

## Resources

Since its founding in 1836, **Emory University** has grown into a national center for teaching, research, and service, awarding more than 3,300 degrees annually. For more than a decade, *U.S. News and World Report* has named Emory University as one of the nation's top 25 universities. The medical component of Emory University, known as the Robert W. Woodruff Health Sciences Center (WHSC), is a dynamic destination for education, a robust research institution, and the largest, most comprehensive health care provider in the state. Emory University research partners include the Georgia Institute of Technology, the University of Georgia, Morehouse School of Medicine, U.S. Centers for Disease Control and Prevention, Children's Healthcare of Atlanta, Georgia Cancer Coalition and the Georgia Research Alliance.

**Laboratory:** The Department of Psychiatry and Behavioral Sciences has over 12,000 sq ft of state-of-the-art molecular biology, surgical and wet lab space on the 4<sup>th</sup> floor of the Woodruff Memorial Research Building in addition to ~600 sq ft of animal testing rooms in the vivarium of Woodruff Memorial Research Building. The laboratory space on the 4<sup>th</sup> floor is adjacent to a five-room, light-controlled, and sound tight behavioral testing suite for facilitation of accurate and reliable testing of rodent behavior. This room was built specifically for rodent behavioral testing. In addition to the individual laboratory space in the WMRB, there are also shared space for equipment, dark room, -70°C freezer storage, glassware preparation, walk-in cold room, cell culturing, core molecular labs, chemical hoods for drug separation and concentration, and radioiodination and radioactive materials storage. These laboratories have all of the necessary equipment and accessories which are required to conduct this project.

### Human Psychophysiology of Emotion Core

This 450 square foot translational neuroscience laboratory is equipped with a psychophysiological suite that allows us to objectively assess the symptoms of mood and anxiety disorders using state-of-the-art technology. We have an acoustic startle system housed within a sound attenuated booth (Med-Acoustics - Acoustic System Model "RE-146MC") coupled to the BIOPAC MP150 Psychophysiological Recording Apparatus that allows us to measure acoustic startle (electromyogram, EMG), skin conductance (GSR), heart rate variability (electrocardiogram, ECG), respiration, and cognitive awareness concurrently. In addition, we have an ASL eye-tracking system that allows us to assess attentional bias as well as post-traumatic symptoms such as hypervigilance and hyper-arousal. Also, a laptop-based Emotional Stroop paradigm has been established to assess emotional regulation/dysregulation in traumatized, depressed, and anxious populations. The Human Psychophysiology of Emotion Core contains three Dell Latitude laptop computers, an iMac desktop computer, and two desktop PCs, all for the purposes of stimulus presentation (SuperLab 4.0, Cedrus Corporation, San Pedro, CA), data collection (AcqKnowledge 4.0), data analysis (Mindware, Mindware Technologies, Gahanna, OH; SPSS 19.0) and interpretation, and manuscript preparation.

### Emory University Center for Molecular Genomics

The Emory Center for Molecular Genetics (CMG) supports all Woodruff Health Science Center investigators as well as local, national, and international investigators in health science. The CMG is non-profit and focuses on the application of high-throughput genetic and molecular techniques for disease research in a translational setting. This includes molecular characterization, susceptibility genetic association studies, analysis, validation, and diagnostic development in a CLIA (CLIA # 11D1086150) certified environment. Services include: DNA extraction, quantification and storage, sequencing and fragment analysis, Taqman copy number assays (CNA), Beckman SNPStream multiplex genotyping, Illumina GoldenGate genotyping, Illumina Infinium whole genome genotyping, Affymetrix genotyping, Illumina Infinium methylation analysis, Illumina GoldenGate methylation analysis, and various RNA and microarray services. Available equipment at the CMG includes: Illumina Beadstation 500 Illumina's BeadArray technology provides superb sensitivity and specificity due to a high redundancy and robust QC across every feature. The BeadArray Reader with resolution of less than 1 micron can scan high density beadchips for applications in genotyping, mRNA & profiling, methylation characterization. Beckman Coulter SNPStream The Beckman Coulter SNPstream can genotype from 4,000 to 3 million genotypes per day. This system can process up to 48 SNPs per well of a 384-well plate, operating at a consistent cost per genotype/sample, regardless of run throughput, allowing users to cost-effectively pinpoint targets with both low and high-throughput studies. The SNPStream features a single-based primer extension technology and operates at over 99% accuracy. The system's high sensitivity delivers accurate results using

as little as 2 ng of genomic DNA. ABI 3100 capillary systems The ABI 3100 is a multi-color fluorescence-based DNA analysis system using the technology of capillary electrophoresis with 16 capillaries operating in parallel. This fully automated system separates amplified fragments of varying sizes for analysis of short tandem repeats (STRs) among individuals and extended pedigrees. Raw DNA sequence is retrieved from the 3100 and imported into Applied Biosystems SEQSCAPE, v.2.0, a sequence comparison tool designed to determine the quality of the DNA nucleotide calls and to identify nucleotide and amino acid variants.

### **The Biomedical Imaging Technology Center (BITC)**

The BITC at Emory University is housed in approximately 3000 square feet of space. BITC is a core facility of the School of Medicine at Emory University. It was established to focus on the development and application of imaging technology, particularly magnetic resonance imaging. BITC is equipped with a 3 Tesla Siemens Magnetom Trio™ whole-body MR system dedicated to research. In addition, a research agreement was reached with Siemens Medical System such that we have full access to sequence programming software, technical details for data manipulation, and necessary technical support. This MRI system will be used for MR studies proposed in the project.

### **Animal:**

Animal care facilities are available in the basement of Woodruff Memorial Research Building. Division of Animal Resources (DAR) maintains these facilities. The Division of Animal Resources at Emory University has two full time veterinary faculty members available for consultation at all times. Our facility has AAALAC approval. In addition there are two rodent housing rooms maintained by the Division of Animal Resources on the 4<sup>th</sup> floor of the WMRB. These rooms are used for housing rodents on variable light/dark cycles or in need of special housing.

### **Clinical:**

**Emory Healthcare** is the clinical arm of the WHSC, which focuses on patient care, education of health professionals, research addressing health and illness, and health policies for prevention and treatment of disease. The backbone of this system is the Emory University School of Medicine. The Emory Healthcare system encompasses: The Emory Clinic, Emory University Hospital, Emory University Hospital Midtown, Emory University Orthopedics and Spine Hospital, Emory-Adventist Hospital, Emory-Children's Center, Wesley Woods Center and Emory Johns Creek Hospital. As the largest, most comprehensive health care system in Georgia, Emory Healthcare has 9,000 employees, more than 20 health centers located throughout Metro Atlanta, 1,184 hospital beds, 54,662 annual hospital admissions, and 2.8 million annual outpatient/other patient services. Physicians in Emory Healthcare and affiliate hospitals are responsible for 4.6 million patient services a year.

**The Emory University School of Medicine** is ranked among the nation's finest institutions for education, biomedical research, and patient care, with 2,051 full- and part-time faculty and 999 volunteer faculty. Medical school faculty received \$331.3 million in sponsored research in fiscal year 2012, plus another \$75.5 million in funds received by medical faculty at other units in the health sciences center and at the Atlanta VA Medical Center. The school is ranked 16th nationally in NIH dollars received. Emory School of Medicine is one of the fastest-growing recipients of NIH awards in the country, and a nationally recognized leader in biomedical research. The School of Medicine is an outstanding teaching institution whose mission is to educate students who will become leaders in medicine and science. In addition to the school's regular medical education programs, almost 8,000 physicians and other health care professionals come to Emory each year to participate in one of the nation's largest and most successful continuing medical education programs.

### **Grady Memorial Hospital:**

Participants will be recruited at Grady Memorial Hospital, which is part of the Grady Health System, a publicly funded, urban care center serving a predominantly socioeconomically disadvantaged inner-city population. One section of the general medical clinics at Grady Health System provides care to over 10,000 active patients with 217 average daily visits, and we recruit from at least 4 of these medical clinic sections on a daily basis. Based on our previous work at this institution, we anticipate that participants will have a high rate of exposure to diverse types of trauma, which will allow for assessment of the effects of trauma across a range of severity levels and types. Furthermore, the patient population is primarily composed of low SES (87% with monthly household income < \$1000), minority individuals (>80% African American and 5-10% Hispanic).

**Atlanta Clinical and Translational Science Institute (ACTSI)**, an NIH-funded collaboration between the Emory School of Medicine, Morehouse School of Medicine and Georgia Institute of Technology was created to increase availability and enhance efficiency of clinical trials for patients. It is an inter-institutional magnet that concentrates basic, translational, and clinical investigators, community clinicians, professional societies, and industry collaborators in dynamic clinical and translational research projects. ACTSI provides research resources including technical support, biostatistical consultation, equipment, laboratory services and nursing support. A clinical interaction network provides support for conducting patient oriented research. Research educational opportunities include a Master of Science in Clinical Research program and KL2 Career Development Award for junior faculty. Community engagement is an important component of ACTSI and promotes effective community participation in clinical trials to build a partnership between researchers and the community in order to reduce health disparities. Other components of ACTSI include ethics and regulatory support; biostatistics, epidemiology, and research design support; a pilot grant program to promote new and multidisciplinary research; a tracking and evaluation unit; and the Clinical and Translational Research Program for Pediatrics that has provided financial support to develop inpatient and outpatient clinical research units in collaboration with CHOA and is becoming a centralized home for clinical research collaborations across the entire Atlanta pediatric community.

The multi-site **Clinical Interaction Network (CIN) of the ACTSI** formally replaces the Emory General Clinical Research Center (GCRC). The CIN includes sites at Emory University Hospital, Emory Crawford Long Hospital, Grady Memorial Hospital, the Ponce Infectious Diseases Clinic, the Hope Clinic, Wesley Woods Health Center, the Morehouse School of Medicine Clinical Research Center, and Kaiser Permanente of Georgia. Given the dispersed nature of the Atlanta research community and the goal to actively engage the community in bidirectional research translation, the ACTSI has developed a three tier Clinical Interaction Network (CIN) that incorporates hospital-based, medical office-based and community-based clinical interaction sites through integration with the Community Engagement and Research Program. An efficient, flexible and geographically distributed CIN has been created to meet the needs of translational and clinical investigators from Emory, MSM, and GA Tech. The CIN is centralized under the leadership of a single CIN director, Dr. Arlene Chapman of Emory University (letter of support included) and a co-director, Dr. Elizabeth Ofili of MSM. An inter-institutional senior management team is present to streamline administrative efforts and to ensure appropriate city-wide access to resources.

#### **Computer:**

Full computer support is available within each department and all computers are equipped with the latest software programs for data analysis, word processing, statistical analysis, and presentations. Furthermore, the SOM offers BimCore various bioinformatics software (sequence analysis, genomics, microarray analysis) and biomolecular modeling software (display, modeling, mutagenesis, docking). Password-protected access is available between computers and data storage. Each investigator and all research staff have access to personal computers equipped with all relevant software and networking capabilities to complete the research project. In addition, computer support exists for all behavior programs that are part of the department's core facilities. The behavioral testing suite is equipped with the Cleversys Behavioral analysis system.

Emory University has available to investigators via a fiber optic linked campus wide network, an IBM-ES9000-610, 2 SUN SC1000 UNIX systems and DEC/VAX mainframe capabilities. In addition, each investigator has individual computers that are connected via 100 base T-ethernet lines to the LAN and the campus network that they also use for word processing and data analysis. The platform is monitored by University Technical Services support 24/7/365 and has 4 hour onsite service for hardware replacement.

#### **Office:**

The Department of Psychiatry and Behavioral Sciences has approximately 3000 sq ft of office space on the 4th floor of the Woodruff Memorial Research Building (WMRB) with more than 15 faculty offices. Postdoctoral fellows and students are each assigned a study cubicle with phone, printer, and network access. Desk space with computer access for technicians is available in the laboratories.

**Other:** The Business Office of the Department of Psychiatry & Behavioral Sciences is directed by the Vice-Chair for Administration and consists of 12 grant support staff. Their services will be used for administration of the financial portions of this grant.

### **Data management and analysis**

All systems and data tracking are supported by the ThermoFisher Nautilus Laboratory Information Management System (LIMS). Based on the "Nautilus" software system, the LIMS (Laboratory Information System) allows the user to graphically design a workflow (detailing the lifecycle of samples for a given project) using a Windows Explorer-like interface. Upon entry into the lab, all samples entered into the LIMS and assigned using an EBSC specific barcode for tracking purposes. The LIMS follows the movement of individual samples, recording the test performed, the associated laboratory technician, reagents utilized and any results associated with each test. Full functionality for plate handling and manipulation can be used to track plate movement and genealogy as multiple daughter plates are created for downstream analyses. Integration with existing instrumentation (automated extractors, liquid handlers, capillary systems) gives the EBSC the ability to prepare instrument worksheets and commands as well as to extract data from an output file using simple 'point-and-click' technology. The data values are then mapped into the Nautilus system. Such integration enables the automation of data transfer and removes the possibility of transcription errors. This relieves trained personnel from tedious, time-consuming data entry tasks and maximizes the resources and investment of the laboratory. In addition, users can import and export any static data item (or a set of static items) using the Nautilus Explorer, including workflows, instruments and calculations. This allows data to move easily between the EBSC, where the data is generated, and the individual investigator, where the data is analyzed.

### **Center for Comprehensive Informatics**

The Center for Comprehensive Informatics (CCI) is a new, multi-disciplinary center at Emory University. The Center promotes and fosters collaborative projects between software system researchers and scientific research groups. We carry out a broad research and software development agenda in high performance computing, biomedical informatics, Grid computing, translational research informatics, and imaging informatics. Our research and development efforts are motivated by the requirements of cutting edge scientific research projects. An increasing number of research projects employ complementary types of information sources and large volumes of data to perform detailed studies of mechanisms underlying physical and biological functions and processes. Data in these studies are generated by simulations or obtained from high-resolution, high-throughput instruments. A translational research project in biomedicine, for example, may gather clinical, molecular, pathology, and imaging data in order to target better treatments by performing comparative analysis of data from a subset of patients. Similar types of projects arise in many fields of science, engineering, and biomedicine. We develop innovative, open source software systems, tools, and applications to address the informatics requirements of such projects.