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## RESOURCES

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**FACILITIES:** Specify the facilities to be used for the conduct of the proposed research. Indicate the performance sites and describe capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Under "Other," identify support services such as machine shop, electronics shop, and specify the extent to which they will be available to the project. Use continuation pages if necessary.

**Department of Psychiatry.** The Emory Department of Psychiatry & Behavioral Sciences, Chaired by Charles Nemeroff, M.D., Ph.D., is one of the most exciting and rapidly growing psychiatry departments in the U.S. today. Clint Kilts, PhD, is Vice-Chair for Research. Since Dr. Nemeroff moved to Emory in 1991, he has overseen an invigorating growth of research. Emory has moved from being a primarily clinical and regional department to one of the most rapidly expanding psychiatry departments in the country. Dr. Nemeroff is an internationally recognized research in psychiatry and PI of the Emory Conte Center for the study of Early Life Stress. Psychiatry has a number of NIMH-funded investigators, and the WMB has basic research laboratories for the faculty with primary appointments in psychiatry (Drs. Nemeroff, Kilts, Plotsky, Davis, Miller, Berns). The laboratories include facilities for molecular biology, neurochemistry, in vitro autoradiography, and psychopharmacology. These laboratories are available to support the work of trainees in the program.

**Department of Neurology.** The Department of Neurology at Emory School of Medicine will also play an important role in the NISTP. Since 1990, when Dr. Mahlon DeLong became Chair of the department, the faculty has grown from fewer than 10 largely clinical faculty to about 60 faculty, approximately half of which are clinician-scientists or scientists. Dr DeLong now heads the Institute of Neurosciences, and Alan Levey, MD, is Chair. The department has extraordinarily broad clinical expertise, with programs in General Neurology, Epilepsy, Movement Disorders, Neurobehavior and Memory Disorders, Functional Neuroimaging, Neuromuscular Diseases, Neuro-ophthalmology, Pain and Headache, Restorative Neurology, Sleep Disorders, Stroke, and Pediatric Neurology. Faculty in each of these clinical areas are involved in extramurally-funded basic or clinical investigations. The department has modern, well-equipped laboratories and shared core facilities for molecular biology, cell culture, image analysis and histology. NISTP faculty from Neurology include Drs. DeLong, Vitek, Crutcher, and Sathian.

**Department of Pharmacology.** Emory's Department of Pharmacology, chaired by Dr. Ray Dingledine, is extremely strong in neuropharmacology and neuroscience. Eight of 16 tenure-track faculty focus on neuroscience.

**Woodruff Memorial Building Radiology Research Facilities** (Dr Mark Goodman, Director of PET Radiochemistry and Director of the Division of Radiological Sciences in the Department of Radiology) entails radiochemistry and basic research laboratories for the faculty with primary appointments in radiology (Drs. Goodman, Votaw, Faber, Brummer, Mao, Galt, Oshinski). The laboratories include facilities for organic chemistry, radiochemistry, PET and MR physics, engineering and computer science. These laboratories are available to support the work of trainees in the program.

**Psychiatry Service, Atlanta VA Medical Center** The psychiatry service includes office and laboratory space for faculty with primary appointments at the VA (Drs. Bremner, Duncan, Drexler and Zola) as well as a large clinical service with patients available for recruitment into research studies. A VA Mental Illness, Research and Education Center (MIRECC) is pending.

**Grady Hospital** is a large teaching hospital that serves the underserved citizens of Atlanta and is an excellent site for clinical research; it also ensures racial diversity in research carried out at Emory and Georgia Tech.

**Emory Center for Positron Emission Tomography (PET)** (J Douglas Bremner, MD, Director) This center has a CTI ECAT 921 and 951 camera and a Concord MicroPET, a GE PET-CT and Siemens HRRT are in the process of installation, on site cyclotron and radiochemistry facilities including hot cells and robotic arms.

**Emory Biomedical Imaging Center** (Xiaoping Hu, PhD, Director) This program includes laboratory and equipment for research MRI including 3T human and a 4.7T animal magnet.

**Frederick Philips Center for Magnetic Resonance Imaging (MRI)** at Emory (John Oshinski, PhD, Director) The center includes two 1.5T Philips MR scanners with capacity for functional MR, structural MR, and spectroscopy.

**Office of Postdoctoral Education, Emory University School of Medicine** Emory University School of Medicine established the Office of Postdoctoral Education (OPE) in 1999 in recognition of the vital roles of postdoctoral fellows and their training programs in its research mission. The OPE currently supports approximately 470 postdoctoral fellows as well as their advisors in the School of Medicine, and serves as liaison to postdoctoral programs in other units of the University and in collaborating institutions. OPE postdoctoral programs and services include oversight of institutional postdoctoral policies and benefits, provision of postdoctoral career development and professional skills workshops, and support of postdoctoral communication via orientation activities, postdoctoral listserv and website services, and postdoctoral alumni tracking. Training in grant writing and review, in the responsible conduct of research via the University course Values in Science and structured guidance in job searches for academic research careers are important functions. The OPE also supports postdoctoral recruitment through national and regional recruitment activities, including participation in national minority career events, and assists in fellowship and other postdoctoral funding applications. Emory University School of Medicine has consistently ranked in the top 10 to 12 medical schools nationally for NIH fellowship awards in the past several years, reflecting excellence of both the trainee population and of the faculty who guide their research training.

**Emory University Graduate School of Arts and Sciences, Division of Biological and Biomedical Sciences** The Division currently includes over 260 faculty members and the research resources of Emory College, the Medical School, and several university affiliates for the explicit purpose of training students at the doctoral level. The Division consists of several interdisciplinary training programs, each leading to the Ph.D. degree. Each program focuses on a major area of contemporary biology, and each emphasizes the interdisciplinary approach that has proven to be successful in advancing research in the life sciences. Each program seeks to provide students with a broad multidisciplinary background, as well as advanced concepts and in-depth skills from at least two of the traditional biological or biomedical sciences. Each student can be exposed to a wider range of faculty research interests than is possible within a department. The program structure allows for greater flexibility in tailoring graduate education to the particular needs and interests of each student. Because of the Division structure, every student potentially has access to training with any of the more than 260 faculty members affiliated with the training programs. The programs that comprise the Division are Biochemistry, Cell and Developmental Biology; Genetics and Molecular Biology; Immunology and Molecular Pathogenesis; Microbiology and Molecular Genetics; Molecular and Systems Pharmacology; Neuroscience; Nutrition and Health Sciences; Population Biology, Ecology and Evolution.

**Emory Neuroscience Community.** While the Departments of Psychiatry and Neurology have amassed an outstanding research and clinical faculty that will serve as postdoctoral mentors, it is important to recognize that the proposed training program will take place in the broader setting of a rich, diverse and nationally recognized neuroscience community at Emory. There is a federally-funded predoctoral training program in Neuroscience which currently lists approximately 75 active mentors from the departments of Neurology, Psychiatry, Neurosurgery, Pathology, Pharmacology, Cell Biology, Physiology, Psychology, Biology and the Yerkes Center. It includes the School of Medicine, the Yerkes Regional Primate Research Center, and Emory College. In addition, the strength of the neuroscience community has also resulted in the establishment of a new undergraduate major in Neuroscience.

**Neuroscience Program.** The predoctoral program in Neuroscience at Emory attracts some of the best students in the country. Students may choose to pursue thesis work with any of 75 faculty working in one or more of the four broad areas of emphasis in the program: Movement Science, Neuronal Cell Biology and Biophysics, Neural Systems, or Neural Basis of Behavior and Cognition. Further emphasizing the collaborative, collegial atmosphere at Emory, “the Emory Neuroscience Program actively encourages the flow of information between investigators and students working in different fields of neuroscience.” Members of the Psychiatry and Neurology faculty are very active in the Neuroscience program and many have students in their labs.

**Emory University Department of Psychology (Darryl Neill PhD, Chair), Graduate Program in Neuroscience and Animal Behavior** The program in Neuroscience and Animal Behavior (NAB) approaches topics within the traditional areas of physiological psychology, acquired behavior, and ethology as a unified entity. The emphasis is on behavior as a biological phenomenon; physiological psychology explores brain-behavior relationships; research on acquired behavior studies the ongoing and evolutionary factors influencing individual adaptations; and animal behavior is concerned with understanding how animals function in their natural environment. The blend of these concerns in the NAB program represents our conviction that a comprehensive understanding of behavior requires knowledge of the why and how of natural

behavior, the manner in which the current environment influences behavior, and the physiological processes underlying both. Research is conducted mainly with animals, although the findings are applied to understanding human as well as animal behavior.

**Center for Behavioral Neuroscience** The National Science Foundation awarded a ten year grant (awarded in two five year increments) of nearly \$20 million to support the Center for Behavioral Neuroscience (CBN) (Elliott Albers, PhD, Georgia State, Director; Stuart Zola, PhD, Emory and Yerkes, Co-Director). The CBN is a consortium of eight colleges and universities in Atlanta. In addition to Emory which serves as the lead institution, the Center includes Georgia State, Georgia Tech, and the five historically African-American schools of the Atlanta University Center (Clark-Atlanta, Morehouse, Morehouse School of Medicine, Morris-Brown, Spelman). The Center is funded to integrate research and education across its participating institutions. Courses include a special topics seminar course taught in the fall semester and an introductory course taught each spring which covers major issues and techniques in behavioral neuroscience. In addition to formal courses for undergraduate and graduate students, the Center hosts a monthly evening seminar series, an annual research symposium, and annual technical workshops. All trainees within the Center are linked to a collaboratory, which is a multi-laboratory working group that meets monthly to develop and critique research projects. The Center currently has 25 graduate students with 5 more entering next semester. The Neuroscience and Behavioral Biology major at Emory College is one of the largest undergraduate neuroscience majors in the country with roughly 400 students.

**Yerkes Regional Primate Center** More than 210 scientists currently conduct research at Yerkes Regional Primate Center (Stuart Zola, PhD, Director). They include 26 core scientists and 42 associate scientists, nearly all with joint appointments in Emory University's School of Medicine or College of Arts and Sciences. An additional 36 collaborative and 75 affiliate faculty from medical centers and scientific institutions throughout the world participate in research at the Center. Assisting both core and adjunct scientists and gaining valuable research experience are nearly 100 graduate and undergraduate students. A staff of 280 provide research and operational support for Yerkes. Yerkes is one of eight institutions that together make up the National Institute of Health's Primate Research Program. Research funding at Yerkes comes from some 65 peer-reviewed grants awarded by the National Institutes of Health, the National Science Foundation, and various other agencies and foundations. Yerkes' scientific initiatives have thrived on its unique animal resources and its proximity to Emory University and the Centers for Disease Control and Prevention. In addition, the Center has fostered collaborations across traditional departmental boundaries and with numerous universities and research organizations worldwide. By bringing together scientists with diverse skills, Yerkes has built investigative teams that can approach complex biomedical and biobehavioral problems in novel and creative ways. The Yerkes Regional Primate Research Center consists of two facilities: The Yerkes Main Station, located on 25 acres of the Emory campus in Atlanta, contains most of the center's biomedical research laboratories. The Yerkes Field Station, on 117 acres of wooded land near Lawrenceville, 30 miles north of Atlanta, specializes in behavioral studies of primate social groups. Seven species of primates are represented in the center's colony totaling some 3,000 animals. They include rhesus and pigtail macaques, baboons, sooty mangabeys, capuchins, squirrel monkeys, and chimpanzees. Yerkes also is one of the few research centers with chimpanzees, which are currently involved in noninvasive research on social intelligence, evolution, reproduction and conservation. The Center's primate populations are virtually self-sustaining. Each year, births in the rhesus monkey colonies alone total about 300. Around the clock animal care at Yerkes is provided by five clinical veterinarians, seven veterinary technicians, some 60 primate care specialists, and a registered nurse. They are aided by pathologists, experts in reproductive medicine, and behavioral scientists and technicians who specialize in environmental enrichment for captive primates. The Yerkes Center includes major research resources for non-human primate work and primary laboratory space for faculty who are part of the center (Drs. Howell and Zola). On-going projects include studies of brain blood flow in awake non-human primates who self administer cocaine, measurement of dopamine transporter occupation with cocaine analogues, and studies of neural circuits and structures in maternally deprived non-human primates.

**The Georgia Institute of Technology** Georgia Tech is a world leading center for research and education in engineering and technology. **Georgia Tech had 7 engineering programs in the top 10 in the nation this year based on the US News and World Report rankings.** Georgia Tech has \$232,000,000 in research funding from federal and private sources and is a convenient ten minute drive from Emory. The combination of the clinical and medical expertise of Emory with the technical expertise of Georgia Tech is an unparalleled opportunity for cross fertilization of trainees in the NISTP in the rapidly changing landscape of neuroimaging. Emory and Georgia Tech have already begun to collaborate, as evidenced by the joint Georgia Tech/Emory Biomedical Engineering Program. Georgia Tech consists of a number of centers and institutes, some of which that are relevant to the NISTP include biomedical engineering, psychology, and computing (including the Graphics Visualization and Usability group).

**Wallace H. Couter Georgia Tech/Emory Department of Biomedical Engineering** In September 1997, after an intense planning and review process that involved faculty from both institutions, Georgia Tech joined with Emory University School of Medicine to establish the Georgia Tech/Emory Department of Biomedical Engineering (BME). The Wallace H. Couter Georgia Tech/Emory joint Biomedical Engineering (BME) Program is highly relevant to this training program and will be a cornerstone of the T32. BME was founded by Don Giddens, PhD, GRA Eminent Scholar, and currently Dean of Engineering at Georgia Tech, with the support of a \$16 million leadership development grant from the Whitaker Foundation, and later a \$25 million award from the Wallace H. Couter Foundation. Larry McIntire, PhD, is the current Chair. BME jumped from #6 to #2 nationally in this year's US News and World Report rankings of BME departments nationwide. BME has research programs in Cellular and Tissue Engineering, Neuroengineering, Biomedical Imaging, Bioinformatics/System Biology, Cardiovascular Biomechanics and Biology, and Biomedical Engineering/Bionanotechnology. This new academic unit is a unique partnership between a public and a private institution. This Department represents the strong commitment that both Emory and Georgia Tech have toward enhancing research in the biomedical and bioengineering sciences, and will significantly enhance research and education opportunities in these areas. State-of-the-art facilities are available at Georgia Tech, including the new biocomplex building to be completed in the future. Georgia Tech is located just west of downtown Atlanta, about 15 minutes from the Emory campus. Full time faculty at Georgia Tech on the NISTP include Drs. Skrinjar and Potter. Dr. Hu also has a joint appointment with Georgia Tech. Several Emory faculty have secondary appointments at Georgia Tech (Drs. Brummer, Faber, Oshinski).

**Georgia Tech Optical Neuroimaging Laboratory** In the Laboratory for Neuroengineering (Drs. Bellamkonda and Potter), a part of Georgia Tech/Emory BME, ideas, lab space and equipment are shared between 7 faculty and approximately 100 students, staff, and postdocs. No one in the Neurolab "owns" their own lab space, which helps to produce an atmosphere conducive to collaboration and permits the leverage of expertise and equipment funds. This lab recently moved into the new U. A. Whitaker Biomedical Engineering Building on the Georgia Tech Campus, and the Neurolab occupies the entire 3rd floor and part of the 2nd floor. This includes 7,300 sq. ft. of lab space, 2,800 sq. ft. of grad/postdoc office space, and 3,200 sq. ft. of faculty/senior scientist office space. In addition there is a 200 sq. ft. imaging facility in the adjacent building, with a multiphoton microscope. Because BME is shared with Emory University School of Medicine, two NeuroLab professors have their tenure line through Emory, and most faculty have collaborations with researchers at Emory, which provides easy access to the clinical world, and other neurobiology labs there. Additionally, the Neurolab is the Innovative Technology Initiative section of the Center for Behavioral Neuroscience (CBN, <http://www.cbn-atl.org>). Involvement in the CBN permits access to a wide range of neuro-behavioral expertise and equipment in participating labs.

**Georgia Institute of Technology, Department of Psychology** The School of Psychology (Dr Engle, Chair) serves a dual function in the Georgia Institute of Technology. First, it offers programs of study leading to a Bachelor of Science (BS) in Applied Psychology, a Master of Science (MS), and a Doctor of Philosophy (Ph.D.) in Psychology. Second, it offers training in basic and applied aspects of the science of behavior for students majoring in architecture, engineering, management, and the natural sciences. A productive relationship between basic and applied research is a significant feature of the psychology programs at Georgia Tech. For example, the director of Zoo Atlanta is a professor in the School of Psychology. He is a world expert on the design of zoological parks that promote preservation of endangered species. This same research-practice interaction can be seen in other projects. For instance, several faculty members examine the basic mechanisms responsible for cognitive changes accompanying normal human aging. This is part of a larger sponsored project that examines the effect of life-long experience on adult development. Another project examines the acquisition of automatic skills and applies the results from this basic research to improve training programs. Other projects focus on problem solving and the development of models of problem-solving. Still other initiatives focus on the measurement of individual differences in knowledge and disposition; fundamental mechanisms of judgment and their implications for decision making, motivation, and adaptation to change; and social and cognitive factors that promote accuracy in personnel decisions. The School of Psychology maintains excellent research and educational interactions within the College of Science as well as with other scientific and technological disciplines on campus, such as The Graphics, Visualization, and Usability Center (GVU) and Cognitive Science. In recent years, joint graduate courses and research projects have involved students in industrial engineering (human factors and applied measurement), management (organizational behavior), architecture (environmental design), and computing (artificial intelligence, cognitive science, and human-computer interaction).

**The Georgia Research Alliance** The Georgia Research Alliance (GRA), founded in 1990, is a unique partnership among universities, government and industry and a nationally recognized model. The GRA uses state funds, matched by universities, to make strategic investments in Georgia's research universities with the aim of increasing economic development in biotechnology. Since its inception, GRA has funded \$350 million in technology development and transfer, including 40 Eminent Scholars, and has leveraged 2 billion in matching funds from the federal government and private donors. The six GRA universities include Emory, the Georgia Institute of Technology, the University of Georgia, Clark-Atlanta University,

the Medical College of Georgia and Georgia State University. The Eminent Scholars - the centerpiece of the GRA's investment strategy - are the brain trust of top scientists recruited to Georgia research institutions. The eminent scholars are selected for their ability to lead Georgia into the biotech future, in which scientific discovery is expected to drive economic development. Georgia Research Alliance investments in Eminent Scholars and sophisticated research laboratories help Emory and Georgia Tech scientists to be highly competitive for federal and private sponsored research funding. Drs. Giddens and Hu are both GRA Eminent Scholars.

**Center for Disease Control** The CDC is a world known resource for research in Epidemiology and disease assessment and intervention. CDC is adjacent to Emory University and a number of investigators collaborate actively with the CDC scientists, physicians and staff.

Laboratory:

The PET Radiochemistry Program under the Direction of Mark Goodman, PhD, includes a radiochemistry area with a 2,154 square foot cyclotron vault and laboratory which includes three master slave manipulator arm-equipped hot cells, four mini-cells, two computer programmable two reaction vessel radiochemical processing units, one automated carbon-11 methyl iodide synthesis module. There are four additional labs in proximity to the cyclotron at Emory.

Clinical:

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Animal:

Animal facilities at Emory University for primate and rodent research are easily accessible to the PET Facility. Emory Center for PET has a MicroPET system (Concord, Inc) which will facilitate animal work with PET.

Computer:

The Emory PET Center Director of Physics, John Votaw PhD, oversees computer resources on site in PET, including 4 SPARC workstations, 4 MAC Quadras, 1 Silicone graphics, Bioscan blood detector. In Dr Bremner's lab at Emory West there are 2 Sun UltraSparc 80, 1 Ultra20, and one Ultra5, all networked to the MR and PET Centers. In the Frederik Philips MR Research Center, there are a variety of computer workstations.

Office:

Separate offices for each investigator and research assistants. There is a secretary in the PET Center. Copying, FAX and secretarial support are available. Offices for the investigator and research staff at Emory West.

Other:

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MAJOR EQUIPMENT: List the most important equipment items already available for this project, noting the location and pertinent capabilities of each. Emory Center for Positron Emission Tomography (PET), J. Douglas Bremner, M.D., Director, is a modern 3,000 square foot facility with the Emory University Hospital. The PET Center contains two scanner suites, a cyclotron vault, radiochemistry and organic chemistry space dedicated to the production of radionuclides and radiopharmaceuticals for basic science and clinical research and diagnostic nuclear medicine. Scanner suite one contains a Siemens ECAT EXACT 47 (921) scanner, a

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whole body scanner with 54 cm transaxial and 16.2 cm axial field of views. The septa are easily removed to permit 3D data acquisition. Data acquisition modes include static, dynamic, whole body, and gated. The intrinsic resolution is 5 mm in all directions. The room is equipped with anesthesia gases and exhaust and a pneumatic tube system for delivery of doses from the cyclotron suite downstairs. The second scanner room contains an ECAT 951 scanner with a 54 cm transaxial field of view and a 10.8 cm axial field of view. It is identical in all aspects to the 921 scanner except for the shorter axial field of view and its septa. Emory recently purchased a Concord MicroPET which permits the imaging of small animals including rodents and nonhuman primates. The MicroPET has spatial resolution of 3 mm and 10 fold better sensitivity than conventional cameras. Emory has also purchased a Shared Instrumentation Grant for purchase of a CTI/Siemens brain-dedicated High Resolution Research Tomograph (HRRT) (PI: Bremner, Co-PI Insel). The HRRT has 2.5 mm resolution and 13 fold superior sensitivity relative to current PET cameras. The PET Center has an on-site Siemens RDS 112 multiport, self-shielded, automated cyclotron producing a 11 MeV, 50  $\mu$ A proton beam. The cyclotron is equipped with targets for the routine production of curie amounts of [18F]fluoride, [18F]fluorine, [11C]carbon dioxide, and [15O]oxygen and 100 millicurie amounts of [13N]ammonia.

In the Frederik Philips MR Research Center in Emory University Hospital/Emory Clinic there are three state-of-the-art 1.5 T, Philips Gyroscan clinical scanners, all available for use in research projects. One of the three scanners is a new model (Intera), equipped with all available research options for acquisition and processing. There are capabilities for a wide range of pulse sequences for anatomical imaging as well as other techniques including fMRI, spectroscopy/CSI, diffusion, perfusion, high-speed bolus tracking, cardiac, MRA, including a large number of special-purpose RF receiver coils. The systems have 23 mT/m gradients and performs single shot echo planar imaging or, using navigators, multi-shot echo planar imaging. The RF transmitters have 25 kW peak capacity or higher, and the scanner can receive multiple signals simultaneously. The short-bore magnets with flared ends minimizes claustrophobia, makes it easy to visually monitor sick patients, and facilitates placement or readjustment of coils and leads.

In addition to the clinical equipment the project will have access to a newly installed whole-body high-field 3T imager (Siemens, Inc.). This machine is fully committed to use by researchers at our institution. This machine has multiple imaging gradient insert options, optimized for whole-body imaging as well as for imaging with smaller field of view (head and neck, animals, phantoms), and is equipped with a variety of special-purpose RF coils.

The scanner rooms are adjacent to a patient preparation room for weighing patients, starting an IV, etc. and is near patient waiting and dressing areas. A new animal preparation facility is located adjacent to the high-field scanner. Two SUN based workstations running Philips EasyVision software for data analysis and 3-D visualization are located near the scanner.

At Georgia Tech, in the Laboratory for Neuroengineering, 3rd floor of Whitaker BME building, Georgia Tech campus, there is a 640 sq. ft. Optical Neuroimaging light-shielded room with low-noise DC lighting, with Zeiss Axioskop 2FS fluorescence microscope, with quadocular head, motorized x-y stage, full set of high-NA dipping objective lenses, monochromator xenon illuminator, CoolSnap CCD camera and RedShirt NeuroCCD camera (2000 frames/sec, for optical recording); SlideBook acquisition and image processing software (Intelligent Imaging Innovations); Zeiss Axiovert 200 fluorescence microscope with Varel and phase contrast. Electrical engineering bay (640 sq.ft.) with testing equipment, soldering stations, neuromorphic circuit design and modeling software. Molecular biology and wet-lab bay (800 sq.ft), with centrifuges, electrophoresis equipment, PCR DNA amplifier, and multi-well plate reader. Two 200-sq.ft. cell culture rooms with biosafety hoods, centrifuges, incubators, refrigerators, microscopes, -80°C freezer, and water baths. Benchtop autoclave in Neurolab, and large autoclave on 2nd floor. Departmental imaging facility in the Petit building at Georgia Tech: 200 sq. ft. room with 4x10 ft. air table, Zeiss 510 Meta NLO 2-photon/confocal microscope, and, sharing the same femtosecond Coherent Mira900 laser, custom-built upright 2-photon microscope. This facility also includes a state-of-the-art Beckman-Coulter fluorescence-activated cell sorter.

