Augusta University
Facilities and Environment

Version Date: January 15, 2018

Table of Contents

ENVIRONMENT

Augusta University (AU; formerly Georgia Regents University, Georgia Health Sciences University, and the Medical College of Geogia), was chartered in 1828 as a single academy to provide instruction in "several branches of the healing art". Augusta University, home of the Medical College of Georgia, is one of four public compregensive research institutions in Georgia. The university includes nine colleges and schools with nearly 9,000 students, 1,000 full-time faculty members, 7,000 staff members, and 125 educational programs. In addition to housing the nation's 13th oldest medical school, Augusta University is home to the state's only dental school, an aligned and integrated health system, a growing intercollegiate athletics program, and the highly respected Hull College of Business. The mission of AU is to lead Georgia and the nation to better health through excellence in biomedical education, discovery, patient care and service. AU consists of nine colleges: The Medical College of Georgia (MCG); The College of Allied Health; The Pamplin College of Arts; Humanities, and Social Sciences; The Hull College of Business; The Dental College of Georgia; The College of Education; The Graduate School; the College of Nursing; and The College of Science and Mathematics, with an affiliated Augusta University Health System (AUHS) Overall research growth at AU within the recent past has been substantial. As a unit of the University System of Georgia–the state's public system of higher education–AU shares with other research universities the following core characteristics: a statewide responsibility and commitment to excellence and academic achievements having national and international recognition; a commitment to excellence in a teaching/learning environment dedicated 1) to serve a diverse and well-prepared student body, 2) to promote high levels of student achievement, and 3) to provide appropriate academic support services; a commitment to excellence in research, scholarship, and creative endeavors that are focused on organized programs to create, maintain, and apply new knowledge and theories that promote instructional quality and effectiveness, and enhance institutionally relevant faculty qualifications; a commitment to excellence in public service, economic development, and technical assistance activities designed to address the strategic needs of the State of Georgia along with a comprehensive offering of continuing education designed to meet the needs of Georgia's citizens in life-long learning and professional education; and a wide range of academic and professional programming at the baccalaureate, master's, and doctoral levels. MCG has seen substantial growth in educational, research, and clinical initiatives in disease categories affecting every family in Georgia and the United States. These include cancer, cardiovascular disease, diabetes, obesity, infection/inflammation, and neurological disease. Last year, AU was awarded over $109 million in total sponsored research funding and approximately $51 million in Federal funding. AU utilizes the Cerner electronic medical records institution-wide to facilitate patient care and data collection for various research projects including both inpatient and outpatient services. The institution has numerous core laboratories and services, of which many have been supported with funds from the Georgia Research Alliance. Research space totals approximately 180,000 square feet, and 90,000 square feet will be added with a new research facility. AU has intramural programs to support research and assist faculty with procuring extramural support.

Augusta University Health System is a world-class academic healthcare network offering the most comprehensive primary, specialty, and sub-specialty care in the region. AUHS provides skilled and compassionate care to its patients, conducts leading-edge clinical research, and fosters the medical education and training of tomorrow's healthcare practitioners. The clinical operations of AUHS include the 478-bed Medical Center, the Medical Office Building with more than 80 outpatient practice sites in one setting, the Critical Care Center housing a 13-county regional trauma center and the 154-bed Children's Hospital of Georgia. The health system also includes a variety of centers and units such as the Sports Medicine Center and the Georgia Cancer Center. In addition to providing care in the Augusta area to patients from Georgia, the Southeast and beyond, AUHS physicians travel to multiple satellite practice sites across the state and region. AUHS is a part of a thriving academic medical center that includes: Georgia Prison System HealthCare, Juvenile Health Care, Warm Springs. The ethnic composition of our population at Augusta University Medical Center is 45.9% African American and 49.7% white. Asians, Hispanics, and American Indians comprise the remaining 4.4%.

At Augusta University, care is provided by multiple faculty practice groups, including the AU Medical Associate Practice Group, the Dental Practice Group, the Allied Health Practice Group, and the School of Nursing Faculty

Practice Group.

Strategic Partners

Augusta University and AU Medical Center have entered into three major strategic long term (15 years) initiatives over the last three years. The first was with Philips Corporation in 2014 to provide consulting services, medical technology purchases and maintenance, and other services. The second was with Cerner Corporation (which provides the EMR for both inpatient and outpatient clinical (services) in August 2014 which provides sourcing of information technology staff, remote hosting and support, software implementation, access to future products, and innovation opportunities. The third was with Beckman Coulter in 2016 to streamline laboratory operations, standardize instrumentation and middleware, reduce service and maintenance issues, provide access to innovative tests and diagnostic solutions, and establish quality and efficiency benefits through laboratory-wide process improvements. Improve the patient safety, quality, efficiency, and capacity of operations, and decrease overall cost of providing Pathology Services and reference lab testing. Collectively, these provide major strategic partners which will allow AU to maintain cutting edge technology for healthcare, and will allow investigators to have opportunities for collaborations with major biomedical health companies. AU Health will direct about $300 million over 15 years to Netherlands-based Philips as part of an alliance to improve patient care, boost the hospital's efficiency and reduce costs.

CORES

Electron Microscopy and Histology Core Laboratory - The mission of the Electron Microscopy and Histology Core is to provide high quality services at an affordable cost to research investigators at the Augusta University and external research facilities. The core occupies ~3,000 sq. ft. and is located on the first floor of the Carl Sanders Research and Education Building (CB1113). The Core is well equipped and offers a variety of specimen preparation services for transmission and scanning electron microscopy, vibratome, paraffin, cryostat and JB-4 sectioning. The Core, which operates on a fee-for-service basis, offers routine H&E staining and various histological special stains, PASH, Masson Trichrome, Van Gieson and many others. The Core offers investigators a full line of immunohistochemical services including immuno-EM studies. It is a full service facility, and augments research by providing expensive, specialized equipment and experienced technical staff to perform ultrastructural analyses. The Core staff performs all aspects of the ultrastructural procedures from specimen processing to imaging (for Electron Microscopy, TEM and SEM) and processing, sectioning and staining for light microscopy (paraffin, cryostat, and JB-4). The core is managed by Ms. Penny Roon (HT, ASCP). Additional staff members include Dr. Brendan Marshall, an expert in Electron Microscopy and Immunohistochemistry; Ms. Elizabeth Perry (MSA Certified), an expert in Electron Microscopy (TEM, SEM and IEM) and Immunohistochemistry; and Ms. Donna Kumiski, an ASCP Cerified Histotechnologist. Newly added services include sectioning of calcified bone specimens and EM-cryosectioning for EM-cryoimmunodetection.

The Genomics Core Laboratory is located on the Augusta University campus in the Interdisciplinary building (CA1041). It is a multifunctional molecular biology resource facility directed through the Center of Biotechnology and Genomic Medicine. Services are available to all campus investigators, students and incubator tenants, as well as off-campus users. Instruments available to users include: Life Technologies 3730XL genetic analysis instrument, Illumina Bead Station micro array instrument, Nano-Drop micro spectrophotometer, Fluidigm high throughput microfluidic-based genetic analysis instrument, Agilent Tapestation 2200 bioanalizer, Ion Torrent PGM next gen sequencer, Life Technologies 7900HT high throughput real time PCR instrument, RNA-seq, ChIP-seq, targeted re-sequencing, and de novo assembly, on the Illumina HiSeq and Roche 454 GS-FLX platforms. For automated fluorescence DNA sequencing the state-of-the-art ABI 3730 XL 96-capillary sequencer is available for ultra-high throughput projects and the ABI Big Dye Terminator 3.1 is the default instrument also available to users. The staff is qualified in assisting investigators in analysis and interpretation of their results.

Flow Cytometry Core - The AU Campus Flow Cytometry Core Facility (CFCCF located in CA2056) is equipped with flow cytometer equipment of 2 types 1) Cell Sorter - operated as a service to Investigators and 2) Cell Analyzer(s) - generally Investigator operated but can also be provided as a service as well. The Cell Sorter is the Beckman Coulter MoFlo and allows for 7-color fluorescence, 4-way or multiwell plate cell sorting and has recently been upgraded to allow for sorting of well characterized BSL2 materials (ATCC, NIH, etc.) approved by

the Biological Safety Office in addition to the BSL1 materials it has historically sorted. The Cell Analyzers, two bench-top BD (BD Biosciences) FACSCalibur instruments, are capable of 4-color fluorescent analysis. Computers workstations attached to the analyzers are available for data analysis, presentation and publication preparation when not in use for acquisition purposes; additionally there are 2 standalone MAC's and one PC available in a separate analysis room as well. There are several softwares available for analysis purposes; BD CellQuest Pro, Treestar Flowjo, Verity Software House (VSH) ModFit in addition to MS Office to aid in presentation preparation. Core personnel are available to aid in experiment design and implementation as well as data preparation.

Cell Imaging Core: This facility is operated by the Department of Cellular Biology and Anatomy on a fee-for-service basis. The facility is directed by Dr. Paul McNeil and offers state-of-the-art light microscope imaging capabilities, including super-resolution, confocal, multi-photon and epi-fluoresce and transmitted light microscopy. Available software supports ratiometric analysis, enhancement, deconvolution and 3D reconstruction of digitized image files. Expert assistance and training is provided by an on-site expert, Dr. Anna McNeil. Users have access to the facility 24/7. Further information is available at the Core's web site http://www.augusta.edu/mg/cba/cic/index/php.

Research Support Center - The Research Support Center in the Department of Population Health Schiences supports the research mission of all units of Augusta University (AU) by providing biostatistics, epidemiology and mathematical modeling support for research planning, design, analysis, interpretation and manuscript preparation. The department is actively involved in methodological and collaborative research, and has a strong applied research thrust. Department faculty members have extensive experience in providing statistical collaborations for NIH, NSF and private foundation grants. Collaborative research is conducted by serving as co-investigators in grant proposals and funded projects. The collaborations span through all phases of the research project, from designing the studies, clarifying specific aims and hypotheses, examining design alternatives, exploring appropriate analysis alternatives, and providing power and sample size estimation. The Research Support Center offers comprehensive statistical consulting for investigators within AU, and from other academic institutions, government agencies and private industries. Specific services offered include design of clinical trials, experimental design, survey design, determination of sample size requirements, randomization, data management, statistical modeling, data analysis and interpretation. All faculty and professional staff in the department participate in providing this service. Methodological research areas of our faculty include statistical genomics, genetic epidemiology, Bayesian Inference, survey sampling, analysis of clustered and correlated data, multistate modeling, stochastic systems modeling, mathematical and statistical aspects of bioinformatics, resampling methods, survival analysis, clinical trials, psychiatric epidemiology, psychometrics, epidemiology of aging, and health disparities. The department is also a teaching arm of the University System of Georgia, and offers PhD and MS programs in Biostatistics, and post-doctoral training programs in Biostatistics and Epidemiology. In addition, the department is also actively involved in mentoring graduate and post-graduate students and offering didactic courses for the undergraduate, graduate, medical, nursing and dental students on the Health Science campus of AU.

Proteomics and Mass Spectroscopy Core Laboratory is a fee-for service resource facility for the characterization and expression level measurement of proteins (isolated or in an extract) by mass spectrometry, electrophoresis or chromatography. It is located in the Interdisciplinary Building CA1041 and is operated jointly by the Center for Biotechnology and Genomic Medicine. The proteomics facility uses Amersham Pharmacia Cy2, Cy3, and Cy5 dyes, both saturating and non-saturating, to label proteins for first and second dimension separation and analysis. The facility provides lysis buffer to investigators. After proteins are labeled the samples are subjected to isoelectric focusing followed by standard 2-D PAGE. The proteomics facility also offers the Ettan DALT II Large Vertical System for simultaneous running of up to twelve large-format gels. Gels are scanned, fixed and stained with Supro Ruby Gel Protein stain followed by gel analysis using the Decyder Differential In-gel Analysis system. The Ettan Spot Picker picks the selected spots and transfers them into a 96-well plate, they are digested, transferred to a second plate and spotted using the Ettan TA Spotter, which is designed for high throughput sample spotting on Q-Star, Voyager or 4700 MALDI-TOF target slides. The Mass spectrometry instrumentation includes the 4000 QTRAP hybrid MS from ABSciex, ABI 4700 Proteomics Analyzer, Voyager,

and Q-Star. Mass spectra from any of these instruments are compared against a number of data bases for identification using GPS Explorer. Data analyses use a variety of search engines and staff members in the facility are available for consultation to assist in protein identification. Other staff members available for technical assistance are W. Zhi and E. Miller.

Human Pathology Core: The Human Pathology Core Facility has three main components: research histology, specimen procurement and protocol review. The research histology component provides all of the tissue processing and histology services as typically performed in a clinical laboratory, but it is specifically dedicated to the needs of the Augusta University research community in general and the Cancer Center research community in particular. The research histology core facility functions under the auspices of the Anatomic Pathology clinical service. The Pathology Core Facility is unique in that it has the capability and flexibility to address specific research protocol needs, including tissue microarray production and multispectral imaging technologies. The tissue procurement component of the Pathology Core Facility has two main functions: (1) human tissue and fluid procurement, storage and distribution and (2) quality assurance and protection of research subjects. The tissue procurement component addresses the growing need for human tissue and serves as an "honest broker" with HIPAA-covered entities in an effort to expedite research activities, particularly in the use of human biological materials and associated data. Operating with the joint input of the Georgia Cancer Center and the Department of Pathology, sample accrual and processing operates in the context of the Georgia Cancer Center Biorepository (GCCB). The GCCB is a shared human specimen resource for the Augusta University research community and also serves as the central coordinating hub for the statewide biobanking effort, the BioRepository Alliance of Georgia for Oncology, or BRAG-Onc. The primary mission of the Biorepository is to collect and store clinically annotated tissue and blood derivatives using standard protocols. All biospecimens are obtained with ethical patient consent and only de-identified specimens and accompanying clinical information, without any protected health information, is provided to investigators. The repository operates under IRB and institutional oversight with an approved IRB (Human Assurance Committee) file protocol and with chemical and biosafety authorization. The GCCB is guided by the "Best Practices for Biospecimen Resources" published by the NCI's Office of Biorepositories and Biospecimen Research (OBBR) and ISBER. The TIES informatics package developed at the University of Pittsburgh Medical Center utilizing natural language processing search and annotation capabilities has been incorporated as an adjunct to the biospecimen cataloging software package. The GCCB has been in continuous operation since 2005 and has over 16,000 registered donors, including BRAG-Onc accruals. The liquid nitrogen storage archive includes over 30,000 independent samples in a monitored storage environment supplied with bulk liquid nitrogen delivery system. A subset of over 10,000 samples have corresponding FFPE blocks which are routinely reviewed by licensed pathologists to assess diagnostic correlation as well as sample integrity and tumor prevalence. The GCCB has provided vetted and approved 30 samples to the cancer genome atlas initiative. GCCB patient sample data has been featured in at least five TCGA primary references. In addition, processed blood and body fluid components number greater than 80,000 specimens. These are maintained predominantly in -80^{o}C storage in the GCCB/BRAG-Onc archive. Processing capabilities include a full menu of blood and body fluid protocols including separation of plasma, serum, buffy coat and mononuclear cell suspensions. A catalog of over 4000 peripheral blood and bone marrow aspirate-derived mononuclear cell preparations acquired by differential centrifugation through Ficoll is preserved in viable status in liquid nitrogen for *in vivo* and *in vitro* research purposes. For clinical purposes, the GCCB provides direct support for biospecimen-centric clinical trials, predominantly in experimental cancer therapeutic venues. At present the support includes more than 10 trials registered with the NCI. The support includes processing of surgical and biopsy samples, pharmacokinetics sample processing and storage, as well as mononuclear cell preparation and cryopreservation for subsequent ex vivo evaluation. To date, the quality control measures have met the needs of these clinical trials, and progressive quality improvement initiatives are ongoing. From a hospital laboratory perspective, the Clinical Pathology services include microbiology, clinical chemistry, toxicology, cytopathology, hematology, blood banking/transfusion medicine, histocompatibility and immunopathology. These functions are provided under CLIA license and, in facilities variably accredited by CAP, ASHI, FACT, and AABB and registered with FDA.

The Small Animal Behavior Core (SABC) The SABC is located in the Dugas Building in BG-1084 and 1086. It provides expertise in all aspects related to the design and implementation of behavioral experiments in mice and

rats, as well as data analysis and interpretation. The core is fully equipped to accommodate a full battery of behavioral tests relevant to learning and memory, attention, executive function, sensory gating, place/fear conditioning, motor function, nociception, and anxiety-related behaviors, etc. The following tests are currently offered by SABC: Anxiety-Related Behavior Tests (elevated plus-maze and preference - emergence neophobia), Memory, attention, executive function-related Tests (spatial learning & memory - Morris Water Maze, - Radial Arm Maze, passive or inhibitory avoidance, pre-pulse inhibition, Y Maze, fear conditioning, two-trial novel object recognition task, five-choice serial reaction time task), Motor Function Tests (open field locomotor activity, rotarod, grip strength), and Tests of Nociception (tail flick, thermal sensitivity test), tests for gastrointestinal mailasie, conditioned taste aversion).

Georgia Cancer Center State-wide Tumor Tissue and Serum Repository - The Georgia Cancer Center Tumor Tissue and Serum Repository collection includes a variety of specimen types, such as tumor tissue and cells, blood and other biofluids as well as normal specimens. Also housed at AU is the only state-wide biorepository the Bio-Repository Alliance of Georgia for Oncology or BRAG-Onc which includes 14 participating hospitals all over the state of Georgia. The quality of all the specimens are reviewed by a pathologist, and the information is captured in the tumor bank's searchable database. The tissue bank provides human specimens and laboratory services for basic and translational research to further the understanding of the cellular and molecular pathogenesis of human cancers. Its overall mission is to facilitate access to human tissue for investigators with IRB approval with an emphasis on translational efforts and as such, is an extremely valuable resource. All samples are ethically consented and the repository database has used for clinical data has the necessary HIPAA security features. Both biorepositories housed at Georgia Cancer Center follow the NCIs Best Practices Guidelines.

Georgia Cancer Center Integrated Genomics Shared Resource - This resource offers both Next Generation Sequencing (NGS) and Microarray technologies and data analysis. For NGS analysis, the facility equipped with Illuminas High-Seq 2500, MiSeq , Next-Seq and a Life Technologies Ion Torrent. The HiSeq 2500 permits high-throughput sequencing output generating up to 200Gb data per run or 2 billion paired end reads per run. The cBot cluster generation station is also available for automated generation of clusters. For high through-put computational analysis the Resource is equipped an IlluminaCompute analysis and storage system with 2 Rack and 8 Blade servers with 36 AMD 16-core CPUs and 64GB RAM from Dell Corporate running Linux, dedicated of computational analysis. This cluster includes a 2-way SMP system acting as front-end cluster nodes and a file server, a large memory 2-way SMP system acting as a web front-end and a database server. Storage with approximately 60TB of raw storage capacity is shared out to the computational nodes. All file systems are built on top of a parity RAID scheme using RedHat XFS. The core personnel will prepare samples and libraries or these can be user generated. The core personnel are well-versed at running the following applications: Targeted Sequencing analysis, Gene Regulation Analysis, Sequencing-Based Transcriptome Analysis, SNP Discovery and Structural Variation Analysis, Cytogenetic Analysis, DNA-Protein Interaction Analysis (ChIP-Seq), Sequencing-Based Methylation Analysis, Small RNA Discovery and Analysis. The Facility also has access to a variety of software including the TopHat suite of analyses algorithms, ANNOVAR, BWA, GSNAP, GATK 2, Partek Genomics Suite and CLC Bio Genomics Workbench which can be accessed by individual users. In addition, the Bioinformatics core has 2 individuals assigned specifically to perform novel and downstream analysis of Next-Gen sequencing data. The Facility computers also contain Illumina software, Partek Genomics Suite, Ingenuity Pathways Analysis and a wide range of freeware analysis programs which can be accessed by individual users including GATK 2.0 and the Tuxedo suite of programs for RNA-Seq data. In addition, the Bioinformatics core has 2 individuals assigned specifically to perform novel and downstream analysis of Next-Gen sequencing data. The GCC Integrated Genomics Facility also provides Affymetrix microarray technologies to faculty. The equipment and personnel are located within the GCC Cancer Center. The Resource aims to provide researchers with access to microarray technology and bioinformatics at an affordable cost, and to provide training to the research community through educational seminars for analysis of microarray data and programs designed to analyze large data sets. Equipment in this facility includes an Affymetrix GeneChip Scanner 3000 7G Plus, an Affymetrix Hybridization Oven 640, two Affymetrix Fluidics Station 450's, an Agilent Microarray Scanner, an Agilent Hybridization Oven, an Agilent 2100 Bioanalyzer, an Applied Biosystems GeneAmp 9700 Thermocycler, and a NanoDrop 1000 spectrophotometer. DNA sequencing and synthesis is also available. The available

softwares for data analysis include; Affymetrix Genotyping Console, Affymetrix Expression Console, Affymetrix GCOS, GTYPE and CNAT, Clustall, CNAG, GO, Ingenuity Pathway Analysis, OGT CytoSure Visualization Software, Partek Genomics Suite ,TreeView and Exon Easy. The facility personnel are well versed in the use of these various softwares for data analysis. The Pyrosequencer, and QPCT and associated software to be used in the epigenomics research projects is also located in this facility.

Georgia Cancer Center Bioinformatics Shared Resource - The GCC Bioinformatics Resource offers collaborative research and services in the areas of bioinformatics. The staff has experience and expertise in bioinformatics software/database development, customized data analysis, and providing bioinformatics infrastructure and training. Services include, but are not limited to: development of bioinformatics software and databases, integrative analysis of multi-dimensional high-throughput data (e.g. gene expression, array CGH, CHIP-chip, DNA methylation tiling arrays, SNPs, DNA sequencing data, metabolomics, proteomics etc.), identification of transcriptional regulatory elements, mapping of pathways and gene ontology, gene annotation, identification of alternative splicing forms, etc. The Resource has a seamless partnership with the Department or Biostatistics at MCG coordinating the effort of providing bioinformatics service/support to the local biomedical research community. The Resource staff are responsible for management of the Georgia Cancer Center HPC Server composed 544 total compute cores and an aggregated memory of 2.9TB. The system is composed of (15) PowerEdge R430 1U systems (128 GB RAM each), (1) PowerEdge R830 (1024 GB RAM) and a high-speed 10GbE interconnect for intra-node communication. The HPCC also houses 832 TB RAW storage capacity.

Georgia Cancer Center Flow Cytometry Shared Resource - The GCC Flow Cytometry Resource is equipped with flow cytometers that are categorized into two application types: i) Analyzer flow cytometers that are typically operated by individual investigators and ii) Cell Sorting flow cytometers that are typically provided as a service to investigators. The Analyzer flow instruments include Becton Dickinson Accuri, FACSCanto and 2 LSRIIs each comes with a variety of different lasers to provide comprehensive coverage for a variety of applications. For cell sorting the lab is equipped with a Becton Dickinson FACSAria and Influx II. The facility provides sorting in a Biohazard level 3 safety room for sorting of unfixed human cells. There are several computer workstations available that facilitate the analysis, presentation and publication of flow cytometry-generated data loaded with Flow- related softwares such as FlowJo v10 and v9,ModFit LT v4, Flowing Software v2.5.0, Cyflogic v1.2.1, Microsoft Photoshop CS5 and Illustrator CS5. Resource personnel are experts in all aspects of Flow Cytometry and will collaborate with investigators on the design and implementation of protocols.

Georgia Cancer Center Proteomics/ Metabolomics Shared Resource - Resource houses 3 platforms; 1) Thermo Scientific Orbitrap Velos Pro Hybrid ion trap mass spectrometer supported by Agilent 1200 Series Nanoflow LC System for MS and an Agilent 1200 Series capillary pump 2) Agilent 6410 Triple Quad LC/MS System quadrapole mass spectrometer connected to a high speed, rapid resolution Agilent 1200 Series Binary LC System and 3)an Agilent 6520 Accurate-Mass Quadrupole Time-of-Flight MS also coupled to an Agilent 1200 Series Binary LC System. Data analysis softwares include Mascot, Sequest, X-Tandem, Scaffold, PeptideProphet and ProteinProphet, Metlin metabolomics data base and Mass Profiler. Proteomics analyses are available but not limited to; protein identification, detection and characterization of posttranslational modifications of proteins - structural characterization of modified proteins, lipids and DNA in disease – e.g. the identification and quantification of oxidative damage to proteins, lipids and DNA and screening for genetic mutations in proteins. Metabolomics applications include XCMS output (*m/z* and RT) highlighting the ions that differed the most in intensity between data sets, tentative identification of metabolites based on accurate mass and molecules available in the METLIN database and further identification based on comparative MS/MS and high accuracy analysis of 'unknown' with a standard provided by the client. This resource is fully equipped to handle sample preparation and analysis, simple synthetic chemistry, and compound isolation and characterization. The laboratory includes a library of over 500 authentic chemical compounds for reference. The laboratory is fully equipped with, inert (nitrogen) chemistry chambers, -80° freezer space with an automated alarm and backup power supply is available for long-term storage of the samples.

Georgia Cancer Center Clinical Research Unit - The Clinical Research Unit (CRU) is located in the newly constructed Georgia Cancer Center for outpatient treatment located directly across from the Cancer Research

Facility. The building is 57,000 square feet with a parking garage the same size. Featuring a beautiful lobby and commons area, the building offers the following clinical services: 30 exam rooms designed for patients by patients, 30 infusion stations which offer flexibility to provide the utmost privacy or the ability to visit with other patients and families and 6 private treatment rooms Clinical research administrative and treatment areas where patients have the opportunity to participate in cutting-edge clinical trials.

Georgia Cancer Center Biostatistics Shared Resource - The Biostatistics Shared Resource is dedicated to supporting members of the Georgia Cancer Center in their investigative studies. Researchers will find expertise in planning, conducting, analyzing and reporting data relative to clinical trials as well as epidemiologic-, and population-based studies. In collaboration with the Augusta University Quality Assurance Office for Clinical Trials (QACT) and the Office for Protection of Research Subjects (OPRS), this resource provides efficient and accurate database design and management of clinical research data. The GCC Biostatistics Shared Resource investigators also conduct independently sponsored research in statistical analysis, data mining using the Cancer Center registry data, clinical and laboratory, SEER and other national databases.. Many of the Biostatistics core members are also faculty at the department of Biostatistics and Epidemiology and provide educational programs to meet the needs of the Cancer Center investigators.

Georgia Cancer Center Small Animal Imaging Shared Resource - This shared resource provides access to Magnetic Resonance Imaging (MRI), Optical (bioluminescent, fluorescent, and X-ray), Single Photon Emission Computed Tomography (SPECT), and CT guided radiation treatment of small animals. MRI imaging is performed on a Bruker Biospin 7T horizontal, 30 cm bore scanner. Two gradients are available to accommodate both small and large sized rodents. Numerous MRI protocols and sequences are available. Paravison software provides a framework for multidimensional MRI/MRS data acquisition, reconstruction, analysis and visualization. The Resource also provides access a BioScan nanoSPECT/CT, a dual modality system for imaging mice and rats. The system is capable of imaging a range of isotopes from the low energy of 125 I to 111 In, alone or in dual isotope acquisition mode. It is capable of high sensitivity submillimeter imaging, dynamic SPECT, and gated cardiac SPECT imaging alone or in dual isotope acquisition mode. The information obtained is typically presented as cross-sectional slices, however, the subject but can be freely reformatted or manipulated as required. The Resource also has a license to use all clinically approved radiotracers for SPECT studies. Small Animal Radiation Research Platform (SAARP) provides image guided microirradiation technology (IGMI) for radiobiology research purposes. It generates X-Ray does up to 225 kV with a range of 0-30 mA and a maximum power limit of 3kW. The X-Ray tube is mounted on motorized gantry for optimal focus on targets of interest. Bioluminescence, fluorescence, and X-ray imaging are also available through the GCC Small Animal Imaging Resource. Optical Images are created non-invasively via the detection of photons emitted by specific tracers. The cameras are able to detect wavelengths for 400-800 nm and from sources as little as 500 cells. Resource Personnel are experts in the operation of each imaging modality and small animal handling procedures. Analytical software support for quantitative image analysis including image reconstruction, multi-modality fusion, quantitative image analysis and high-resolution graphics are also provided. Personnel are trained in the operation of each imaging modality and small animal handling procedures. Analytical software support for quantitative image analysis including image reconstruction, multi-modality fusion, quantitative image analysis and high-resolution graphics are also provided

Small Animal Irradiation Facility - Irradiation facilities are housed in the basement of the CB building and the Georgia Cancer Center (Nordian and JL Shepard Cs-137 irradiators), along with technical expertise and a comprehensive training program in place to assist with procedures.

AFFILIATED ENTITIES

Charlie Norwood Veterans Affairs Medical Center

The Charlie Norwood Veterans Affairs Medical Center is a two-division medical center providing tertiary care in medicine, surgery, neurology, psychiatry, rehabilitation medicine, and spinal cord injury. The Downtown Division is authorized 166 beds (58 medicine, 37 surgery, and 71 spinal cord injury). The Uptown Division, located approximately three miles away, is authorized 123 beds (68 psychiatry, 15 blind rehabilitation and 40 rehabilitation medicine). In addition, a 132-bed Restorative/Nursing Home Care Unit and a 60-bed Domiciliary

are located at the Uptown Division. The medical center serves as a network resource for the treatment of spinal cord injury, blind rehabilitation, posttraumatic stress disorder, and psychiatry patients.

Georgia War Veterans Nursing Home - A 192-bed skilled nursing care facility located adjacent to the Health Sciences campus of Augusta University. It is operated under an interagency agreement between the Georgia Department of Veteran Services and Augusta University. The facility is accredited by The Joint Commission.

Augusta VA Medical Center has two locations in Augusta with its downtown hospital connected to Augusta University Medical Center by a covered walk-way. The facility has 166 beds (58 medicine, 37 surgery and 71 spinal cord injury). The VA Medical Center has an affiliation agreement with Augusta University. Both entities have collaborated in clinical research studies.

Fort Gordon – United States Army installation with approximately 30,000 military and civilian employees. Dwight D. Eisenhower Army Medical Center is located on the base and serves active duty military and their families as well as military retirees in the surrounding area. The Medical Center has a research Department of Clinical Investigation (DCI).

INSTITUTIONAL RESOURCES

Sponsored Program Grant Management

The Sponsored Program pre-award accountant supports the department with assisting in the identification of funding; reviewing program guidelines prior to review of applications; providing assistance in proposal development related to sponsor, institutional, and compliance requirements; serving as liaison with the Legal Office in contract review process; reviewing proposals and provide institutional sign-off; receiving notice of award from sponsors; requesting account numbers from Post-award Staff; receiving payments from sponsors and matches to appropriate accounts; reviewing extension requests; reviewing requests for establishment of Residual Accounts; providing training to faculty and departmental administrative research staff; oversight of fiscal and administrative compliance issues; liaison with sponsors on behalf of the institution and the investigator relative to matters that require sponsor prior approval.

The Sponsored Program post-award accountant supports the department with establishment of sponsored accounts and budget load; approval of ne-budgeting and cost-transfer requests; invoicing of sponsors/submission of cash drawdown for federal awards; deposit of payments; development and submission of Financial Status Reports to sponsors; oversight of close-out activities, including establishment of residual accounts; assisting departments with accounting issues; provision of training to faculty and departmental administrative research staff; development and negotiation of federal Facilities & Administrative Cost Rate Agreement; oversight of effort reporting and cost-sharing activities; oversight fiscal and administrative compliance issues relative to fiscal and administrative management of extramurally funded projects.

The Research Development Service (RDS)

This office works with researchers and staff to obtain Augusta University Health System services and resources for studies. Augusta University Health resources include access to patients, the clinical research pharmacy, radiology, pathology and other ancillary hospital services. RDS assists researchers with access to hospital online programs, databases and patient derived materials including tissue and blood. RDS serves as the administrator of the hospital clinical data warehouse (i2b2) and facilitator of PowerTrials, the research module for the hospital electronic health record. The research application enables appropriate access to the medical record for research staff and study monitors, and works in conjunction with OnCore, the enterprise-wide clinical research management system.

Augusta University Health is a not-for-profit corporation that manages the clinical operations associated with Augusta University. The health system includes a 478-bed medical center, the 154-bed Children's Hospital of Georgia including the region's only Level IV Neonatal Intensive Care Unit (NICU), a Critical Care Center housing a 13-county regional Level I trauma center, the Georgia Cancer Center, more than 80 outpatient clinics as well as community-based clinics and hospitals in other Georgia locations.

Clinical Research Pharmacy – Investigational Drug Services
The AU Medical Center Clinical Research Pharmacy provides oversight and direction for the use of investigational medications for all clinical facilities on the campus of Augusta University (AU). Areas of service specific to cancer clinical research supported by the Clinical Research Pharmacy include the Georgia Cancer Center and Georgia AU Medical Center (inpatient hematology/oncology, bone marrow transplant, pediatric hematology/oncology clinic, and Children's Hospital of Georgia inpatient pediatric hematology/oncology).

The Clinical Research Pharmacy promotes patient safety, regulatory compliance and safe conduct of human research for all protocols involving investigational drugs and/or study medications, and also provides expert consultation to investigators. All study medications for clinical research are stored in and prepared/dispensed from the Clinical Research Pharmacy in the main hospital (24 hour access area) or the satellite Clinical Research Pharmacy location in the Cancer Center Pharmacy. The main Clinical Research Pharmacy is a separate locked room in the secure, 24-hour inpatient (hospital) pharmacy. The Cancer Center Pharmacy has a dedicated area for clinical research activities including separate locked cabinets and a locked refrigerator and freezer for study medications. All the refrigerators and freezers are monitored with a local audible alarm and central monitoring to ensure appropriate drug storage temperatures. In addition to maintaining records of refrigerator and freezer temperatures, the minimum/maximum room temperature and room humidity are recorded in both locations each business weekday.

Investigational Drug Services are provided by a Clinical Research Pharmacist Supervisor (over 22 years of research pharmacy experience), an Oncology Clinical Research Pharmacist, a Clinical Research Pharmacy Technician Supervisor (over 14 years of research pharmacy experience) and an Oncology Clinical Research Pharmacy Technician. The second pharmacist and technician positions were added in fall 2012 due to the rapid expansion of oncology-related clinical research at our institution. The Clinical Research Pharmacy supports an average of 150-200 ongoing clinical trials from Phase 0 to Phase 4 at any point in time. The clinical research protocols includes a wide range of sponsorship (pharmaceutical industry, investigator-initiated, grant-funded and NCI-cooperative group) and clinical conditions (cancer, sickle cell, cancer prevention, vaccines, psychiatry, neurology, neurology and stroke, movement disorders, infectious diseases including HIV, cardiac). The pharmacy has been actively involved in all medication-related trials conducted at our institution's Cancer Clinical Research Unit since it opened in 2008. Both pharmacists serve on the Protocol Review and Monitoring Committee (PRMC) for the Augusta University Georgia Cancer Center.

Clinical Research Pharmacy Services include:

- Expert consultation to investigators on medication-related issues
- Protocols for pharmacy dispensing of investigational drugs
- Preparation and dispensing of investigational medications including compounded sterile products, antineoplastic agents, and outpatient (take-home) prescriptions of all types.
- Preparation of pharmacy budgets
- Service as a resource for investigational drug-related questions
- Maintenance of drug inventory, accountability documentation and study blinding
- Support for study monitor visits and for audits
- Research pharmacy tours for study site selection visits
- Blinding and randomization for investigator-initiated studies
- Confirmation of informed consent documentation, study enrollment and authorized investigator prescriber prior to dispensing study medication

Oncology Pharmacy Services: Oncology Pharmacy services for the Georgia Cancer Center and AU Medical Center are provided by a dedicated team from the Department of Pharmacy. Certified pharmacy technicians aseptically prepare chemotherapy under the supervision of Oncology Pharmacists in the Cancer Center Pharmacy (Monday through Friday day shift for outpatients and inpatients) and Hospital Pharmacy (weekends and holidays). Each location has an IV clean room with biological safety cabinets and laminar flow hoods and

meets USP 797 standards. The hospital pharmacy is staffed 24 hours every day, and oncology pharmacists are always on site or on call. The current staff includes five Oncology Pharmacists employed by the hospital and two who are faculty from the University of Georgia College of Pharmacy, four chemotherapy pharmacy technicians and a pharmacy reimbursement (patient assistance) specialist and a pharmacist manager for the Oncology Service line. The AU Pharmacy and the University of Georgia College of Pharmacy also have a PGY2 Oncology Pharmacy Residency (ASHP accredited since 2011) with a residents who participates in oncology patient care and clinical trial activities.

AU Institutional Review Board (IRB)
The IRB provides both an educational forum and an internal monitoring function to assure that all research studies utilizing human subjects and/or human derived materials comply with federal, state, and institutional regulations and policies to protect research subjects, the university and the research team while assigning the highest priority to human subject protection. The IRB hosts the institution's electronic institutional review board management system, IRBNet.

IRB Support Services
Educational Venues:

- Study Start-Up Compliance Meetings: required for new principal investigators (PI) and experienced PIs who are new to Augusta University. The meeting, conducted by a compliance coordinator, provides an overview of IRB requirements based on the research protocol.
- Collaborative IRB Training Initiative (CITI) for all research team members.
- Walk-in –Wednesday: weekly afternoon walk-in sessions for researchers and support staff.
- IRB Navigator: the Navigator provides one-on-one assistance with all aspects of the IRB submission process.
- IRBNet Training: available for groups, or individuals.
- Compliance Lunch-n-Learn: monthly training on key aspects of study conduct and compliance

Compliance
The IRB has developed an extensive clinical trial review process to optimize clinical trial compliance with federal, state, and institutional regulation and policies. These reviews may be one of four types: random, for cause, medical record review, or investigator-initiated. A periodic review of published articles by AU faculty is also conducted.

AU Office of Innovation Commercialization (OIC)
Whether with startup, small, medium or large companies – around the world, as well as in our own community – OIC is actively marketing and commercializing exciting and promising new technologies which can change the future for the better. OIC hosts the Life Sciences Business Development Center – a 14,000 sq. ft. facility including wet labs, offices, shared equipment and common areas. OIC staff works with Augusta University innovators and industry partners across a range of intellectual property-related activities, such as: Confidential disclosure agreements, Material transfer agreements, Industry-sponsored research agreement support, Clinical trials agreement support, Patenting of exciting new inventions, Option agreements, and License agreements. OIC is excited to be closely involved in Augusta University intellectual property commercialization-related activities with companies from the Fortune 100 to the newest startup firm. In the course of these activities, OIC negotiates more than 500 agreements each year in support of research, innovation, and commercialization.

Additional Services
Machine shops and electronic shops are additional support facilities provided through the AU Laboratory Equipment Services division. Other research support divisions include Medical IIlustration and Photography, and Biological, Chemical, and Radiation Safety divisions.

ANIMAL CARE PROGRAM
Augusta University (AU) maintains a centralized animal care program with administrative responsibility assigned to the Division of Laboratory Animal Services (DLAS). The Office of DLAS reports to the Senior Vice President

of Research and consults/collaborates with the Institutional Animal Care and Use Committee. DLAS serves as the primary resource for the use of animals in research and education. The department provides primary care and oversight to all vivariums dispersed throughout the multiple research buildings on three AU campuses. The Animal Care and Use Program and vivarium facilities have been accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC) since May 1978. Augusta University is a Registered Research Facility with the United States Department of Agriculture (USDA Number 57-R-0002), and the Office of Laboratory Animal Welfare (OLAW Assurance number: D16-00197; previously A3307-01).

DLAS's office is physically located in the Sanders Research and Education Building (CB), Room 2803. There are three full-time Clinical Veterinarians and 20 animal care technicians on staff, in addition to administrative support staff for overseeing animal ordering and "facilities maintenance". The total space for housing animals is approximately 91,000 sq. ft. Species represented on campus may include, but are not limited to: mice, rats, hamsters, zebra fish, pigs, dogs, and non-human primates

The Institutional Animal Care and Use Committee (IACUC)
The Institutional Animal Care and Use Committee (IACUC) reviews all research and teaching protocols involving the use of animals and fulfills regulatory compliance with USDA, OLAW and the PHS mandated requirements.

AUHS CLINICAL SITES
Medical Office Building (MOB**)** - Augusta campus – has multiple facilities housing ambulatory clinics for more than 80 outpatient specialties/ subspecialties and over 425,000 outpatient ambulatory visits. Additional institutional clinical practice sites include West Wheeler facility which has 20 outpatient specialties/subspecialties and over 50,000 outpatient ambulatory visits, Lake Oconee facility which has 15 outpatient specialties/subspecialties and over 12,500 outpatient ambulatory visits, and the Hillcreek facility which has 2 outpatient specialties/subspecialties and over 3,500 outpatient ambulatory visits. Clinical service also targets the diverse needs of the state and nation, from frontline wellness care to complex care for the sickest adults and children. Assets include: a 478-bed adult hospital, a 154-bed children's hospital, and a 13-county region's only Level 1 adult and pediatric trauma center. The Medical Office Building, with more than 80 outpatient practice sites in one building. Other practice sites include Lake Oconee Village in Greensboro and the West Wheeler Medical Clinic in West Augusta. MCG faculty physicians also see patients at around 80 sites across Georgia. Alliances across the state, including an affiliation with Roosevelt Warm Springs Institute for Rehabilitation and a long-standing relationship to manage health care for 59 adult prison facilities for the Georgia Department of Corrections and a new relationship with the state's Department of Juvenile Justice to manage health care for 26 facilities. This year, the health system also launched the Center for Rural Health Study and Support, to support statewide coordination of clinical and educational outreach, as well as multidisciplinary research.

Clinical Laboratory
The AUHS clinical laboratories are located on the second floor of the AUHS Hospital. There are also satellite laboratories located within the Family Medicine practice site, Pediatrics, the Georgia Cancer Center, Children's Hospital of Georgia operating room, and the adult operating room. Testing includes microbiology, parasitology, mycology, virology, serology, immunology, toxicology, routine clinical chemistry, immunochemistry, cytogenetics, molecular microbiology, molecular genetics, immunogenetics (HLA), flow cytometry, immunohistochemistry, anatomic pathology (surgical and cytopathology), histology, and hematopathology. The AUHS Clinical Laboratories are accredited by the College of American Pathologists (CAP) and function under the regulatory rules of the Clinical Laboratory Improvement ACT (CLIA), Food and Drug Administration, and Joint Commissions on Accreditation of Health Care Organizations. Research rates are available.

ELECTRONIC MEDICAL RECORD
The patient component of the AUHS electronic information system is a Cerner based electronic medical record. Linked directly with the EMR system are three specialized clinical research applications. 1. The 12B2 platform which allows investigators to access de-identified clinical data from a clinical data warehouse; Searchable domains include diagnoses, patient demographics, laboratory results, medications and procedures; 2. PowerTrials which provides directed research access to the medical record which enables investigators to

identify potential study participants, use the electronic medical record for source documentation, easy recognition of patients enrolled in clinical trials and directed access to the medical record for external study monitors, and 3) the OnCore Clinical Trial Data Management Systems with integrated Registry and Biorepository functions.

GRAChlE

We are involved in GRAChlE, a Health Information Exchange (HIE) providing foundational interoperability services to support care coordination across GA and already includes over 1.1 million patients. It was founded in 2012 by Georgia Regents Health System (Augusta) and Navicent Health (Macon). GRAChlE is a 501c3 HIE, governed by its Board of Directors. GRAChlE has developed a sustainable platform to assist healthcare providers in reaching networking strategies from Meaningful Use, Accountable Care development, Patient Centered Medical Home, and Population Health strategies. GRAChlE has successfully on-boarded 15 unaffiliated healthcare organizations and is in process of onboarding another 30. GRAChlE is still working throughout GA to recruit new members primarily focusing its efforts on Central and Eastern GA.

ON-LINE COLLABORATIVE RESEARCH ENVIRONMENT (OnCore®)

The On-line Collaborative Research Environment (OnCore®), developed by Forte Research Systems, is Augusta University's clinical research management (CRM) system of record. This web-based solution provides a secure centralized system for tracking and managing clinical research. OnCore includes a suite of clinical and translational research and cancer modules to manage clinical research trials, patient registries and biospecimen management activities. OnCore's extensive interface is designed to facilitate complex workflows and it provides research coordinators and administrators the ability to manage day-to-day operational activities of clinical studies. OnCore increases effectiveness and efficiencies for all aspects of the research protocol including, budgeting, tracking protocols and enrollments, patient tracking, clinic visit tracking, sponsor billing, accrual reporting, committee reviews, internal auditing, and reporting to regulatory agencies. OnCore provides multi-center trial support functionality as well as collaboration with other OnCore research organizations. OnCore has been successfully implemented in 86 institutions, 46 Cancer Centers (of which 35 are NCI-designated), 29 academic medical centers (17 CTSAs), and 11 health care systems and hospitals. All Augusta University clinical researchers have access to this system and the internal OnCore support team. Augusta University launched OnCore in September of 2014.

I2b2 - (Informatics for Integrating Biology and the Bedside) is an NIH-funded National Center for Biomedical Computing based at Partners HealthCare System. The i2b2 NCBC developed a scalable informatics framework that bridges clinical research data and the vast data banks arising from basic science research in order to better understand the genetic bases of complex diseases. This open-source platform currently enjoys wide international adoption by the CTSA network, academic health centers, and industry. Augusta University utilizes the i2b2 platform and the AU medical center data warehouse to support research. i2b2 was designed primarily for cohort identification, allowing users to perform an enterprise-wide search on de-identified or IRB approved identifiable data from individualized Data Warehouses to determine or validate a set of patients meeting specific inclusion or exclusion criteria. The i2b2 framework is packaged with a query tool that allows the user to drag-and-drop search terms from a hierarchical ontology into a Venn diagram-like interface. The AU data warehouse compiles data from multiple sources including the Electronic Health Record, billing systems, and other applications. Researchers can utilize the i2b2 platform to request or perform an initial analysis to produce de-identified data. If the results are promising, fully identified data can be extracted and stored on the R drive to be further defined through chart review. The consolidation of this wealth of data into a single secure database maximizes efficiency, quality, safety, and security while allowing monitoring to assure consistency with regulatory requirements.

COMPUTERS

The PIs, Co-Investigators, and the other study-supported staff are part of a large computer network with secure access to information as needed for each respective role. No additional computer resources will be required for this project. The Augusta University community is served by a fiber-optic-cable-based Ethernet backbone, which serves the main campus as well as satellite campuses throughout the state of Georgia. All faculty and staff have access to email, the Internet, research computers/servers (Linux and Windows operating systems) and library

services (including on-line searching of comprehensive literature databases including Medline as well as other library databases such as ElSevier's PURE) through this superstructure. In addition, the Department of Obstetrics and Gynecology maintains a dedicated server and a dedicated full-time computer engineer to maintain and upgrade hardware and software systems as well as facilitate interactions with computer networks and servers. The servers are located in a secured Tier III data center (see below).

Data Center Power Specs -The Augusta University data center located at the Health Sciences Campus is a Tier III data center which is concurrently maintainable. This allows for any planned maintenance activity of power and cooling systems to take place without disrupting the operation of computer hardware located in the data center. In terms of redundancy, Tier III offers "N+1" availability. IT has "N+1" in all facets of the AU data center, except the generator. The building is fed by 3 independent power feeds from a substation about 1Ž2 mile away. Located in a room near the data center, there are dual uninterruptible power supply (UPS) systems operating at less than 40 percent load. The UPS systems feed redundant data center power distribution centers which provide redundant rack/server power. For devices that do not support dual power supplies, IT provides an in-rack automatic transfer switch to transfer between UPS system feeds. Network is configured with multiple feeds from the fiber ring and network gear in the data center is redundant to each rack/server identified by either blue cabling for side A or white cabling for side B. IT has a single diesel generator (load tested monthly) located outside the data center, near the North Entrance of Annex I. This investment and redundancy lessens the likelihood of a total data center outage.

Data Center Security - Access to the data center is strictly controlled to essential personnel only by the use of smart cards issued to those requiring access. IT Security audit this list quarterly. Data center access to visitors require that they sign a visitor log and be escorted by IT personnel. This log is maintained as a paper log. The log shows the name of the visitor, time in, time out and purpose for the visit. Additionally, video cameras are deployed within the data center to monitor and record all activity occurring within the data center and control room.

Data Backup/Recovery - All data is backed up to tape daily via IBM Tivoli Storage Manager. Backups are monitored daily by the TSM Administrator. Tapes are sent off-site daily and stored off-site. The Computer Operations Supervisor maintains a list of off-site storage. The Manager of Systems and the Manager of Data Center Operations maintain a list of who has access to data sets.

University Libraries Facilities

The University operates two main libraries, Robert B. Greenblatt, M.D. Library on the Health Sciences campus and Reese Library on the Summerville campus, both accessible to students and faculty from all locations. There is also a library at the AU/UGA Medical Partnership in Athens, GA and a library service point in the J. Harold Harrison, M.D. Education Commons Building on the Health Sciences campus. Greenblatt Library serves students and faculty in programs focused on health professions and biomedical sciences. Housed in the center of the Health Sciences campus, the two story, 70,967-square-foot Greenblatt Library, built in 1963, is open 98.5 hours a week for research, stacks access, work, study, and meetings. Study tables, open study carrels, lounge furniture, conference rooms, individual study rooms, and small-group rooms meet the study needs of Greenblatt Library users. The library partners with Information Technology to maintain three electronic classrooms on the first floor, with a total of 59 workstations for training, instruction, and online testing. An additional 33 workstations are maintained in open labs with productivity software and Internet access for general use. An 86-seat room with video conferencing and lecture capture capabilities is available for instruction and assembly. Reese Library serves the students and faculty in the Summerville Campus. Reese Library, built in 1976, is a three story, 85,000-square-foot building, located on the Summerville campus, and adjacent to the Jaguar Student Activity Center. The library is currently open 109.5 hours a week. Reese Library has 78 workstations for AU affiliates use as well as 4 workstations for general public use and 3 kiosk stations for quick catalog look-ups. Study tables and comfortable seating are located throughout the building. Group and individual study rooms, including three presentation rooms, are available. There is wireless access throughout the building. An instruction room with 30 laptops is located on the first floor.

The J. Harold Harrison, M.D. Education Commons building, is a three-story 175,000 square-foot building with classroom and group learning space for Medical College of Georgia and College of Dental Medicine. The building holds an interprofessional state-of-the-art simulation center. A designated library space is available for students on the second floor, hosting a consultant desk and an integrated Mediascape workstation to encourage collaboration. The Greenblatt Library faculty and Library staff offer assistance in finding full text articles, searching research databases, applying evidence-based medicine principles, and using the bibliographic software Endnote. In addition, as a part of the Augusta University/University of Georgia (AU/UGA) Medical Partnership campus in Athens, GA, there is library space that serves the students, faculty and staff of the Medical Partnership, which is open 24 hours a day/ seven days a week. The space houses a 357 reference book collection and several study aids such as anatomical models, with the librarian's office in the adjoining room. The library space includes study tables and comfortable seating to complement the small group rooms that are also used for studying. The AU/UGA Medical Partnership campus students, faculty and staff have access to the online resources at the AU Libraries.

Resources - The Greenblatt Library's web site features quick links to critical resources such as *AccessMedicine*, *CINAHL Full Text*, *Micromedex, Ovid*, *PubMed*, *UptoDate*, *Turning Research Into Practice (TRIP) Database* and *Web of Science*, as well as providing links to other available library resources, research guides, and services. E-book collections include *AccessMedicine*, *Ebrary*, *eBooks on EBSCOHost*, *Science Direct*, and *SpringerLink.* Table 1 (below) illustrates the AU Libraries' holdings as of June 30, 2016.

AU Libraries' Information Resources (as of June 30, 2016)

Type of Information Resource	Holdings
Paper Format Books	321,307 titles and 338,743 volumes
Serials	4,545 titles and 214,362 volumes
Audiovisual Materials	6,738 pieces
Microforms	79,404
E-books	411,474*
E-journals	326,985**
Government Information	170,500 paper pieces and 67,576 digital items
Special/Historical Collections	964.1 linear feet of processed collections

*includes GALILEO ebook collections for ebrary, EBSCO as well as Safari Books Online
**includes ejournals through GALILEO

The AU Libraries provide access to electronic materials through GALILEO (Georgia Library Learning Online) and other information portals. GALILEO is the University System of Georgia's (USG) consortial, online portal to authoritative, primarily subscription-only information across all disciplines. Among the GALILEO offerings for AU are general key academic resources, including *Academic Search Complete*, *ProQuest Research Library,* as well as a wide variety of discipline-specific databases, such as *Education Resources Information Center* (*ERIC*), *Business Source Complete,* and *MLA International Bibliography. Academic Search Complete,* for example, indexes full-text, peer-reviewed journals and provides full text access to conference proceedings, books, reports, etc., in the sciences, social sciences, and humanities discipline-areas. *ERIC,* a discipline-specific database, provides digital access to education-related materials including books, research syntheses, conference papers, and full-text journal articles. GALILEO offers a discovery tool (EBSCO Discovery Service), which simultaneously searches the databases within the GALILEO collection as well as individual subscription resources and the Libraries' catalog which have been integrated into the tool. Greenblatt Library provides additional access to critical clinical resources for evidence-based patient care, teaching, and research. The premier biomedical database, MEDLINE, provides links to full-text articles in the fields of medicine, nursing, dentistry, veterinary medicine, the health care system, and pre-clinical sciences. Web of Science provides access to science and other multi-disciplinary resources beyond MEDLINE. Discipline-specific resources include Cumulative Index to

Nursing and Allied Health (CINAHL) and PsycInfo. Point-of-care clinical tools are part of Greenblatt's online offerings and include *UpToDate®, Essential Evidence Plus, AccessMedicine, TRIP Database* and *JAMAevidence®*. *UpToDate®* is a decision support resource that reviews medical literature to help medical professionals formulate clinical recommendations. Essential Evidence Plus synthesizes topic reviews, guidelines, calculators, and research summaries. JAMAevidence® provides guides to best available evidence by reviewing the validity, importance, and applicability of claims about the assessment of health problems and the outcomes of health care.

Reese Library provides a number of electronic resources to meet primarily undergraduate and faculty scholarly needs such as, *JSTOR* and *Project Muse. JSTOR* provides electronic access to back issues (from the date of first publication) of selected, core journals in a variety of discipline areas while *Project Muse* focuses on digital humanities and social sciences content. Discipline-specific resource examples include *Oxford Music Online*, *ARTstor*, *IOPScience* (Institute of Physics journals), and *Cambridge Histories Online*.

Distance Learning **-** All off-site instructional campus sites and distance education students have access to web-based library resources via individual user authentication. The off-site campus locations include the Southwest Campus at Phoebe Putney Memorial Hospital, Albany, GA; the Southeast Campus at St. Joseph's/Candler Health System in Savannah, GA; Southeast Georgia Health System in Brunswick, GA; Northwest Campus in Rome, GA; Roosevelt Warm Springs Rehabilitation and Specialty Hospital in Warm Springs, GA; as well as the AU/UGA Medical Partnership campus, located in Athens, GA.

Georgia Prevention Institue (GPI)

The Georgia Prevention Institue (GPI) a division in the department of Population Health Sciences established by the Board of Regents of the University System of Georgia in 1981 to conduct research on health promotion and disease prevention research and has had continuous NIH funding since 1984. Its primary function is to conduct epidemiologic and interventional research on the antecedents of cardiovascular and metabolic diseases in both youth and young adults. It has 10 full-time faculties members with expertise in cardiology, cell biology, clinical psychology, genetic epidemiology, molecular genetics, physiology, and smoking prevention. The GPI also has 6 laboratories including a Cardiovascular Reactivity and Stress Laboratory, an Echocardiography Laboratory, an Exercise and Human Metabolism Laboratory, a Body Composition Laboratory, a Biochemistry Laboratory, and a Molecular Genetics Laboratory, which provide all the facilities for the scientific measures proposed in the current project. The focus of these studies has been on prevention in the development of cardiovascular disease including essential hypertension, diabetes, and obesity. These studies have generated approximately 11,000 subject visits/year each of the last four years, generating approximately 60,000 blood and urine samples per year and 12 million hemodynamic measurements. Findings of these studies have resulted in a number of scientific advances in the prevention and treatment of disease in youth and young adults.

The GPI also has a long and successful history of conducting both population and lifestyle intervention studies in obesity, hypertension and related target organ damage, examining ways to reduce obesity, inflammation, hypertension and type 2 diabetes (T2D) in youths and young adults and also attempting to identify the mechanisms underlying obesity, hypertension and other CVD and T2D.

Laboratories: The GPI has a number of laboratories including:

Bioassay:	600 sq ft
Body Composition:	400 sq ft
Exercise & Metabolism:	1,325 sq ft
Genetics & Cell biology:	1,200 sq ft
Gymnasium:	3,184 sq ft
Hemodynamic Reactivity:	700 sq ft
Interview/consent:	300 sq ft
Mobile Research Lab:	350 sq ft
Multipurpose Room:	246 sq ft

Bioassay: consists of three rooms totaling 600 sq ft. This lab space is for sample processing, and is equipped with centrifuge, orbital shaker, autoclave machine, water cooling system, incubator, water bath as well as -20c and -80c freezers.

Body Composition Laboratory: consists of two rooms totaling 250 sq ft. One is equipped with two dualenergy X-ray absorptiometers (Hologic QDR 1000 and QDR-4500W), a body weight scale, stadiometer, and skinfold measurement and other anthropometric equipment. The other room is used for medical examinations and completion of questionnaires.

Cardiovascular Imaging: three rooms are equipped with patient examination tables and Critikon Model 1846SX Dinamap adult/pediatric monitors. One is equipped with two computers featuring the Arterial Analysis Systems from Medical Imaging Applications, Inc. (Iowa City, Iowa). Two rooms have Hewlett Packard (HP) 5500 echocardiograph featuring HP fusion imaging and an S4 (model 21330A) ultraband sector transducer (2-4 MHz) and SphygmoCor machines. HP fusion imaging integrates the low-and high-frequency ranges acquired through the ultraband transducers into one image. Harmonic imaging with the S4 transducer allows exceptional image quality, texture detail and contrast resolution to help evaluate even difficult to image subjects. In addition, the HP 5500 has an ultraband linear-array transducer (L7540) with a bandwidth of 4MHz to 10MHz allowing arterial and venous imaging. The fourth room has an HP model 7500 echocardiograph that has 3D feature in addition to the above described features of HP 5500. Each evaluation room is interfaced with an observation room where hemodynamic instrumentation and related equipment are used. Four of the evaluation rooms are equipped with adjustable hospital beds and the fifth evaluation room has two comfortable reclining chairs.

Genetic and Cell Biology Laboratory: The Genetics and Cell Biology lab is comprised of four rooms totaling 1,200sq. ft. A variety of equipment items are available for genetic/epigenetic and cellular analysis. The equipment includes: 1 Applied Biosystems 7500 Fast Real-Time PCR System for SNP genotyping and gene expression analysis, 1 PyroMark Q24 system for mutation analysis and DNA methylation pyrosequencing, 2 ABI 9800 fast thermocyclers for PCR, RT- PCR,1 cell culture hood, 1 C02 incubator and 1 inverted microscope for cell culture, 1 refrigerated Eppendrof Multipurpose Centrifuge 581OR and 2 desk top microcentrifuges for Protein prepration and cell harvesting, 1 Bio-Tek PowerWave HT Microplate Spectrophotometer for ELISA assays, Thermo Scientific NanoDrop 2000 Spectrophotometer, 1 Bio-rad Gel Documentation system, 1 Semi-Dry Transfer Cell system, 1 electrophysiological transepithelial measurement system, 1 temperature-controlled microplate shaker, 1 orbital shaker, 2 VWR CryoPro Rack Liquid Nitrogen tanks (120L) and 2 -20"c and 2 -80"c freezers.

Interview/Consent Laboratory: Three 100 sq ft rooms with tables and chairs used for interviews/consenUassent forms, questionnaire administration, etc.

Multipurpose Room: One 246 sq ft room with a TV, large table and ten chairs is available for informed consent discussions with families and other small group activities.

James and Jean Culver Vision Discovery Institute

In 2008, the Medical College of Georgia at Augusta University launched the “Vision Discovery Institute” (VDI) now an endowed institute named: The James and Jean Culver VDI. (Brigadier General Dr. James F. Culver was an MCG (’45) graduate who was the first ophthalmologist for the aerospace program.) The mission of the Culver VDI is to promote effective interactions among clinicians and scientists who engage in high impact research and discovery related to visual function and disease. The outcome of these interactions is expected to promote translational research that will have far-reaching clinical applications for patients suffering from blindness and visual disorders. Currently, ~30 faculty (including clinical ophthalmologists, basic science vision researchers, and vision rehabilitation experts), 9 ophthalmology residents and a host of laboratory members (students, post-doctoral fellows, research associates, technicians) meet monthly to discuss the clinical and basic scientific aspects of visual disease (the Vision “DIGM” series). The Culver VDI hosts a monthly distinguished seminar

series to foster interactions with noted vision scientists and clinicians from around the country. This team of interactive basic scientists and clinicians train graduate students in an organized program that features three vision science courses, an annual scientific retreat and a small grants program that supports pilot projects, which foster collaboration between basic scientists and clinicians. The Culver VDI has a basic science co-director (S.B. Smith, PhD.) and a clinical co-director (J. Nussbaum, MD).

COLLEGE OF NURSING (CON)

Housed in the top two stories of the 189,000 sq. ft. 5-story Health Science Building (HSB), the AU College of Nursing (CON) is the flagship nursing education program for the USG with 69 regular faculty members. The stellar faculty has led the campus in NIH-funded community-based participatory research to reduce health disparities, the development of hi-fidelity, realistic, simulated learning environments, smoking cessation practice and research, and long-term maintenance of a Community Advisory Board for research. In the past 4 years (FY 2013-2016), the CON received $3,185,813 in extramural research, training, and service grants that involved innovative research in the areas of sickle cell disease, risk for sepsis and organ failure following trauma, faith-based diabetes prevention,implementation of a video analysis tool in a geriatric community setting, and lung cancer screening. The focus of CON research since 2015 is ground-breaking bio-behavioral research in such vital areas as epigenetics across the life span and generations, inflammatory responses across the health continuum, and interventions across healthcare settings to reduce health disparities;

The CNR professional team also facilitates community service and practice grant preparation and project evaluation and dissemination. Under the auspices of the Center for Strategic Initiatives, CON signature community projects provide opportunities to integrate teaching, research, and service/practice. Also sponsored by the CON, the Greater Augusta Healthcare Network (GAHN) is a consortium of seven safety-net community clinics, six hospitals, and eight community organizations. GAHN's mission is to increase access to quality and affordable health care for medically underserved Augustans who experience a host of negative determinants of health. Another signature project is the CON Healthy Grandparents Program which has been funded since 1999 by the Georgia Department of Human Resources at an average of $133,000 per year. With faculty, professional staff, and students, this program has served 375 families, 507 grandparents, and 816 grandchildren by providing support groups, monthly nurse visits, health and wellness programming, custody/adoption services, and referral assistance, yielding positive health and educational outcomes. For 10 years, 2 annual Costa-Layman interprofessional health fairs sponsored by the CON serve up to 400 international farm workers (one general health and one women's health including cervical cancer screening). Twice a year, a delegation of faculty and students spends 10 days in Peru to provide cervical cancer screening and prevention services. Finally, the CON partners with the state psychiatric hospital to hire and support the nursing staff.

Center for Nursing Research (CNR)

The CNR is staffed with full-time grants development specialist, office manager, research associate, data manager, and a bioinformaticist. The CNR advances the CON research and scholarship mission by facilitating faculty and student efforts to obtain external funding for research, educational, and community service projects. The CNR personnel assist faculty with conducting literature searches, processing Human Subjects protocols to the three University-based Institutional Review Boards (IRBs) for approvals, preparing and submitting grant proposals and budgets, and providing internal and external mock reviews before grant submissions. The CNR offers bi-monthly educational seminars and "work-in progress" sessions to facilitate interdisciplinary collaboration and assists faculty with post-award requirements. CNR also provides consultations to publish research findings in high impact journals: with the support to access Web of Science ranking data for various specialty and professional journals.

Within the HSB, the CNR has three project rooms, a large conference room, and 10 offices for research team meetings, personnel offices, and related work. The CNR awards funds for pilot projects, poster production, and travel, and provides research software for big data analysis and meta-analysis projects.

Interdisciplinary Practice and Research Center in HSB

Clinical evaluations and procedures can be conducted in the Interdisciplinary Practice and Research Center (IPRC), which allows nursing and allied health practitioners to assess and treat clinical and research clients. The clinic is a 3,767 square foot contiguous, interdisciplinary workspace that is available for patients' visits and

interviews as well as venipuncture and other noninvasive procedures. Five examination rooms, practitioner work space, secure file storage, phlebotomy laboratory space, and convenient registration and waiting areas are available. Free, ground-level patient parking areas are located on either side of the Center. A designated handicap parking and entrance are available for convenient patient access. With the approval of AU's Interdisciplinary Space Committee, In IPRC, CON has about 300 square foot space allocated for epigenetics research, equipped with three alarmed deep freezers and two usual laboratory refrigerators-freezers, bench top research lab space equipped with two centrifuges for sample processing, and an interview room. Additional phlebotomy room, waiting room, patient clinic space, conference rooms are shared with multidisciplinary professionals to serve underserved patients.

THE DENTAL COLLEGE OF GEORGIA (DCG)

The Center for Clinical & Translational Craniofacial Research (CCTCR) The CCTCR is located on the fourth floor of the Dental College of Georgia and provides a dedicated environment for clinician scientists, basic scientists, and graduate students to perform clinical and translational craniofacial and oral health research. It encompasses approximately 3,500 square feet including four complete dental operatories, two surgical suites, a large reception area, two interview rooms, a phlebotomy room, and secure storage space for biological samples, a fully functional dental laboratory, and office space.

The Periodontal Molecular Immunology Laboratory (PMIL) The PMIL consists of approximately 1,400 sq. ft of wet lab space a short walk from the dental college on the 2nd floor of the Carl T. Sanders Research Building.. The PMIL is a state of the art immunology laboratory devoted to study of the immunobiology of human and mouse dendritic cells and T cells and host-anaerobic pathogen interactions. PMIL contains a cell culture clean room, molecular biology workstation equipped with real time PCR system (Applied Biosystems), a separate thermocycler, nanodrop spec, Coy anaerobic chamber, cryostat, immunohistochemistry workstation with autostainer. Zeiss epifluorescence microscope with nomarski optics, Gel pro gel scanner and analyzer, RoboSep automated cell separation system and MacsQuant flow cytometer. The PMIL contains two Nuaire laminar flow hoods- one located in an enclosed tissue culture clean room for DC culture, the other in a semi-clean room for DC-pathogen pulsing experiments The tissue culture room is also equipped with Nikon inverted microscope, small refrigerator, Forma C02 incubator and refrigerated table-top centrifuge. The semi-clean room is equipped with Nikon E600 epifluorescence microscope (equipped with SPOT CCD camera, integrated with a Pentium IV PC running ImagePro and 2D and 3D deconvolution software, networked to a HP Color LaserJet 2840 printer), Shandon cytocentrifuge, UV/light spectrophotometer, MagPix multiplex proteomics reader and Emax ELISA reader equipped with a dedicated PC, microplate reader and cell harvester for T cell
proliferation assays

Molecular Oral Cancer Pathology Laboratory (MOCPL) The Molecular Pathology Laboratory carries out research to understand the pathogenesis of oral diseases, with a focus on oral cancer. This laboratory has expertise in animal and cellular models of cancer, gene expression analysis, promoter analysis, gene silencing and gene knockout, inducible expression systems, mutagenesis, and protein interaction techniques.

Biomaterials Testing Facility (Dental Materials) This facility located in the dental college is designed for testing basic physical and mechanical properties of dental restorative materials, and is also equipped to test a wide variety of types of specimens (non-biological). Testing capabilities include basic stress-strain measurements, biaxial and conventional flexural strength and modulus, the effects of thermocycling, as well as examining the effects of low stress, long-term fatigue. Characterization of light and exiting beam images in terms of spectral irradiance and overall beam homogeneity are available. Changes in specimen surface gloss, smoothness, and 3-D contour are obtainable using a variety of instrumentation. Surface contact angle measurements and surface energy values are also possible. Mid-infrared spectroscopy of flat surfaces is possible, as well as controlling specimen temperature while obtaining these spectra. Assistance in object design and resulting 3D-filament-based printing facilities are available, as well as are custom instrumentation facilities for fabricating self-contained, computer-controlled devices.