quickly move ideas forward, and they get help from entrepreneurs and business executives.

AEI is in the business of creating new knowledge. Our professors and colleagues are working on cutting-edge research, creating new learning tools and teaching students of all ages around the world.

AEI is located at the EDGE, which is a partnership with the West Alabama Chamber of Commerce and the City of Tuscaloosa. Students use the co-working space at the EDGE; it provides space for teams to work together, network with established entrepreneurs, and meet with mentors who help get their new ventures up and running.

The mission of AEI is to become a magnet program for UA Innovators, Inventors, and Entrepreneurs (faculty, staff, and students) as well as the people who support their work (e.g., investors, business leaders, and community members). Through programming, research, and the use of incubator spaces on and off-campus, AEI spurs the growth of innovation, new jobs, and businesses, as well as sharing research-based best practices. AEI’s work goes beyond the start-up stage to help new and established enterprises succeed through successful entrepreneurial growth.

**The EDGE and EDGE LABS:** AEI delivers on its mission by utilizing the space and assets that are part of The EDGE Incubators. The mission of The EDGE and EDGE Labs incubators is to provide opportunities for UA Innovators, Inventors, and Entrepreneurs who may be students, faculty, alumni, and/or community members, to assess commercialization potential, realize economic benefits for inventions, build startups and drive the growth of their businesses. The University’s entrepreneurship-related assets contribute to the building of a strong entrepreneurial ecosystem in Tuscaloosa and across Alabama.

**Schools and Colleges**

**College of Community Health Sciences (CCHS) - Richard Friend, M.D., Dean:** CCHS was established in 1972 to meet the critical demand for primary care physicians and quality healthcare in Alabama's rural areas. CCHS was founded on the principle that community involvement is essential to the health profession. The College serves as a model for community-oriented medical education and clinical training, offering rural medicine clerkships, novel curriculums that increase students' exposure to rural medical practice, and programs that guide rural Alabama high school and college students into health careers. CCHS is dedicated to promoting and improving the health of individuals and communities in Alabama and the region through leadership in medical education and primary care, the provision of high-quality accessible health care services, and scholarship. Engaging communities as partners, particularly in rural and other areas, and fostering innovative, community-oriented research to inform population health and support community providers is central to the CCHS mission. The College is located in a state-of-the-art 77,000 square foot facility that houses 48 physicians in training, 75 medical students, 25 graduate students, 50 faculty, and 300 staff. CCHS provides the Institute for Rural Health Research (IRHR) space for current staff and allows for growth in personnel and programs. CCHS has classrooms and space for lectures, seminars, and training workshops/activities. The College's Health Sciences Library maintains the Clinical Digital Library, which provides professional digital library services to off-site users. Nearly 800 students have completed their third and fourth years of medical school at the Tuscaloosa Regional campus and over 500 residents have graduated from the Family Medicine residency. One in 7 Alabama family physicians graduated from the Family Medicine residency at CCHS.

University Medical Center (UMC) serves a large patient population. For example, UMC serves a disproportionate share of Medicaid, rural, and low- income patients. Medicaid patients comprise 22.0% of UMC’s patient population. By contrast, the average family practice physician in the United States has approximately 12.0% of their patients on Medicaid according to the AMA. Additionally, more than 50% of UMC’s overall patient population are in rural areas as designated Health Resources and Services Administration and 23.9% are over 65 years old and 9.8% over 80 years old.

UMC is a multi-specialty clinic with specialties in family medicine, internal medicine, pediatrics, obstetrics and gynecology, geriatrics, psychiatry and mental health, neurology, emergency medicine, and sports medicine. Additional services through this clinic include social services, nutrition and dietetics, and psychological services. It is the largest community practice in West Alabama with over 240,000 patient visits per year and serves patients from a large swath of west Alabama, including Tuscaloosa, Pickens, Hale, Marengo, Fayette, Bibb, Jefferson, Greene, Lamar, Marion, Perry, and Sumter Counties – most of which are rural and have health care provider shortages as described above.

University Medical Center currently has locations in Tuscaloosa, Marengo, Sumter, and Pickens Counties in Alabama. The clinic in Marengo County is in Demopolis, Alabama and was opened in response to the growing need for primary and prenatal care. Additional locations in these areas are in the planning stages. In addition to having locations in these areas, practitioners from UMC also travel to other regional sites to provide service in their areas of specialty where those services are not available. Lamar and Fayette counties also benefit from these services.

The College of Community Health Science’s (CCHS) 50+ full time faculty are dedicated to the primary care, community-oriented mission of the College and have created a model of community-oriented medical education and clinical training through student, resident and fellow rural medicine rotations and novel curriculums that increase learners' exposure to rural practice. University Medical Center is host to the University of Alabama Family Medicine Residency (UAFMR) – one of the largest AGCME accredited family medicine residency program in the United States. UAFMR has been in existence since 1972 and was founded to meet the acute need for more physicians, especially primary care physicians, in our nation – particularly in rural areas. Like the University of Alabama, UMC and UAFMR have a strong focus on community outreach and care. Overall, the residency program has produced 1 in 7 family physicians in Alabama and currently has 48 family medicine residents in training. The addition of this remote patient monitoring and telemedicine equipment into their clinical workflow will serve as an additional training opportunity that will equip them to use similar mechanisms effectively and efficiently to serve at-risk patients in their future practices.

* **Community and Population Health:** The department is driving medical education, accelerating discovery, and delivering competent and compassionate patient care. It offers clerkships, residencies, fellowships, and professional development for students. The department ranks #17 in the nation in NIH research and has award-winning scientific discovery programs. Research focuses range from whether pig kidneys can alleviate the transplant shortage to how to encourage healthy lifestyles in disadvantaged communities.
* **Family, Internal, and Rural Medicine (FIRM)**
* **Pediatrics:** The department provides education programs and curricula for medical students and residents. It also coordinates practice-based research on local and regional research. Multiple research areas include health outcomes, preventative care, and chronic disease.
* **Psychiatry and Behavioral Medicine:**
* **Sports Medicine:** The Department of Sports Medicine is committed to impacting the field of sports medicine through innovative and practical clinical teaching and training. Medical students, resident physicians and fellows learn to evaluate and treat active individuals and athletes for various medical and musculoskeletal conditions as they care for patients at the department’s Dr. Bill deShazo Sports Medicine Center. The faculty and fellows also work with University of Alabama Athletic Department coaches, athletic trainers, and athletes as well as numerous local high school athletic programs and community recreational athletes. In addition, faculty are actively involved in teaching family medicine residents, medical students, athletic training students and learners from other programs across the University.
* **Surgery:** The Department of Surgery provides comprehensive education and training for future generations of physicians and delivers the most advanced care to patients from across the region. Our faculty play a critical role in shaping the future of health care as they nurture and guide medical students and resident physicians through a curriculum that drives excellence in surgical skill. Faculty also provide patients with innovative surgical treatments and superior care.
* **Translational Science and Medicine**
* **Rural Medical Scholars:** The Rural Medical Scholars Program was founded in 1996 to address the shortage of primary care physicians in Alabama’s rural communities. The program works to recruit and assist rural Alabama college students who want to become physicians and practice in the state’s rural communities, where they are most needed.

On average, 11 students are admitted to this highly selective five-year medical education program of The University of Alabama and the University of Alabama at Birmingham Marnix E. Heersink School of Medicine. The Rural Medical Scholars Program includes a year of study, after students receive their undergraduate degree, which leads to a master’s degree in Rural Community Health and early admission to the UAB Heersink School of Medicine. Undergraduates may qualify after their junior year if they have met most of the requirements for their undergraduate major. In the year prior to entry into medical school, students take coursework related to rural health and the practice of primary care in rural areas, and participate in special seminars, field trips and community service programs.

**Capstone College of Nursing (CCN) - Julie Tanner Sanford, DNS, RN, FAAN, ANEF, Dean:** The University of Alabama Capstone College of Nursing (CCN) prepares graduates for the professional practice of nursing. The College is a national innovator in clinical simulation in nursing education, utilizing simulators and telehealth technology in teaching, research, and health care delivery. We partner with a variety of well-respected health care facilities to provide clinical experiences that ease the transition into the working world and prepare graduates for challenges after school.

CCN’s degree programs are led by the Associate Dean for Undergraduate Programs, Dr. Michelle Cheshire, and the Associate Dean for Graduate Programs, Dr. Amy Lee. In addition to a traditional Bachelor of Science in Nursing (BSN) program, CCN has online and blended degree programs that offer practicing nurses the opportunity to advance their education. Programs include an RN Mobility track leading to a BSN and/or Master of Science in Nursing (MSN), MSN degrees with five concentrations, (Family Nurse Practitioner [FNP], Psychiatric Mental Health Nurse Practitioner [PMHNP], Dual FNP/PMHNP, Nurse Educator, and Nurse Executive), BSN to DNP in all five concentrations, a post-masters Doctor of Nursing Practice (DNP), a Doctor of Education in Nursing (EdD) in collaboration with the UA College of Education, and a Joint Nursing Science PhD with the University of Alabama in Huntsville. In addition, CCN offers postgraduate certificate programs in the FNP and PMHNP concentrations. In Fall 2025, CCN will implement the Masters Entry into the Profession of Nursing program to prepare second degree students for entry to practice while meeting the requirements for an MSN.

At CCN, faculty practice is a valued and integral approach for fulfilling the College’s mission. Clinical faculty engage in various models of practice and promote expert care for Alabamians, the nation, and the world. Faculty with expansive expertise provide increased access to care in a variety of settings, such as acute care, primary care, and mental health. At the core of each faculty practice is the pursuit of promoting health and preventing disease. By supporting faculty practice, CCN ensures students are mentored by clinically competent faculty who achieve excellence and innovation in teaching, practice, and scholarship.

The Office of Nursing Research and Translational Science (NRTS), led by Dr. Robin Bartlett, Associate Dean for Research, supports all external and internal grant submissions; CCN faculty have funding from various federal sources such as NIH, HRSA, CDC, and DOL. The research efforts of the faculty and students at CCN address a variety of contemporary clinical and health policy questions. Pertinent areas of inquiry include lifespan health of rural populations, and chronic disease management and prevention of illnesses such as cardiovascular disease, diabetes, Alzheimer’s Disease, HIV/AIDS, chronic pain, urologic conditions, opioid abuse, and cancer.

CCN is also home to the Center for Substance Use Research and Related Conditions (CSURRC) led by Dr. Mercy Mumba, Associate Dean of Global Initiatives and Community Partnerships. The mission of the CSURRC is to promote the health and well-being of individuals and communities affected by substance use disorders in Alabama and beyond through innovative, state-of-the-science and research that reduces negative health outcomes.

**College of Human Environmental Sciences - Stuart Usdan, Ph.D., Dean:** The UA College of Human Environmental Sciences (CHES) brings together multiple disciplines that share a common vision – the determination to improve the quality of life for individuals, families, and communities. CHES is the fourth largest academic division at UA and is comprised of five academic departments that offer 11 undergraduate degree programs, 8 master’s degree programs, and 2 doctoral degree programs. Accomplished and award-winning scholars working in world-class labs and facilities drive innovative research and interdisciplinary collaborations.

**Department of Health Science.** The Department of Health Science at UA is committed to providing a high quality, student-oriented program to students with the skills to design, implement, and evaluate health education and health education programs. The department offers master’s degree programs in athletic training, public health, and health studies and a doctoral program in health education and promotion. Faculty offer expertise in instrument development, health behavior interventions, and program evaluation. Faculty focus areas of application include sleep and adipose risk factors for cardiometabolic disease, alcohol related sexual violence, sport-related concussion, maternal and child health, Chronic Obstructive Pulmonary Disease (COPD), nutrition and chronic disease prevention, and sedentary lifestyles.

**Department of Human Nutrition, Hospitality and Sport Management.** The Department of Human Nutrition, Hospitality, and Sport Management at UA brings together bench scientists, clinical researchers, and researchers focused on application in the community and industry. The department offers master’s degree programs in nutrition, hospitality, and sport management, and a doctoral program in human nutrition. Faculty offer expertise in translational nutrition methodologies, clinical nutrition, metabolic and dietary assessment, and implementation and community-based participatory research methods. Faculty focus areas include nutrition and metabolism (e.g., the effect of bioactive food compounds on cardiometabolic heath, molecular mechanisms of neuronal death during neurodegenerative disease, structure-functional relationships in food materials, bio-compounds that are important for the healthy development of infants), clinical nutrition (e.g., supporting individuals with cognitive conditions to maintain nutritional status, nutritional influences on aging and neurogenerative diseases), and nutrition education (e.g., diet and inflammation, health outcomes, environmentally sustainable food choices).

**Department of Human Development & Family Studies.** The Department of Human Development and Family Studies (HDFS) at UA focuses on helping children, families, and relationships thrive. The department offers master’s degree programs in human development and family studies, marriage and family therapy, and child life. Faculty focus areas include the development of the family system, the dynamics of interpersonal and family relationships, and growth and development throughout the lifespan. Faculty focus areas include the implementation and dissemination of mobile health technologies for assessing and treating mental health problems, psychosocial issues affecting children and families in the medical setting, the development of language and mathematical skills at home and in school, parent-child relationships, relational quality in adult relationships, and the prevention and treatment of violence, addictive behaviors, and suicide.

**Department of Consumer Sciences.** The Department of Consumer Sciences prepares students for leadership roles in business, government, and non-profit settings. The department offers master’s degree programs in consumer economics, consumer quality management, and family financial planning and counseling as well as a certificate in conflict resolution. Faculty focus areas include consumer behavior, health and economic outcomes, food insecurity, financial and healthcare decision-making, investment decisions, financial planning, developing financial capital and family financial wellness.

**Department of Clothing, Textiles, and Interior Design.** The Department of Clothing, Textiles, and Interior Design ensures that students graduate prepared for various roles within the dynamic and ever-evolving fashion and interior design industries. Faculty research areas include design for the human user, historic and archaeological textiles, sustainability, branding, e-commerce, and entrepreneurship.

**College of Education - Joyce Alexander, Ph.D., Dean:** The School of Education provides an innovative environment that promotes professionals in education, health and wellness, kinesiology, and educational neuroscience in collaboration with content experts in associated academic areas. The mission of the department of kinesiology is to disseminate new knowledge across multiple subdisciplines in Kinesiology while preparing students for careers in school, community, rehabilitative, health, medical, sport, and athletic settings. Consistent with the vision of the University of Alabama, we have a student-centered faculty committed to high quality teaching, research, and service endeavors. We offer undergraduate and graduate degrees in Kinesiology with areas of study focused on Exercise Science and Sport Pedagogy/Physical Education. Housed in Wade Hall, our students and faculty utilize multiple state-of-the-art laboratories and workspaces in the pursuit of their personal and professional goals.

Educational neuroscience is an emerging transdisciplinary field incorporating methods and perspectives from psychological and brain sciences, and education. Its principal goals are (1) to explore biological mechanisms that underlie learning and cognition, (2) to inquire how these mechanisms interact with factors relevant to education, and (3) to develop evidence-based practices in teaching and designing learning environments. Given its transdisciplinary nature educational neuroscience requires a foot in two worlds: psychological and brain sciences, and education. In 2014, the University of Alabama started a PhD Concentration in Education Neuroscience, under the Educational Psychology Program–one of the few PhD-level educational neuroscience programs in the world. Our goal with this program is to train researchers who are skilled and knowledgeable in methodologies and theoretical perspectives in both originating disciplines. However, we not only need researchers but also teachers, administrators, and policymakers with transdisciplinary training in educational neuroscience. We have developed the undergraduate major to respond to this need.

**School of Engineering - Clifford Henderson, Ph.D., Dean:** The College of Engineering offers many activities students can pursue while at the Capstone. Our programs are designed so our students can meet their personal education goals while also allowing them to experience life fully at a major liberal arts and research university. Our students are customizing their individual areas of interest and maximizing their engineering educational program.

As the demand for engineers and computer scientists continues to grow, UA’s College of Engineering is focused on preparing our students for the infinite number of opportunities available. Our mission would not be possible without the loyal support of our alumni and friends who have generously given scholarships that enable the College to provide our students superior educational experiences.

**Department of Chemical and Biological Engineering**

**Department of Aerospace Engineering and Mechanics:** UA’s Department of Aerospace Engineering and Mechanics undertakes an integral role in educating aerospace engineering and mechanics students, conducting innovative and exciting scientific research, and improving the economic development of the state of Alabama. The department has a long and rich history dating to 1912 with the formation of the Department of Engineering Mechanics and to the late 1920s with the start of the aeronautics program. The two departments merged in 1996 to form the Department of Aerospace Engineering and Mechanics. Today, with innovative programs and research, UA’s aerospace engineering continues to be an important training ground for future engineers across the state, region, and nation.

The Department of Aerospace Engineering and Mechanics has graduated students who have achieved successful careers in industry, education, the military, and government. These students have been able to utilize the technical education they received at the Capstone in careers in a wide range of fields ranging from engineering to computer science to business and medical fields.

**Department of Civil, Construction and Environmental Engineering:** The Department of Civil, Construction and Environmental Engineering’s comprehensive programs are future-focused and founded on UA’s long tradition of excellence. Civil engineering is one of UA’s oldest programs, offering many specialties. Students work with the latest materials and technologies to design buildings, develop transportation networks, and enhance environmental systems for a sustainable world.

**Department of Computer Science:** The department of computer science encompasses a broad range of topics, from the theoretical capabilities of computers and the properties of algorithms to techniques for the design and construction of systems and application software.

**Department of Electrical and Computer Engineering:** UA’s Department of Electrical and Computer Engineering offers dynamic programs for students interested in a traditional electrical engineering degree, those who desire a specialized computer engineering degree, and those who wish to earn a truly interdisciplinary degree in musical audio engineering.

**Department of Mechanical Engineering:** Mechanical engineering program is the most versatile of all engineering programs and is designed for students who are interested in applying their solid backgrounds and knowledge of mathematics, science, and general engineering to design and conduct experiments; analyze and interpret data; and design systems, components, and processes to meet desired needs for a long-lasting societal impact.

Mechanical engineers pursue careers in the automotive, aerospace, chemical, computer, communication, defense, energy, railroad, and robotics industries, just to name a few. Mechanical engineers are also found in almost all manufacturing industries. Increasingly, mechanical engineers are needed in the environmental and bio-medical fields, and many of our graduates have pursued education in medicine and law. Virtually every product or service in modern life has been touched in some way by a mechanical engineer!

Linked to this, our department is also offering a degree in manufacturing systems engineering. Manufacturing jobs have become a major staple in the state economy, and our department, joining forces with the College of Engineering and The University of Alabama, is doing what it can to supply a pipeline of workers. A new manufacturing facility has been built as part of an initiative oriented to develop a premier hub for multidisciplinary research and education in intelligent and advanced manufacturing systems and processes. This new B.S. program will provide graduates the skills and knowledge for successful careers in manufacturing systems and processes with practical applications ranging from manufacturing processes to cyber-physical systems.

**Department of Department of Metallurgical and Materials Engineering:** Materials properties form the basis of all engineering designs. Our students are exposed to sophisticated equipment and computer technology in applications ranging from the processing of liquid metals to micro-electronic devices. By learning the basic structures, properties and processing of materials, students can achieve success in a multitude of varied industries including automotive, aerospace, electronics, and basic metals production.

**Culverhouse College of Business - Kay M. Palan, Ph.D., Dean:** Culverhouse College of Business students have access to an uncommon variety of resources within an institution that is renowned for its top faculty, staff that take a hands-on approach toward student support, and a cutting-edge curriculum. Culverhouse was rated as the #11 Accounting Program in the nation.

Undergraduate majors include Accounting, Business Cyber Security, Business Statistics, Economics, Finance, Management, Management Information Systems, Marketing, and Operations Management. The Manderson Graduate School of Business, housed within The University of Alabama’s Culverhouse College of Business, offers 11 distinct master’s degree programs including online options. A variety of doctoral programs are available.

Culverhouse College of Business has a focused societal impact initiative in Selma, Alabama, working on a variety of efforts to improve economic development in Selma and the surrounding region.

The Research and Outreach Centers include

* Alabama Center for Risk and Insurance Research
* Alabama Center for Real Estate
* Alabama Entrepreneurship Institute
* Alabama International Trade Center
* Alabama Productivity Center
* Center for Business and Economic Research
* Culverhouse LIFT
* Human Resources Institute
* Institute of Data and Analytics

**College of Arts and Sciences - Joseph Messina, Ph.D., Dean:** As the academic core of UA, the College of Arts and Sciences is a forward-thinking leader in the arts, humanities, and natural and social sciences. With guidance from our award-winning faculty, our students graduate prepared to make transformative impacts in their chosen fields and the world around them.

We are one of the oldest and largest liberal arts colleges in Alabama and among the finest in the region. We are recognized nationally for the number of undergraduate and graduate students who receive national awards and scholarships. Internationally recognized scientists, writers, artists, and scholars teach in our classrooms and labs. Our students work closely with professors who are not only experts in their disciplines but also creators of new knowledge.

The college is home to 22 academic departments and a variety of interdisciplinary institutes and centers. The College of Arts and Sciences also offers over 80 baccalaureate undergraduate majors and more than 20 graduate programs.

**Department of Communicative Disorders**

**Department of Criminology**

**Department of Psychology*:*** The UA Department of Psychology was formally established in 1937. In its rich history, including the founding of the state’s first doctoral psychology program in 1958, the department has had a steady progression of distinguished faculty, accomplished graduates, innovative training programs, and research achievements. Some 700 PhDs have been awarded.

Annual grant funding approaches $3 million. Students receive recognition from professional and scholarly societies. Cooperative relationships with health, mental health, educational, legal, and research agencies, both public and private, enrich the student experience. There are many opportunities to explore the excitement of a thriving department on a growing flagship campus.

The Department of Psychology houses a Psychology PhD program. The PhD program is divided into two areas, clinical and experimental, with a number of subareas. Clinical subareas are Child, Health, Psychology and Law, and Geropsychology. Experimental subareas are Cognitive, Developmental, and Social. All Clinical and Experimental subareas focus on developing skilled researchers and college-level teachers. The clinical psychology area also focuses on developing skilled practitioners. Coursework and training are in person; this is not an online program.

The basic philosophy of the Department of Psychology is to promote independent scholarship and to ensure competence in the fundamental areas of psychology and in the subareas offered. The department trains psychologists who are scientists and scientist-practitioners and, in so doing, provides broad research training, substantive academic areas of study, and opportunities for teaching and applied experience.

* ***Cognitive psychology***
* ***Clinical Geropsychology***
* ***Behavioral Sleep Medicine***
* ***Developmental Science***
* ***Clinical Health Psychology:*** The clinical health psychology subarea is designed to prepare doctoral students for careers as scientists and scientist-practitioners in the areas of health psychology and behavioral medicine. In addition to the graduate core curriculum and the clinical psychology core curriculum, students specializing in clinical health psychology will have the opportunity to pursue coursework and practical training experiences that will prepare them to work in academic/medical settings. The didactic and practical training experiences focus on the integration of psychosocial and biomedical processes. Complementing the core faculty in the clinical health psychology training, students will also be trained by practicing health psychologists and physicians who are associate faculty members in our training concentration.
* ***Social Psychology***
* ***Autism Spectrum Disorders Clinic:*** The University of Alabama Autism Spectrum Disorders Clinic provides support to individuals and families affected by Autism Spectrum Disorder through comprehensive evaluation and therapy services, research opportunities, and consultation services. In addition, the Autism Spectrum Disorders Clinic provides professional training and in-services for parents and professionals in Central and West Alabama.

**Department of Biological Sciences**

**Department of Chemistry and Biochemistry:** As one of the original six disciplines taught at the University, we trace our roots back to the institution’s founding in 1831. Today, we are a growing program that produces world-class research and offers bachelor’s, master’s, and doctoral degree programs. We have 28 full-time faculty, nearly 100 graduate students, and over 300 undergraduate majors. We are based in Shelby Hall, a state-of-the-art facility for our research, teaching, and administrative functions. Within Shelby, we maintain a wide range of instrumentation in specialized research facilities for nuclear magnetic resonance, electron paramagnetic resonance, mass spectrometry, and X-ray diffraction. Modern glassblowing, electronics, and machine shops provide rapid, on-site equipment maintenance and the capability to create custom-designed apparatus.

Our faculty members’ research projects span the major chemistry disciplines and numerous interdisciplinary fields. All our faculty provide undergraduate, graduate, and postdoctoral students the opportunity to get involved in research, exposing them to a wide range of challenging problems.Through their involvement in interdisciplinary centers, our students and faculty also interact with scientists in other fields to address problems of current and far-reaching interest. These centers include the Center for Materials for Information Technology (MINT) and the Center for Biomolecular Products

**Department of Mathematics:** When The University of Alabama first opened its doors in 1831, mathematics was one of just five academic departments comprising the University. Today we are a growing program that awards bachelor’s, master’s, and doctoral degrees. We have around 30 full-time faculty members, nearly 50 graduate students, and over 300 undergraduate majors.The mathematics department’s offices and classrooms are well equipped to support our teaching, research, and service activities, with equipment that is continuously updated and supported by highly trained faculty and staff. All our facilities are located near the core of the University of Alabama campus, just a short walk or shuttle ride from residence halls, the student center, dining facilities, and parking.

Our faculty members’ research projects span many disciplines in applied and pure mathematics with active research groups in algebra, analysis, geometry, topology, partial and ordinary differential equations, numerical analysis, scientific computing, math education, statistics, probability, and optimization. Our faculty members also participate in numerous interdisciplinary research projects across campus (and beyond), with interests in mathematical biology, data analysis, image processing, physics, fluid dynamics, materials science, machine learning, and artificial intelligence, among others. Undergraduate, graduate, and postdoctoral students are provided the opportunity to get involved in research, exposing them to a wide range of challenging problems.

**School of Social Work - Schnavia Smith Hatcher, Ph.D., Dean:** Our BSW program leads to direct employment and social work licensure in a wide variety of social work careers — in helping children, in work with older adults, in mental health, and in hospital and healthcare settings, among many others. Our MSW program is offered as a traditional on-campus MSW program, and a primarily online MSW program. Our doctoral programs prepare students for leadership roles and careers in social work research and education. Students develop expertise working with highly respected social work researchers.

We collaborate, innovate, and transform to push new boundaries in social work education, research, and teaching at The University of Alabama School of Social Work. Our constant pursuit of excellence is reflected in the quality and quantity of our degree programs. We are the only social work school in Alabama offering three levels of social work education — bachelor’s, master’s, and doctoral.

The Youth Services Institute (YSI) is committed to serving youth involved in the juvenile system. The institute oversees the operation of three juvenile programs — the Certified Therapist for Adolescents with Problematic Sexual Behavior (CTAPSB) program, the Continuum of Care Program (COCP), and the Trauma Systems Therapy (TST) program. Through agreements with the Alabama Department of Youth Services (DYS) and the Tuscaloosa Children’s Center, YSI provides assistance in the areas of:

* Program development and implementation
* Treatment consultation
* Practitioner training, development, and supervision
* Training needs assessments and the provision of training sessions
* Diversion grants and requests for proposals
* Program evaluation
* Grant proposals
* Research endeavors and data collection

**University of Alabama Libraries:** The University of Alabama has eight library facilities throughout its campus, comprising over 350,000 ft2 for users, collections, and technology. This includes five facilities administered by University Libraries, one facility administered through UA School of Law, one facility administered through the College of Community Health Sciences, and one facility administered through the Division of Student Life. These libraries are:

University Libraries (directed by the Dean of Libraries)

* Amelia Gayle Gorgas Library (main library; social sciences and humanities)
* Eric & Sara Rodgers Library for Science & Engineering
* Angelo Bruno Business Library
* W.S. Hoole Special Collections
* Libraries Archival Facility (remote storage) UA School of Law
* Bounds Law Library College of Community Health Sciences
* Health Sciences Library Division of Student Life
* Frances S. Summersell Library

These libraries provide innovative services, state-of-the-art library spaces, and high-quality information and technology resources to facilitate teaching, learning, and research throughout campus. University Libraries is committed to be student-centered and research-focused to support discovery, learning, and creativity. University Libraries seek to create an environment in which faculty and students have in-depth awareness of the wide variety of information resources available, the skills to evaluate and utilize them effectively, and a desire to pursue a life of continual learning. As an organization, University Libraries value:

* Providing excellent services and learning experiences for all members of the University community while promoting collaboration.
* Openness to a variety of voices and perspectives for exchanging information and ideas.
* Access to comprehensive scholarly information resources that support campus curricula and contribute to the impact of the research lifecycle.
* Assessment and continuous improvement of current practices with a culture of accountability.
* Training and technology that support innovation and entrepreneurship.

**Core Functions**

Campus libraries provide access to collections, technology, spaces, services, and other resources designed and maintained in support of teaching, learning, research, and the University’s broader mission to impact global communities. Library offerings on the UA campus align with established norms for doctorate-granting universities and support the research initiatives of students and faculty in numerous ways. “Norms” are established via peer comparisons across numerous performance indicators (PIs). These data are gathered annually by multiple organizations, including: The Association of Research Libraries (ARL), the Association of College & Research Libraries (ACRL), and the US Department of Education.

Vast research collections, including historical collections, are made available to library users via public access to physical library spaces, and virtually through various web properties maintained by campus libraries. These offerings are further buttressed by a variety of information services. This includes point-of-need and appointment-based research support services, as well as robust instructional program offerings supporting bibliographic research, information/data literacy, as well as computing tools and programmatic workflows for data-intensive, technology-infused research.

Technology-enhanced services and spaces are pillars of central importance to University Libraries. UA’s libraries employ numerous strategies to ensure the organization can effectively respond to the evolving needs of students and faculty, including:

* **Forming internal committees, working groups, and task forces** to foster discussion and planning that anticipates technology trends impacting teaching, learning, and research.
* **Maintaining dynamic, accessible, accurate, and timely web properties**, providing library users with 24/7 access to collections, services, and other resources.
* **Engaging in an ongoing program of assessment** to gain insights that support evidence-based planning and decision-making.
* **Facilitating effective research practices** related to the use of collections and technology through instructional programs and workshops offered to students, faculty, and staff.

Importantly, University Libraries is equipped to extend its comprehensive collections, advanced technology, and specialized services to support the academic endeavors of students and faculty, irrespective of their physical location. This includes potential support for off-campus instructional sites such as Westhill Institute and Dauphin Island Sea Lab, where programs in Education and Marine Sciences are offered. University Libraries’ robust infrastructure, including 24/7 access to digital resources, streamlined document delivery, and virtual research consultation services, ensures that all libraries are prepared to meet the needs of the University community, fostering access to information, and facilitating the University’s mission of knowledge dissemination across all learning environments.

**Collections**

University Libraries manages, and makes available to its users, an extensive research collection that is supplemented by hundreds of high-quality digital databases and collections. Local collections include over 5.7 million titles and nearly 6.1 million volumes. These collections are comprised of 3.3 million tangible monographic and serial volumes, encompassing 2.5 million titles—including over 2.1 million book titles, 72,000 serial titles, as well as 200,000 audio-visual, cartographic, and other media titles. Electronic resources account for an additional 3.3 million titles, which includes 2.8 million e-books, 247,000 serials, and 228,000 streaming media titles. In addition, University Libraries provides users with access to tens of millions of titles through various databases and shared collections whose holdings are not accounted for within these figures (e.g., the HathiTrust Digital Library, the Center for Research Libraries (CRL) Shared Digital Library, and federal government documents made available through GovInfo.gov and Data.gov).

Importantly, University Libraries supplements and enhances its local collections by leveraging a robust Interlibrary Loan (ILL) system, document delivery services, and reciprocal borrowing agreements. Through these initiatives, University Libraries provides access to a vast range of materials. For example, ILL services enable the borrowing of resources from libraries worldwide, ensuring that faculty, staff, and students have access to nearly limitless information resources. Additionally, partnerships with organizations like the Center for Research Libraries (CRL), the Association of Southeastern Research Libraries (ASERL), and HathiTrust further bolster these efforts through shared collections and reciprocal borrowing agreements (e.g., ScholarsTrust, Kudzu, etc.) that provide expedited receipt of needed materials within the region immediately surrounding the University of Alabama.

**Facilities**

Amelia Gayle Gorgas Library: he largest library on campus, Gorgas Library houses collections and services supporting the humanities, social sciences, education, and arts, as well as the regional depository collection of federal government documents. Space in the building, constructed in 1940 with an addition in 1969, is shared by Gorgas Library (eight floors) and the School of Library and Information Studies (one floor). Gorgas Library occupies 133,455 ft2 that are devoted to library collections and services.

Eric & Sara Rodgers Library for Science & Engineering: Built in 1990, the Rodgers Library for Science and Engineering consists of two floors and occupies 30,761 ft2. The library supports teaching, learning, and research in the College of Engineering, the Capstone College of Nursing, and in the sciences and mathematics in the College of Arts and Sciences.

Angelo Bruno Business Library: Bruno Library opened in 1994 and serves the students and faculty of the Culverhouse College of Commerce and Business Administration (C&BA), Culverhouse School of Accountancy, and Manderson Graduate School of Business. The Bruno Library shares one floor of the three-floor building with the Sloan Y. Bashinsky, Sr. Computer Center and occupies 43,500 ft2 (net). In 2022, this facility underwent a complete renovation that significantly expanded user spaces—supporting both solitary and group study.

Libraries Archival Facility (remote storage): The Archival Facility was constructed in 2003. Located near campus, the 40,522 ft2, climate-controlled facility has approximately 34,350 ft2 of high-density shelving.

Bounds Law Library: The Bounds Law Library is located on the first and second floors of the UA Law Center and occupies 55,833 ft2. The collection has 911,275 volumes in multiple formats and provides access to a wide range of online legal information. Nearly all items are available via Atticus, the Law Library’s online catalog. The library provides students, faculty, attorneys, and other users with a substantial research collection focusing on American, British Commonwealth, and international legal materials.

Health Sciences Library: The Health Sciences Library (HSL) opened in 1978 and is a unit of the College of Community Health Sciences (CCHS), a division of The UA School of Medicine (Tuscaloosa). In 2004, a new building for the School of Medicine was constructed, and the library moved to the lower level of that building, occupying 5,371 ft2 and containing 4,488 tangible volumes, with electronic access to tens of thousands more titles. HSL serves to assist CCHS in its mission and goals in health-related education, research, service, and rural health. The library recognizes and gives priority to the information needs of the School of Medicine, as well as UA related healthcare programs.

Frances S. Summersell Library: The Frances S. Summersell Library is located in the South Lawn Office Building. Its mission is to serve as a resource for UA and the community. The library has a growing collection of books, videos, magazines, journals, and resource files on a variety of topics. Individual seating areas are available.

**UA’s Office of Information Technology (OIT):** The mission of UA’s Office of Information Technology’s is to advance research, teaching, learning and operations at The University of Alabama by providing exceptional technology services and support to students, faculty, and staff. OIT’s Research Computing team supports UA researchers in AI, Machine Learning, High Energy Physics, Health Informatics, Gene Sequencing, Hydrologic Modeling, Molecular Dynamics, Digital Humanities, and many other categories of research computing. Our current primary research computing services include:

1. High Performance Computing (HPC): The University of Alabama supports two advanced research computing clusters, UAHPC and CHPC. The University of Alabama High-Performance Computer (UAHPC) is a dynamically configured cluster comprising nearly 100 nodes, 3408 CPU cores, and 10 GPUs, delivering a combined single-precision computational power of 342.88 TFLOPS. Additionally, it houses 624 GB of GPU memory. This adaptable infrastructure offers substantial computing capabilities, enabling varied research applications within the University of Alabama’s academic community. UA’s NSF-funded CHPC cluster is composed of 31 nodes, housing 1920 CPU cores and 5 GPUs, theoretical sustained single precision performance exceeding 170.69 TFLOPs. Nearly 1.5 Petabyes of HPC-attached storage is available for researcher use.
2. Research Data Storage: OIT offers data storage, backup, and recovery strategies that align with multiple research data requirements. For data storage requests beyond the scope of current storage availability, OIT can help researchers find cost-effective cloud or alternative data storage options.
3. Geographic Information Systems (GIS): OIT partners with Esri, the global market leader in Geographic Information System (GIS), to support campus researchers and departments with geographic science and geospatial analytics. In addition to online and desktop resources, OIT maintains a GIS platform and consultation services for researcher project development and portal hosting.
4. Virtual Servers: OIT offers Windows and Linux virtual machines (VMs) running on VMWare for your research application, database, or web portal development and hosting. VM images and data are replicated to OIT’s backup systems in Atlanta for backup and recovery support.
5. Cloud Research Computing: OIT supports researcher access to Google, Amazon Web Services, and Microsoft Azure cloud platforms. For research requiring a secure data enclave with NIST 800-171 sensitive research data storage and compute, OIT offers UAResCloud, a Microsoft Azure GovCloud High (GCC) environment.
6. HPC Facility: OIT and the Alabama Cyber Institute are jointly designing and building the new UA HPC Facility to be opened in late 2026. The Facility will host a new leader-class HPC cluster as well as provide data visualization audio-visual technology, advanced data center infrastructure, and conferencing spaces for researchers.

**UA Security Policies and Practices:** UA maintains a unified and comprehensive privacy and information security program that preserves and protects the confidentiality, availability and integrity of all information assets including patients, research, customer, and business data. The integrated security program upholds values and provides high standards of service, trust, confidentiality and responsiveness to patients, customers, employees, and business associates. The security program includes the following:

* IT security policies designed to help ensure a secure state of operations and information management.
* Technical security standards that document baseline security requirements for technologies and platforms such as major operating systems, databases, network device operating systems, firewalls, web-server security, email, encryption, secure file transfer protocols, virus defense, media reuse and media disposal.
* A comprehensive risk management program.
* A computer security incident response plan that is supported by cross-functional response and recovery teams.
* User system access is tightly controlled and meets standards required by various regulations and accrediting agencies such as HIPAA, JCAHO, and CAP. Two-factor authentication is utilized for many of the shared systems. Users must agree to maintain password confidentiality, log-off terminals at the end of each user session, and alert management when security violations become known. We also must routinely demonstrate compliance with Federal granting agencies and the corresponding security requirements.
* An Institutional Firewall for perimeter and layered protection.
* Capability to support encrypted secure file transfers.
* Virus protection agents and comprehensive patch management programs installed on all computer workstations and servers to protect against malware infections.
* Whole disk encryption software is required for all laptops.
* In-depth security training that is provided for all Faculty, Staff, and students.

**UA OIT Datacenter Physical Controls:** The datacenter itself is keycard protected and limited to a small set of trained personnel. The outer perimeter, datacenter entryway, and racks themselves all are locked and protected by swipe card access. The entire facility is also monitored by security cameras that record all movement to an isolated network video recorder (NVR). It is staffed during normal working hours and monitored for intrusion 24x7x365 using both motion detection and video surveillance. It has a waterless (FM-200) fire suppression system that is regularly checked and serviced along with the integrated fire detection system. All equipment power is protected by a UPS system and generator. The facility is cooled by multiple industrial HVAC units that are also generator protected. The facility includes a moisture-detection system.

**Workstation Physical Controls:** For approved users with SQL Server database access, they will access the data from their workstation, which are in offices that are secured by either physical key or keycard access.

**Technical Controls – firewalls, VPN, and two-factor authentication:** UA employs many protective network measures including firewalls, intrusion detection systems, log systems, and log analysis systems. UA OIT has well defined policies for network access control measures and this project will adhere to and build upon those rules. Establishing a virtual private network (VPN) connection will be a requirement to connect to the SQL Server database. The VPN employs two-factor authentication (username & password + Duo Security rolling token) to login. This two-factor authentication requirement helps mitigate the risks of remote terminal or stolen password attacks.

**Administrative Controls:** Least socioaccess is a core policy of OIT, and in addition to limiting access to only personnel with a well-defined need, this project will also ensure that personnel have appropriate training before any data is accessed. The UA campus network incorporates a defense-in-depth model and provides logical isolation for research data resources using two levels of firewall protection operating in MPLS network architecture. Users are authenticated through LDAP and Active Directory as appropriate to the system and applications. Data resources will be secured to the individual user level.

**Encryption:** The SQL Server database, where the data resides, employs Microsoft’s Total Database Encryption (TDE). In addition to TDE, the server itself and any connecting machine or transmittal medium for the data employs encryption on the hard drives. Any transmission or movement of such data occurs over an encrypted medium. Encrypted drives will be utilized at both the desktop and server level and any USB transport of data occurs over a hardware encrypted drive.

**Data Destruction**: From a data destruction standpoint, a DoD 5220.22-M tool like Eraser or BitKiller is used to fully remove data from the server when no longer needed and at the completion of projects. These tools overwrite sectors of a hard drive multiple times to ensure data is fully deleted.

**Affiliated Hospital Programs**

**DCH Regional Medical Center:** DCH Regional Medical Center has been the cornerstone of the DCH Health System since 1923. DCH Regional Medical Center operates specialty units for cardiac and cancer patients, as well as the region's advanced trauma center and Intensive Care Units (ICU).

Physicians at DCH Regional Medical Center use many of the latest surgical techniques that require less recovery time, including microsurgery, laser surgery, laparoscopic and robotic surgery.

From the introduction of open-heart surgery in West Alabama in 1978 to today's development of procedures that can dissolve blood clots without surgery, physicians at DCH Regional Medical Center offer patients many of the latest advances in cardiovascular care.

The Phelps Outpatient Center at DCH Regional Medical Center offers the region's most comprehensive range of services in a private and personalized setting designed for patient convenience.

At the Lewis and Faye Manderson Cancer Center, physician specialists in hematology, medical oncology and radiation oncology lead a dedicated team of nurses and technicians who provide advanced treatment and emotional support.

Other services available at DCH Regional Medical Center include the DCH Home Health Agency and DCH Home Medical Equipment.

The Women's Center at DCH Regional Medical Center offers rooms decorated in a home-like atmosphere, and two-room suites and private accommodations are available. The Women's Center is staffed by an impressive team of professionals with the training, experience, and compassion to make the birthing experience safe and enjoyable.

**DCH Northport Medical Center:** Northport Medical Center has been a part of the DCH Health System since 1992. The facility houses several important specialty services, in addition to the full range of inpatient and outpatient services you expect from a community hospital.

The Comprehensive Joint Program uses the latest technology to ensure the best possible outcomes for our patients who are having, and recovering from, joint replacement surgery. Our designated units are designed specifically and exclusively for our joint replacement patients. They include a team of health professionals who oversee care from before surgery to months after.

The DCH Rehabilitation Pavilion uses the latest advances in rehabilitative care to help patients with spinal cord injuries, head injuries, strokes or other neurological or orthopedic disorders return to independence.

North Harbor Pavilion offers safe and therapeutic programs for both adults and geriatric individuals who are experiencing symptoms that require inpatient psychiatric treatment and care.

The Women's Pavilion at Northport Medical Center has one of the most progressive and modern obstetrical units in the West Alabama area. At the Women's Pavilion, a mother can stay in the same comfortable, well-equipped room from the time she arrives until the day she goes home.

The DCH Sleep Center, directed by Dr. James Geyer, is a 20-bed fully accredited sleep medicine center conducting clinical and research trials. The program has conducted federally funded and industry trials.

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| UNIVERSITY OF MISSISSIPPI MEDICAL CENTER |

**FACILITIES AND OTHER RESOURCES**

The University of Mississippi Medical Center is the state's only academic medical center located in the heart of Jackson – Mississippi’s capital city. UMMC’s three-part mission is to improve the lives of Mississippians by providing a wide range of patient-centered care programs, by conducting innovative, translational research, and by educating tomorrow’s health care professionals. Employing over 10,000 staff members, UMMC is one of the largest employers in Mississippi.

The campus of UMMC includes seven schools including medicine, nursing, dentistry, health-related professions, graduate studies, population health, and pharmacy and is the sole provider in Mississippi for baccalaureate, graduate, and professional degrees in disciplines such as allopathic medicine, dentistry, physical and occupational therapy, and population health sciences. Offering over 35 programs of study, the wide variety of offerings leads to careers that are in increasing demand in Mississippi and across the nation. Enrollment in all programs totals more than 3,000 students, not including over 530 residents and fellows receiving graduate medical training.

As one of UMMC's three interlocked missions, research keeps our faculty, staff, and students at the cutting edge of their fields and deepens scientific knowledge, improving the lives of Mississippians and beyond. From world-renowned studies on heart disease, diabetes, and hypertension to advanced treatment for cancer and the most complete simulation program of human physiology ever created researchers at the University of Mississippi Medical Center are unraveling the diseases that disproportionately affect Mississippians and translating findings into care.

UMMC is also a leader in population health and telehealth as well as home to The Jackson Heart Study, now in its 21st year. UMMC is also one of four sites for the Atherosclerosis Risk in Communities (ARIC) study, one of the largest prospective epidemiological studies in the world. Designated as a HRSA Center for Telehealth Excellence in 2017, UMMC is leading the charge in expanding and refining telehealth services, especially in rural parts of the United States.

UMMC opened its state-of-the-art inpatient and outpatient clinical trials unit in August 2019. The 22-bed facility is complete with infusion suites, interview rooms, and bariatric and negative pressure capabilities. The unit is staffed with clinical and research nurses and coordinators and can provide care for research participants 24 hours, seven days of the week.

With a growing student population, competitive programs, and superior faculty and health care providers, UMMC is achieving its mission of excellence in education, research, and patient care daily.

**Facilities**

**Specialty Clinics and Services**

UMMC features the broadest range of specialty care in Mississippi. These services include:

* Children’s Cancer Clinic;
* a heart station for diagnosis and treatment of heart disease;
* a heart failure clinic;
* Mississippi’s only transplant center with heart, kidney, liver, pancreas, cornea and bone marrow services;
* a comprehensive stroke unit;
* state-of-the-art radiological imaging systems;
* a sleep disorders laboratory;
* an in-vitro fertilization program;
* a Clinical Research and Trials Unit; and
* Air Care Service (helicopter transport) across Mississippi.

**University of Mississippi Medical Center and Health System**

University Health System’s flagship hospital is an 864-bed system comprised of 6 hospitals and more than 50 ambulatory facilities across the state. The flagship hospital, the University of Mississippi Medical Center, is located in central Mississippi.  It offers a complete range of primary and specialty care and is home to the state's only Level 1 trauma center. The facility provides patients with the latest in medical research, technology, and service advancements including TeleER services for community hospitals across the state and the 70-bed Wallace R. Conerly Critical Care hospital, encompassed in University Hospital. The Critical Care hospital provides specialized intensive care for medical, cardiac, surgical and neuroscience patients. Specialty services include complete cardiac care, a stroke unit, an artificial kidney unit and Mississippi’s only transplant center with heart, kidney, liver, pancreas, bone marrow and cornea services. Critical care services also include the only eICU program in the state**.**

**University Physicians Clinics**

In addition to our hospitals, UMMC includes University Physicians, the state’s largest medical group representing more than 125 specialties. This network of providers includes more than 1,000 health care specialists and subspecialists. University Physicians caregivers see patients statewide through our hospitals, clinics, and telehealth locations. Most physicians also serve the future of medicine in their dual roles as UMMC faculty by coordinating groundbreaking research or teaching tomorrow’s health care leaders**.**

**UMMC Grenada**

Residents of Grenada County and the region receive high-quality care close to home. Our hospital and our outpatient clinics provide a broad range of health services to adults and children, including a labor and delivery unit, abdominal transplant clinic services and specialty care available only through the state's sole academic medical center.

**UMMC Holmes County**

UMMC Holmes County, a 25-bed critical access hospital, provides medical outreach through services and clinics in Lexington.

**Jackson Medical Mall**

Just one mile west of campus, the Jackson Medical Mall houses the hospital's ambulatory specialty clinics, the UMMC Cancer Institute, and a comprehensive tobacco cessation program.  It is also home to several ongoing studies, including the NIH-funded Jackson Heart Study.

**Center for Telehealth**

For over a decade, UMMC has been a leader in telehealth with over 200 sites across Mississippi. In 2017, UMMC was recognized as one of only two federally designated Centers of Excellence in Telehealth by the Health Resources and Services Administration (HRSA). With this designation we are tasked to explore innovative ways to advance the modern practice of telemedicine. The UMMC Center for Telehealth serves as a national clearinghouse for telehealth research and resources and provides telehealth services through smartphone apps and partnerships with schools, companies, clinics, and other healthcare providers. The Center for Telehealth is located in Ridgeland, MS in the CSpire building. UMMC works directly with CSpire, an advanced technology company based in Mississippi that delivers customer-inspired, nationwide wireless network services and business solutions, to expand broadband access across the state to improve healthcare access in rural areas. The Center for Telehealth offers care in over twenty specialties including emergency medicine, cardiology, psychiatry, and newborn medicine.

**Translational Research Center**

The $50 million, 124,852 square-foot Translational Research Center was completed in 2017 and includes the Gertrude C. Ford MIND Research Center, the John D. Bower School of Population Health, the Neuro Institute, research administration offices including the Intellectual Property and Commercialization office and a 12-suite incubator facility. Designed to help researchers translate scientific discoveries into therapeutic interventions, the building features state-of-the art clinical research, lab, meeting, and office space.

**Arthur C. Guyton Research Center**

The Guyton Research Center provides over 270,000 square feet of state-of-the-art laboratory research space to UMMC investigators. The Center houses several research department and centers including the Mississippi Center for Clinical and Translational Research (MCCTR), Mississippi Center for Obesity Research, the Cardiorenal and Metabolic Diseases Research Center, the Mississippi Center for Excellence in Perinatal Research, The Center for Psychiatric Neuroscience and the UMMC Cancer Center and Research Institute. The Guyton Research Center is also home to the Center for Comparative Research which provides animal procurement, husbandry, and training services to all UMMC investigators.

**Clinical Research and Trials Unit**

The Clinical Research and Trials Unit (CRTU) includes locations in 7South and 2East of University Hospital, the University Rehabilitation Building, and the Cancer Center and Research Institute at the Jackson Medical Mall. Construction for the Phase I unit on 7South was completed in August of 2019. This new state-of-the-art facility includes 22 inpatient/outpatient rooms, a research pharmacy, two isolation rooms, a bariatric isolation room, an infusion center, sample processing lab, and interview rooms, along with areas for nurses, coordinators, and investigators. The CRTU has access to all of the institutional resources necessary to facilitate clinical research of the highest safety and quality standards.

**Clinical Research Support Program**

The Clinical Research Support Program (CRSP) building, located adjacent to the main campus and easily accessible by interstate and state highways. Ample free front-door parking is available for clinical trial participants. The 8,000-square-foot CRSP facility comprises a reception area, 18 examination rooms, two laboratories for phlebotomy and storage of supplies, two conference rooms, and private offices/cubicle workstations. The following equipment is housed in the CRSP and is at the disposal of the project investigators: a Thermo Electron Revco -80oC upright freezer, a So-Low C85-5 -85oC ultra-low chest freezer, several centrifuges (Eppendorf 5702R, Fisher Scientific Centrific 228, Clay Adams Dynac), a biohazard refrigerator, several mercury sphygmomanometers, one Healthometer and one Detecto 350-lb. capacity balance scales, and a Seca stadiometer. The facility also provides secure storage of study records, a photocopier, paper shredder, fax machine, several networked laser printers, and desktop computers networked to the internet and to UMMC’s intranet.

**Research and Sponsored Programs**

**The Office of Research and Sponsored Programs (ORSP)**

The ORSP reviews and submits extramural proposals and contracts for research, instructional and service activities. The primary functions of the office are to: assist faculty with budgets and other business requirements of proposals; receive, review and negotiate changes in grants and contracts; serve as a source of information with regard to grant/contract procedures and regulations; ensure that policies and procedures are followed, administer the intramural research grants program; and coordinate all aspects of electronic research administration. The ORSP provides oversight and staffing for activities focused on compliance with regulations for research involving humans, vertebrate animals, biohazardous agents and radiation/laser safety. It also coordinates, along with the Office of Integrity and Compliance, management of conflict of interest, financial disclosure, and scientific integrity issues. The unit also serves the administration of the University by implementing policy decisions affecting grants and contracts, by protecting the University's interests in interaction with sponsoring agencies, as well as internal review of grant/contract matters, and by providing information concerning proposal and award activity.

**Grants and Contracts**

Day-to-day accounting transactions for sponsored programs are processed through Grants and Contracts under the direction of the Comptroller. UMMC has a long history in managing Federal awards and has a thorough understanding of Federal requirements. UMMC functions as a prime recipient or as a contractor with other state offices and institutions. As a prime recipient, UMMC also manages funds under formal subcontracting mechanisms with organizations and institutions across the country and has a history of managing federal contracts that have multiple field sites and/or cooperative partners for the conduct of clinical trials or long-term epidemiological studies. The State of Mississippi Audit Office conducts annual audits that meet State and OMB A-133 guidelines.

**The Office of Clinical Trials (OCT)**

The mission of the OCT is to facilitate the efficient activation of clinical trials and to develop and maintain partnerships with trial sponsors, with the objective of attracting high-impact trials to UMMC. The OCT contributes to the UMMC clinical research enterprise by serving as a trusted central resource for investigators, coordinators, and administrators throughout the clinical trials lifecycle. The OCT centralizes clinical research administration and optimizes the clinical trials process, from activation to closeout, providing the following services for the UMMC research community: contract and budget negotiations; clinical trial project management; data solutions and training; recruitment support; and regulatory submission assistance, among others. In particular, the OCT oversees the clinical trial lifecycle, to include contract and budget negotiations, billing, collections, and close-out, facilitating integration among business units and communications with trial sponsors, ensuring timely activation of studies. The OCT will also manage the *Velos* clinical trials management system, assisting study coordinators with creation and maintenance of study records in the system, effectuating oversight and analytics on UMMC’s clinical research portfolio. The OCT will also enhance recruitment efforts via maintenance of a robust, searchable online clinical trials database and facilitation of recruitment of individuals who have indicated their interest in being contacted about participation in a research study.

**Research Support and Core Facilities**

**Assay and Analytical Core**

The Assay and Analytical Laboratory, located on the fourth floor of the Arthur C. Guyton Research Center, is operated by the Department of Physiology and Biophysics. Supported by a knowledgeable staff, the facility provides support for various radioimmunoassays, enzyme-linked immunoassays (ELISA), molecular, and chemical analyses. These facilities and services are available to faculty at UMMC and other educational and research institutions on a fee-for-service basis.

**Analytic Ultracentrifuge Core**

The Analytical Ultracentrifuge Facility is located in the Department of Biochemistry, G208-G209, in the Guyton Research Building. The facility includes a Beckman XLA Analytical Ultracentrifuge equipped with absorption optics, an AVIV FDS system for fluorescence detection, an Anton Paar DMA 5000 for density measurements, and an Anton Paar AMVm micro viscometer. The services are available to faculty at UMMC and other education and research institutions on a fee-for-service basis.

**Animal Behavior Core**

The CPN Animal Core provides brain tissue from animal subjects that have been treated either pharmacologically or behaviorally in a manner that allows CPN investigators to address the specific aims of their individual projects. To allow the assessment of the effects of long-term antidepressant exposure on central nervous system parameters, animals are treated long-term with fluoxetine and sacrificed for postmortem studies of changes in the brain.

**Animal Imaging Core**

The Animal Imaging Core Facility has advanced imaging technology that allows investigators to accurately monitor the development of tumors growing within animals. These tools allow our researchers to monitor more than the size of the tumor, these technologies provide detailed insight into some of the molecular and biological events occurring inside the animal. This core facility allows us to obtain so much more information from our experiments than traditional tumor measurements could provide. These instruments include:

* IVIS Spectrum animal imager system (Caliper Life Sciences)
* Proscan 2 Ti-U Microscope with time-lapse real-time video capacity (Nikon)

**Biomedical Materials Science Laboratories**

Biomedical Materials Laboratories are available for the development, processing, and characterization of a broad range of materials (metals, polymers, ceramics, composites) with a wide range of properties (physical, mechanical, electrochemical, biological) and at all levels of interest – from atomistic to macroscopic. Core laboratories include facilities for tissue engineering, histology, computer modeling, metallography, corrosion, wear, fast fracture, fatigue, and failure analysis. Together, these laboratories cover approximately 5,500 square feet of the first and fifth floors of the School of Dentistry. The services are available to faculty at UMMC and other education and research institutions on a fee-for-service basis.

**Center for Comparative Research**

The Center for Comparative Research is a centrally administered organization responsible for the care and maintenance of laboratory animals used in research.  The CCRF provides the management and resources necessary to maintain full accreditation by the Association for Assessment and Accreditation of Laboratory Animal Care International. Efforts by the CCR are 100% service-based to UMMC’s animal-based research programs. Support functions include daily animal, husbandry requirements, animal quarantine and conditioning programs, animal surgical and anesthetic support, laboratory animal veterinary medical care programs, and regulatory support (IACUC, OLAW, USDA).

The CCR operates five distinct animal environments on the medical center’s campus.  Animal housing and support space for studies are located primarily in four areas on the UMMC campus:

1. The Arthur C. Guyton Laboratory Research Building

2. The Arthur C. Guyton Laboratory Research Center

3. David Pankratz Research Wing

4. James D. Hardy Clinical Sciences Building.

5. Translational Research Center

Total animal housing and support areas are approximately 44,000 ft2

Approx. Sq. ft. animal care & use:  19200 ft2

Approx. Sq. ft. support space:  24800 ft2

Arthur C. Guyton Laboratory Research Building

Total gross sq. ft. = 11,604

Net sq. ft. animal housing space = 5,199

The Guyton Building laboratory animal facility is designed as a conventional resource used for animal housing and support. Adjacent to the animal facility is the central CCROffice. Loading and off-loading docks adjoin a gated courtyard. There are a total of 28 individual animal rooms; a large surgical suite (two operating rooms with prep and equipment areas and veterinary laboratory for supplies & equipment), a feed/bedding storage area, a cage sanitation facility (clean & dirty side), several ancillary storage spaces, and small office and employee break room.  The surgical room has an Amsco gravity sterilizer.

Arthur C. Guyton Laboratory Research Center

Total gross sq. ft. = 15,381

Net Sq. ft. animal housing space = 6407

Net Sq. ft. animal imaging core = 1,200

The Guyton Research Center is contiguous with the Guyton Research Building and serves as the primary rodent housing facility for the institution.  Rats and mice are housed in ventilated microisolator housing in barrier or modified barrier areas.  Several suites of rooms are found whereby closely associated studies are housed in the same relative environment.  A total of 21 individual animal rooms are found, as well as an expansive cage sanitation and processing area, bulk sterilization equipment, and veterinary procedural laboratories.  The CCR central administrative offices are located in this area.  The facility includes an animal imaging area with an IVIS Spectrum in vivo imaging system.  Additional space is available for expanded animal imaging equipment.

David S. Pankratz Research Wing - 8th Floor Laboratory Animal Facilities

Total gross sq. ft. = 12,358

Net Sq. ft. animal housing space = 4,668

The 8th Floor facility is utilized for conventional housing, as well as the capability to maintain animals in ABSL-2 infectious disease studies. It is also used as a rodent barrier environment for the maintenance of immunocompromised animals. There are two office spaces for veterinary and facility management, a total of 37 individual animal rooms, a small barrier facility (with a positive pressure entry vestibule and 6 cubicle designs, and a biological safety cabinet which provides a work area), a hazardous material containment area (with negative pressurization and entry vestibule and necropsy room), a large surgical suite (operating room, prep areas, veterinary lab & patient ICU), a feed/bedding storage area, cage sanitation facility (clean & dirty side), several ancillary storage spaces, and an employee break area with shower/locker facilities. Steris/Amsco vacuum sterilizer is in the surgery area.

James D. Hardy Clinical Sciences Building

Total gross sq. ft. = 1,432

Net Sq. ft. animal housing space = 287

Designated as a genetically altered mouse core facility, this area contains small space for animal housing, a cage sanitation area, and a laboratory space for genetic manipulations.

Aquatic Animal Facility

Total gross Sq. ft. = 2,818

Net Sq. ft. = 2,681

This area serves as an aquatic housing environment.  Rooms are designed to house and maintain fish species. It has design capabilities for flow-through water systems, raceways and infectious disease challenge.  One adjacent room serves to maintain reagents, supplies and pharmaceuticals.

Anatomy Surgical Suite

(Dept. of Anatomy participates with CCR in management of this room)

Total gross sq. ft. = 505

Net sq. ft. = 505

This facility serves as a neurosurgical operating room. UMMC has a properly constituted Institutional Animal Care and Use Committee (IACUC), as per the PHS Policy and the auspices of the USDA Animal Welfare Regulations. The IACUC formally meets on a monthly basis. The committee is responsible for overseeing the entire animal care and use program, with special emphasis on animal protocol management, semiannual reviews and inspections, personnel training and related research compliance. The committee is chaired by Dr. Robert Hester, Professor of Physiology and Biophysics and has membership totaling 25 persons.

**Confocal Microscopy Core**

The Confocal Microscopy Core, located on the second floor of the Arthur C. Guyton Research Building, is primarily an equipment core, though all users must be pre-approved and pass through a training course before they are allowed to use the state of the art equipment. This equipment includes a Leica TCS-SP2 laser scanning confocal upright microscope. The system has 3 separate lasers (488/546/633 nm) for use along with 3 standard visible length fluorescence dyes and transmitted light. This confocal microscope is capable of imaging standard fluorescence dyes within the visible spectra including FITC/TRITC, CY2/CY3/CY5, green fluorescence protein variants (GFP/YFP/RFP/DsRed) and several different indicator dyes (i.e. Ca 2+, pH, membrane potential, oxidative stress, etc).

Capabilities of the Confocal Microscopy Core include:

* Standard confocal microscopy with simultaneous or sequential image collection
* Line scan and Z-scan modes
* 10X, 20X, 40X, 40X oil, 60X oil and 100X oil objectives
* Transmitted light detection
* Tunable filter
* Time lapse
* FRET/FRAP (Fluorescence resonance excitation transfer/ Fluorescence recovery after photo bleaching)
* 3D Reconstruction

**Equipment Repair**

The Equipment Repair Facility is a locally owned company called Phoenix Technical Services (PTS), which works with the Medical Center to provide on-site integrated repair and preventative maintenance services. A technician is present at the Medical Center every Tuesday, and the company is available on an on-call basis other days of the week. PTS is capable of working on a variety of different instruments including large systems and refrigeration components. They also provide limited custom fabrication and modification services.

**Flow Cytometry Core**

The UMMC Cancer Institute Flow Cytometry Core Facility, located on the 6th floor of the Research wing, provides state-of-the-art flow cytometry analysis and related services to the UMMC research community and affiliated institutions. We provide flow cytometry analysis and sorting, as well as consultation for experimental design and data interpretation. A trained operator is available to assist with instrument set-up as well as running and analysis of your samples. Prior to scheduling their first appointment, investigators must meet with the facility staff to discuss experiment plans to avoid potential pitfalls and optimize the time spent on the machine(s). In addition, a training course consisting of individual help sessions tailored to your specific needs is available upon request.

**Histology Core**

The Histology Core Facility offers a variety of services including general histology, specialized histological staining, immunohistochemistry, light microscopy and image analysis. Training in various techniques is also available. The services are available to faculty at UMMC and other education and research institutions on a fee-for-service basis.

**HPLC/Mass Spectrometry Analytical Core**

The HPLC/ Mass Spectrometry Core occupies approximately 1800 square feet of laboratory and office space in rooms R414, R416 and G477. The core provides the instrumentation and analytical expertise to perform quantitative analysis of a variety of endogenous compounds including: lipids (prostaglandins, isoprostanes, and Cyp eicosanoids), catecholamines, creatinine, carbon monoxide, citrulline assay (NOS activity), steroid hormones and circulating peptides (angiotensin II and Ang1-7). Major equipment includes four HPLC systems equipped with UV, fluorescence, radioactive and light scattering detectors, two liquid chromatography/tandem mass spectrometer systems (LC/MS/MS), a gas chromatograph/quadrapole mass spectrometer (Voyager® Thermo Scientific), and a gas chromatography system (Agilent) with FID, electron capture or phosphorus detectors. The LC/MS/MS systems consist of ABSCIOEX QTRAP® 4000 and 5500 systems each equipped with Dionex® HPLC systems and temperature-controlled auto samplers. The 4000 LC/MS system was installed in March 2010 and has been optimized for the identification and quantification of drug and drug metabolites, xenobiotics, lipids and steroids. The 5500 LC/MS/MS system was installed in June 2010 is optimized for proteomic identification of peptides and proteins, quantitative analysis of peptide/protein concentrations and the identification of posttranslational modifications of proteins. The core staff has extensive expertise to develop new analytical procedures and provides instruction in sample collection and storage, extraction and data interpretation.

**Library Services**

Rowland Medical Library provides access to knowledge-based resources for students and faculty. The library acquires, preserves and manages print and electronic resources in the biomedical and health sciences to support the educational, research and clinical mission of the University of Mississippi Medical Center. Rowland Medical Library is located in the second and third floors of the Verner Smith Holmes Learning Resources Center, built in 1981. Occupied in July 1982, the library has 55,612 square feet and provides seating for 420 users. The library provides wireless network access for individual study and research.

Rowland’s collection numbers slightly more than 250,000 print books and bound periodicals, with total holdings of 310,000 volumes. Rowland has access to more than 4800 e-journals in health sciences and many other titles outside the stated scope of the library. Rowland Medical Library accesses titles not owned through interlibrary loan and document delivery services. Rowland serves as a Resource Library within the National Network of Libraries of Medicine for the Southeastern/Atlantic region and is a member of various consortia for services and purchasing.

The facility is open every day for a total of 105 hours per week. Patrons access holdings through the library webpage which is available 24 hours every day. Informational and instructional services are available in person or via telephone, email, or IM.

The scope of the collection includes the core biomedical sciences, related sciences, selected social sciences and humanities to support the medical center programs in education, research, and health care services. Faculty and staff are encouraged to submit requests for library acquisitions.

Library Faculty Advisory Committee is chaired by the Associate Vice Chancellor of Academic Affairs charge is to “broadly represent the Medical Center faculty in advising the director of Rowland Medical Library on the selection and provision of library resource services and materials.”

**Molecular and Genomics Core**

The Molecular and Genomics Facility occupies approximately 1,100 square feet of laboratory space and is well-equipped to perform genetic and genomic analysis on human and several model organisms, including rat and mouse. The core facility is experienced in all aspects of molecular biology, quantitative RNA analysis and genotyping. This facility was established through a BRIN grant and is currently supported by an INBRE grant to the Mississippi Functional Genomics Network (MFGN, University of Southern Mississippi). The facility is located on the 6th floor of the Arthur C. Guyton Research Center.

**Research Data Warehouse/Patient Cohort Explorer**

The Patient Cohort Explorer (PCE) is UMMCs’ self-service online application that allows faculty, staff, and students direct access to a fully de-identified dataset. These data points are compiled from UMMC's Research Data Warehouse (RDW), which includes Epic data from all UMMC hospitals and clinics. With data from over 800,000 patients accounting for over 31.2 million encounters, demographics, admission, procedure, medication, lab, and diagnosis data can be queried via the system without IRB approval. The PCE allows for exports to several formats to assist with data analysis. An honest broker request system is in place to request limited data sets for research, quality improvement, and other initiatives.

**Transgenic Core**

The Transgenic Core provides mouse genotyping and embryo freezing services for the research community of the University of Mississippi Medical Center. It provides interested investigators help in the design of PCR primers for genotyping of transgenic or gene-targeted mice. The transgenic core also provides protocols and reagents for the isolation of DNA from mouse tails for genotyping. It also performs mouse embryo freezing services for the research community including: appropriate hormone treatment of mice, collection of fertilized mouse embryos, embryo freezing and storage.

**UMMC Biobank**

The Tissue Microarray/Biobanking Core Facility serves as a bridge between basic scientists and real cancers affecting real patients. While clonal cell lines used in laboratory research are vital for many types of experiments, they cannot substitute for the variety of cancers seen in our patient population. There are many reasons for this. For one thing, not all cancers can survive in the lab once removed from a patient's body, and so existing clonal cancer cell lines represent only a tiny fraction of all cancers. Secondly, cancers in the human body are not simply masses of identical clonal cells. In fact, cancerous tumors have a more complex structure containing a variety of cell types, both cancerous and non-cancerous. Third, obtaining cancer samples directly from our patients allows us to study the biological aspects of one of Mississippi's most pressing cancer control problems, the problem of population-based cancer outcomes. Finally, with the proper equipment our researchers can now search for rare cell types known as cancer stem cells (or tumor initiating cells) which appear to be the key to understanding cancer metastasis, drug resistance, and other difficult scientific challenges that have prevented us from truly curing all cancers.

The Tissue Microarray/Biobanking Core Facility provides researchers with biological cancer specimens in a very efficient manner. All samples are collected, processed and distributed in strict accordance with protocols that have been reviewed and approved by the UMMC Institutional Review Board. Assuring absolute privacy and uncompromised medical care for our tissue donors is our highest priority.

This equipment includes:

* Tissue Microarray MTA1 (Beecher)
* Cellsearch Circulating Tumor Cell System includes a CellTracks® AutoPrep® System

**Long Term Epidemiologic Studies**

**The Jackson Heart Study**

The Jackson Heart Study (JHS) is a multifaceted project sponsored by NHLBI and NIMHD. Developed in response to differences in cardiovascular health outcomes, JHS involves three Jackson institutions of higher learning: UMMC, Jackson State University, and Tougaloo College. The 5,300 members of the JHS cohort have undergone a detailed evaluation of their cardiovascular health status through clinical testing (e.g., anthropometrics, BP, ankle-brachial BP index, echocardiograms, ECG, carotid ultrasound, and extensive blood testing for known and putative risk factors for CVD). Through extensive interviews, information is collected on participants’ medical history, habits and health behaviors, and several social and psychological variables that may impact health. Data from three completed exams are now being analyzed. Genetic analysis in the JHS is being pursued across a broad front. The overall JHS cohort of 5,300 participants includes a nested family cohort of 1,499 members of 291 families. DNA of each participant in the family cohort has been genotyped for a set of ~400 microsatellite markers (Marshfield marker set 16), and all consenting participants (n=3,443) have been genotyped for genome wide association studies and have undergone Exome Sequencing and joint calling. We have just received notification of funding for deep coverage *whole genome* sequencing of DNA of *all* consenting JHS participants (3,443 less any cases where DNA stores are depleted [<20 samples]).

**The Atherosclerosis Risk in Communities Study**.

The Atherosclerosis Risk in Communities (ARIC) Study is a prospective epidemiologic study conducted in four U.S. communities. ARIC is designed to investigate the etiology and natural history of atherosclerosis, the etiology of clinical atherosclerotic diseases, and variation in cardiovascular risk factors, medical care and disease. ARIC includes two parts: the Cohort Component and the Community Surveillance Component. The Cohort Component began in 1987 and is ongoing. Each of the four ARIC field centers (Mississippi, North Carolina, Minnesota, and Maryland) manages a randomly selected and recruited cohort sample of approximately 4,000 individuals aged 45-64 from a defined population in their community. Thomas Mosley, PhD, serves as principal investigator for the Mississippi site. A total of 15,792 participants received an extensive examination, including medical, social, and demographic data. In addition, two large, multi-site studies related to the ARIC cohort are underway. The ARIC MRI and Neurocognitive Longitudinal Study is designed to identify risk factors for brain aging. The ARIC Carotid MRI study is a new cohort study designed to identify biomarkers associated with plaque development in the carotid artery. Dr. Mosley also serves as principal investigator for these studies.

**The Risk Underlying Rural Areas Longitudinal Cohort Study**

The Risk Underlying Rural Areas Longitudinal (RURAL) Cohort Study is a new six-year project seeking to identify why people in the rural south may live shorter and less healthy lives. Focusing on 10 rural counties in Alabama, Kentucky, Louisiana, and Mississippi, the research team will examine about 4,000 residents to study heart, lunch, blood, and sleep (HLBS) disorders. With funding from the National Heart, Lunch, and Blood Institute, the multi-site prospective study will include 50 investigators from 16 institutions. Dr. Ervin Fox, Professor of Medicine at UMMC, will serve as the Principal Investigator for the Mississippi sites.

**Other Research Resources at UMMC**

**Mississippi Center for Clinical and Translational Research**

The Mississippi Center for Clinical and Translational Research (MCCTR) is designed to promote the success of obesity focused research at three MCCTR partner institutions: UMMC, TC, and the University of Southern Mississippi. The Center is funded by an Institutional Development Award (IDeA) Program Infrastructure for Clinical and Translational Research (IDeA-CTR) grant through the National Institute of General Medicine Sciences. This $19.8 million grant was funded to improve the health of Mississippians by (1) providing the infrastructure needed to support investigators and research projects that can successfully address obesity and related disorders in Mississippi; (2) increasing collaboration among disciplines and institutions that will integrate basic, clinical, and translational research on obesity and related disorders; and (3) improving health and health outcomes in Mississippians through new approaches to prevent, diagnose, and treat obesity and obesity-related disorders.

**Cardiorenal and Metabolic Diseases Research Center**

Researchers in the Departments of Physiology & Biophysics, Pharmacology and Toxicology, Biochemistry, Medicine, Preventive Medicine, Neurology, Obstetrics and Gynecology, and Surgery have developed strong collaborations and are working on a common synergistic research theme of basic and population research aimed at mechanisms of cardiorenal and metabolic diseases. Moreover, these investigators have worked cooperatively to pool their resources to develop core facilities that will facilitate further development of an internationally recognized research center focused on the common theme of cardiorenal and metabolic disease research. UMMC has made a major commitment to develop the Cardiorenal and Metabolic Diseases Research Center by building the state-of-the-art Arthur C. Guyton Research Center which houses basic, clinical, and population scientists whose general research efforts are focused on the central theme of cardiorenal and metabolic diseases. Cardiorenal and Metabolic Diseases Research Center also provides important core research services including transgenic animal models, mass spectrometry/HPLC for lipidomics and proteomics, molecular and genomics subcore, central histology laboratory, imaging core and bioanalytical facility.

**Myrlie Evers-Williams Institute**

The Myrlie Evers-Williams Institute (MEWI) is the central entity at UMMC responsible for addressing differences in health outcomes. MEWI has three central responsibilities: (1) the administration and management of the EversCare Program; (2) community engagement; and (3) educational activities. EversCare is a new clinic that addresses the health characteristics of UMMC patients referred by their health care provider. Community engagement activities of the Institute include issuing the Annual Men’s Health Report card (in collaboration with the Mississippi State Department of Health), community conferences, and the annual Rural Health Champion award. Lastly, educational activities managed by the Institute include the annual RICE Bowl (graduate level college bowl) and the Marian Wright Edelman Lectureship. The MEWI is located in the JMM which permits physical proximity with the JHS Field Center and Coordinating Center.

**John D. Bower School of Population Health**

The John D. Bower School of Population Health is the newest school at UMMC, and represents one of only three schools of population health in the nation. The School of Population Health has been designed to complement, strengthen and extend the capacity for scholarship across UMMC and to assist in achieving the institutional missions by supporting rigorous approaches to investigation and transformational education in the science of population health, data science, health care economics, and preventive medicine.

*Data Science*: Educational programs include Master’s and PhD degrees in Biostatistics and Data Science The mission of the Department of Data Science is to serve as a foundation of expertise and education in the collection, analysis and interpretation of biomedical and population health data, promoting the use of rigorous methods and furthering the disciplines of Biostatistics, Bioinformatics, and Data Science.

*Health Care Economics*: Educational programs include Master’s and PhD degrees in Health Care Economics. The mission of the Department of Health Care Economics is to serve as a base for scholarship, education, and innovative thinking related to the business, management and policy associated with health care service provision and health care financing; national, state and local policies that impact health; and factors that influence patient, provider and insurer evaluation and utilization of healthcare interventions.

*Population Health Science*: Educational programs include Master’s and PhD degrees in Population Health and an Executive Master’s degree in Population Health Management. The mission of the Department of Population Health Science is to train future population health scientists with the methodological expertise and breath of methodological expertise to address the full range of factors that influence health and disease and to prepare clinicians equipped to deliver population-oriented care.

**UNIVERSITY OF MISSISSIPPI - OXFORD**

Founded in 1848, the University of Mississippi is the state’s flagship university. With more than 24,000 students, it is the state’s largest university and is ranked among the nation’s fastest growing institutions. The University of Mississippi is a Carnegie-designated R1 university, and in 2020 also earned the elective Community Engagement Carnegie Classification.

**Center for Clinical and Translational Science (CCTS)**

The Center for Clinical and Translational Science (CCTS) is one of four Centers within the Research Institute for Pharmaceutical Sciences. The CCTS is administered on the UMMC Jackson campus, but fosters cooperative clinical and translational sciences between the UM Oxford and UMMC Jackson and among external partners. It is the mission of CCTS to facilitate the translation of basic research discoveries into clinically validated therapies to improve the health of populations in Mississippi and beyond. The three overarching goals to accomplish this mission are to develop progressive and sustainable capacity for clinical and translational research, promote interprofessional engagement in clinical and translational science, and foster research collaboration among stakeholders. The CCTS is comprised of three research units: 1) The Pre-Clinical/Translational Research Unit: Develops processes to move basic science discoveries towards translation into research in humans. 2) The Clinical Research Unit: Transitions projects that have received IND approval into the first phase of clinical trials. 3) Community/Population Research Unit: Develops, coordinates, and facilitates research activities and translation between clinical and community/population research stages. The CCTS Community/Population Research Unit is home to the UM Community-Based Research Program (CBRP), which was established in 2008 to increase scientific knowledge in health care delivery. CBRP research has focused on the implementation of pharmacist-delivered medication management services in rural community pharmacies, private physician practices, and federally qualified health centers (FQHCs) in Mississippi, specifically in areas of great need in the Delta region. The CBRP structured these services with a research component to provide evidence of the impact and value provided by integration of pharmacy services. Research has focused on diabetes, hypertension, and cardiovascular disease, but spans diseases from HIV to asthma and community issues such as opioid use disorder. The program has also incorporated components to address health information technology, health literacy, competency, and practitioner/resident/student training with a focus on continuous quality improvement, standard processes of care, and identification of populations of focus to benefit patients with greatest need. Dr. Ross and Dr. Bloodworth have served as PI/Co-PI on large scale projects implemented in Mississippi Communities, requiring extensive implementation and evaluation. This on-the-ground experience and existing relationships with medical providers in Mississippi communities position the CCTS to successfully implement the Project Heart Health Mississippi (ProHeart-MS). In addition to primary care providers, the CCTS Community/Population unit has formal partnerships with the Mississippi State Department of Health, Mississippi Public Health Institute, UMMC Telehealth Program, and local and regional community organizations. This unit also works with the Population Health programs on the Oxford and Jackson campuses.

**Center for Research Evaluation**

Established in 1999, the Center for Research Evaluation, or CERE, works with local, state and national organizations to learn more about the impact of their work. Notable clients and included the US and Mississippi Departments of Education and the National Science Foundation. CERE conducts external evaluations, offers workshops and seminars on evaluation, develops online evaluation and impact management systems, and conducts research on the science of evaluation. The Director of CERE, Dr. Sarah Mason, serves as the Director of the Tracking and Evaluation Core for the MCCTR.

**The University of Mississippi School of Pharmacy**

The UM School of Pharmacy (UMSOP) is recognized as a major research institution. Comprehensive in scope but relatively small in size, UMSOP provides excellent opportunities for advanced studies in a supportive and nurturing environment. The UMSOP graduate program offers Master of Science in pharmaceutical sciences and Doctor of Philosophy in pharmaceutical sciences with emphases in environmental toxicology, medicinal chemistry, pharmaceutics and drug delivery, pharmacognosy, pharmacology and pharmacy administration. The UMSOP graduate community includes outstanding faculty, research scientists and students from around the globe, and their cutting-edge research and scholarship reflect tremendous vitality, impact and significance. Areas of interest include cancer, cardiometabolic disorders, neuroscience/drugs of abuse and infectious diseases. As per the Fiscal Year 2018 Faculty Research Grant Institutional Rankings published by the American Association of Colleges of Pharmacy, UMSOP was ranked 6th amongst all the colleges of pharmacy in terms of total extramural funding (approx. $21 million).

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| UNIVERSITY OF SOUTH ALABAMA (USA) |

The University of South Alabama (USA), the only major public institution of higher learning on the upper Gulf Coast, was created by an act of the Alabama State Legislature in May of 1963. The University is strategically located in the greater Mobile area, which has a population of more than a million within a 100-mile radius. USA offers high-quality academic, research and medical programs that create, communicate, preserve and apply knowledge in service to Alabama and the region. In pursuit of establishing a preeminent, comprehensive university, recognized for its impact on the health and well-being of its community, USA thrives by promoting research innovation, stimulating academic engagement, and maintaining the highest standards of clinical practice.

**INSTITUTIONAL RESEARCH ENVIRONMENT & EXPERTISE IN CLINICAL AND TRANSLATIONAL SCIENCE**

**Facilities and Resources**

**USA Mitchell Cancer Institute (USA MCI):** The USA MCI is a state-of-the-art facility with approximately 50% of the total assignable square footage devoted to basic and translational research and the other 50% devoted to clinical activities. There are 13 principal investigators leading research groups (consisting of graduate students, postdoctoral fellows, undergraduate research students, visiting scientists, and technical staff) focused on cancer genomics, cancer proteomics, biomarker discovery and validation, cancer stem cells, cancer metabolism, cancer metastasis, and the development of novel therapeutics. The USA-MCI has been nationally recognized for its unique design and open architecture that facilitates interactions between clinicians, clinical scientists, and basic/translational scientists. In keeping with the spirit and intent of the building, clinical and basic/translational scientists jointly participate in multidisciplinary working groups, tumor board, and clinical trial meetings. In addition, disease-specific working groups (pancreatic cancer, ovarian cancer, etc.) involving multiple investigators and clinicians meet weekly to discuss shared research projects, clinical trials, and translational studies.

**USA Health Clinical Trails Office (USA-CTO):** The Clinical Trails Office (CTO) is a USA Health system wide office providing support to investigators conduction clinical studies, including industry-sponsored, investigator-initiated, and federally funded trials. Managed by a Director with budgetary, regulatory and research coordinator teams, it assists with all steps in clinical trial pathway, including an initial feasibility analysis, trial startup, management of active trials and trial closeout.

**Information Technology**

USA researchers will participate in projects utilizing protected health information. Along these lines, the USA Health System maintains a unified and comprehensive privacy and information security program that protects the confidentiality, availability, and integrity of all information assets (i.e., patient, research, customer, and business data). Our health system follows HIPAA policies and undergoes review by the Joint Commission on Accreditation of Healthcare Organizations. Our security policies are overseen by an appointed HIPAA Entity Security and Privacy Officer. Further, we comply with Family Educational Rights and Privacy Act controls for student information. Our security policies are overseen by an appointed HIPAA Entity Security and Privacy Officer, and compliance with IT Security policies and local and federal laws and regulations is further ensured through review by our expert security consultants, Security Risk Solutions Inc.

**USA Information Technology Operations:** USA’s security policies, IT infrastructure and connectivity are highly compatible with those of UAB and other partner institutions. The University Computer Services Center (CSC), under the direction of the University Executive Director for Information Technology, provides IT support for all University networks and core services, as well as end-user support for most main campus and general division locations. The Health Systems Chief Information Officer, reporting to senior hospital administration, leads the HS Information Technology group, which supports Hospital and Clinical systems and end users. The TRSC utilizes services and resources provided by both CSC and a third party data host, FireHost. Key components of these services and resources are described below.

**Offices and Data Centers:** TRSC and supporting personnel are located in offices in the Technology and Research Park building III (11,576 sq. ft.). Additional offices are located in the College of Medicine Basic Medical Sciences Building, the USAMC, USACW, the USA MCI, and elsewhere on the main campus. The network core and primary data center is located at the University CSC. A secondary disaster recovery site is located across campus, housing redundant network connections, directory services, virtual systems, and mirrored Network Addressable Storage. The USAMC, USACW, the USA MCI, and the CSC are connected in a metropolitan ring using leased dark fiber. There are multiple paths to the facilities, and the main campus core includes dual paths to the CSC and the disaster recovery site.

The data center currently supports 10Gbps switching. The metropolitan ring and main campus distribution fiber networks currently operate at 10Gbps link speeds. The main campus distribution will remain primarily at 1Gbps per building, with upgrades to 10Gbps as required by building traffic.

The copper network wiring plant is Ethernet Category 5 or above. Edge switch ports are primarily 100Mbps, but in general, desktop gigabit could be deployed where required through an edge switch upgrade.

**Network protection/security and access control:** The University networks are protected by Cisco Adaptive Security Appliances (ASA), providing firewall, intrusion prevention, and botnet detection services. Various monitoring tools are in place to detect and isolate network threats. Public facilities, such as “guest” wireless and student computer labs, are contained in separate firewall zones from internal resources. Access to internal, secured resources requires internal physical wired connection or secure wireless authentication under control of Active Directory. VPN services, also controlled by Active Directory, are provided for vendor and employee remote access.

**Directory Services and Access Control:** The HS Information Technology department manages a Microsoft Active Directory system for authentication and access control to a range of services, including Windows desktops and servers, Network Addressable Storage, secure wireless and VPN, and other internal applications. Redundant Domain Controllers and other key components are distributed through the University network system on main campus and in health care locations. The Active Directory is populated primarily with employee and vendor accounts.Domain Name Services (DNS) are provided by a hybrid ISC BIND/Microsoft DNS configuration. The BIND servers are the authoritative source for the registered University domains and respond to DNS queries from external sources. The Alabama Supercomputer Center in Huntsville, Alabama, also hosts secondary authoritative DNS servers for these domains. The Microsoft DNS service supports internal clients and Dynamic DNS registrations.The CSC also manages a Red Hat Directory (LDAP) system in support of a range of systems, including Google Apps and the University’s externally hosted Learning Management System. Student accounts are primarily populated here. Redundant servers are located across campus and at the Alabama Supercomputer Center.

**Animal Research:** Translational research often begins with pre-clinical laboratory studies. In this regard, USA has state-of-the-art animal care facilities located on the first floor of the Medical Sciences Building’s. These facilities are approved for Biosafety Level-2 approved, possess full accreditation by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC International), and meet NIH guidelines for the care and use of laboratory animals. Surgical and animal manipulation rooms are available within this facility.

**Core Facilities**

Multiple research core facilities available to CTSA investigators include but are not limited to: biomedical imaging, proteomics and metabolomics, flow cytometry, gene vector development and delivery. These and other aspects of research support are provided to investigators at institutionally approved recharge center rates.

**Flow Cytometry Shared Resource Laboratory:** The Flow Cytometry Laboratory has locations in both the MCI and MSB, and provides cell counting and cell sorting services to researchers. Instrumentation includes Becton-Dickinson FACSAria and FACSCanto II instruments, as well as a Microfluidic Cell Sorter. The facility also houses a Nexcelom CeligoS microplate-based imaging cytometer, Agilent Seahorse XFe24 and XFe96 Analyzers and a ZetaView® TWIN - NTA Nanoparticle Tracking Analyzer. Each Flow Cytometry laboratory also has on-site tissue culture facilities.

**Bioimaging Cores:** The Bioimaging Cores, located in the USA CoM and MCI, provide imaging and microscopy services to investigators. Equipment in the facilities includes wide-field, line-scanning confocal, and spinning disk confocal microscopes, as well as spectrofluorimetry and laser dissection capabilities. Systems provide multi-label high-resolution fluorescent imaging for both fixed and live-cell preparations, and allow for specialized applications, including high-speed, time-lapse and spectral unmixing. The flagship instrument in the core is a **Zeiss LSM 980 Airyscan2 spectral confocal microscope purchased via an NIH S10 award** that enables extended time lapse imaging of cells and tissues, with minimal photobleaching or photodamage, and enhanced/super resolution imaging of live cell preparations.

**Mass Spectrometry Core Facility:** USA Mass Spectrometry Core Facility, located in the Mitchell Cancer Institute, provides mass spectrometry services, include protein profiling, targeted and untargeted proteomics, lipidomics, and metabolomics. The facility is equipped with two state-of-the-art mass spectrometers: a Thermo LTQ Orbitrap XL and Thermo Q-Exactive Plus. Also available is a Thermo MSQ Plus mass spectrometer and an Agilent 1200 HPLC (equipped with UV detection).  . The facility assists with development of a total proteomics approach for evaluating major proteins in a cell system or gel, and similarly for detecting metabolites in whole cell lysates or cell media. Additional goals of the core are to contribute to the development of methodology for proteomics and metabolomics, and to provide training in state-of-the-art mass spectrometry methodologies.

**Biobank and Histology Core Facility:** Located in the Mitchell Cancer Center, the biobank and histology core facility provides biobanking services, including biospecimen collection, processing, and storage, data repository, and molecular analyses, as well as complete histology services, including embedding, H&E, special stains, and immunohistochemistry. The core also provides general pathology services in support of clinical research.

**Electrophysiology Core:** This core has approximately 250 square feet of dedicated space with two independent patch-clamp systems fully integrated for use. These systems are capable of combining ion channel measurements with fluorescent measurements of cytosolic calcium, perfusion studies, single channel analysis, and whole cell and perforated patch clamp.

**Cell Culture Core:** This core isolates, cultures, and characterizes lung macro- (artery and vein) and microvascular endothelial cells available for use by independent investigators.

**Gene Delivery Core:** This core has approximately 400 square feet of dedicated space used for a full complement of gene isolation and production techniques, and also provides expertise for various methods of gene delivery. Among the services offered by the Core are: plasmid construction, protein expression and purification and generation of recombinant adenovirus and adeno-associated virus vectors.

**Translational Biostatistics and Bio / Medical informatics Consulting Services**

Biostatistical services are available to USA faculty through the Statistical Consulting Center, directed by Dr. Madhuri Mulekar, Chair of the Department of Mathematics and Statistics. The Statistical Consulting Center also serves investigators across the CCTS network as a component of the Biostatistics, Epidemiology and Research Design (BERD) unit.

**Scientific Environment:** Patient engagement and subject recruitment are important contributions of the USA Health System to the UAB CTSA program. These activities will be facilitated by several highly active administrative units in the USA Health Sciences Division, including the NIH-supported Center for Health Communities, the USA Family Practice Center, and the Center for Strategic Health Innovation. Engagement of patients and subject recruitment will occur primarily in Mobile County. Mobile County is located in the southwest corner of Alabama and is the second most populous county in the state with a population of 413,073 (2020 US Census). It is a large county (over 1600 square miles or larger than the state of Rhode Island) but the majority of the population lies within 16-mile radius surrounding the USAMC. The county itself is a primary care physician shortage area with an HPSA Score of 14 for Mobile County and is designated a low income population HPSA.

Mobile County has a poor health status when compared to peer counties and the United States as a whole (following data from 2009, Department of Health and Human Services, Community Health Status Indicators Project). Life expectancy is below the peer counties at 75.42 years. County residents regard themselves as unhealthier than those people living in the “peer counties” (counties selected because of similar demographics). 23% of all Mobile residents rate their health status as fair or poor as compared to 21% of all AL peers and 17 % of the best peer. Mobilians report an average of 4.8 unhealthy days / month. A number of risk factors for premature death are prominent in the USAMC service area. One chief factor is obesity, which is prominent despite a weather pattern that allows outdoor activity on most days of the year and 73% of the population reporting having access to locations for physical exercise. Mobilians report a diet lacking in fresh fruits and vegetables and the obesity rate of 36% is reflective of the first two observations. Mobilians continue to smoke at a rate higher than the national average. Mobilians report a high rate of diabetes as well.

Collectively, these patient demographics present unusual opportunities for a wide range of high impact translational research.

**CLINICAL CARE**

**University of South Alabama University Hospital (USAUH)**: The University of South Alabama University Hospital serves as the region’s safety-net hospital and is the primary site for the clinical educational programs for USA College of Medicine students. The USAUH is a major referral center for southern Alabama, southeast Mississippi and portions of northwest Florida.  It is home to the region’s only Level I Trauma Center and one of only four such designated centers in Alabama. Highly trained clinicians and staff manage trauma and critical care, surgical and medical intensive care, and neurotrauma intensive care. USAUH Trauma Center houses two trauma resuscitation bays that are fully equipped and staffed with professionals from nursing, respiratory care, and radiology. The Emergency Department, expanded and renovated in 2021, includes a designated major operating room in the surgical suite.  Support services include the Radiology Department, which houses two state of the art 64-slice, high resolution CT scanners and interventional radiology, the Clinical Laboratory, and the Blood Bank. The USAUH Burn Center is the only burn center serving the central Gulf Coast region. USAUH is noted for its remarkable stroke, cardiovascular and sickle cell disease centers. USAUH averages more than 30,000 Emergency Room (ER) encounters and more than 11,000 hospital discharges per year. The acuity of the patient population at the USAUH has been rated among the top 10% of the nation’s hospitals.

**USA Children’s and Women’s Hospital (USACW):** The USA Children’s and Women’s Hospital provides neonatal and pediatric intensive care services, high risk obstetrics services as well as routine pediatrics and OB/GYN services, and pediatric oncology services. The Evaluation Center provides emergency medical services for pediatric and OB/GYN patients. An expanded Pediatric Emergency Department is under construction and is expected to be completed in 2023. Currently, USACW sees more than 30,000 pediatric emergency visits each year. The USACW Hospital is the only designated children’s hospital in South Alabama. The hospital also includes South Alabama’s only level 3 neonatal intensive care unit. USACW provides pediatric intensive care service as well as obstetrics and gynecology. A Ronald McDonald house for families of pediatric cancer patients is now affiliated with the hospital. USACW treats more than 6,500 children each year in an inpatient setting.

**GRADUATE EDUCATION AND POSTGRADUATE TRAINING INFRASTRUCTURE**

**Responsible Conduct of Research (RCR) program:** The USA Frederick P. Whiddon College of Medicine’s (CoM) RCR training program satisfies the NIH requirement for training in the ethical conduct of research in the following nine areas: research misconduct, human participants, research involving animals, data acquisition, management, sharing, and ownership, mentor/trainee responsibilities, publication practices and responsible authorship, peer review, collaborative science, and conflict of interests. Instruction in our RCR program utilizes a combination of lectures, on-line tutorials, and small group discussions.

**Selected additional courses / active learning experiences:** The USA Whiddon COM offers a variety or additional learning experiences for students at all stages of pre- and post-graduate training. A partial list of such activities with particular relevance to trainees engaged in patient-centered, clinical, and/or translational research includes: Effective Scientific Writing, Presentation Skills, and Statistics & Experimental Design, and Introduction to Research Methods.

* ***Computer:*** All mentors, residents, prospective trainees, and members of the research teams have dedicated personal computers with internet and email access networked through the University. An interactive computer laboratory is also located in the Medical Sciences Building.
* ***Office:*** All mentors, prospective trainees, and members of research teams have adequate personal office located in close proximity to the clinics, specialized care units or laboratories. Multiple large and small rooms are available for seminars, laboratory meeting, didactic instruction, etc.