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- CTSI
- CTSI Clinical Research Center
- CTSI Communications and Dissemination Program
- CTSI Service Center
- Human Imaging Core
- Mentor Academy
- OneFlorida Clinical Research Consortium
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- Research Coordinator Consortium
- ResearchMatch
- Southeast Center for Integrated Metabolomics
- Study Registry
- Training and Research Academy for Clinical and Translational Science
- UF Health Personalized Medicine Program
- VIVO
- Advanced Magnetic Resonance Imaging and Spectroscopy (AMRIS)
- Animal Care Services
- Center for Health Equity and Quality Research
- Center for Movement Disorders and Neurorestoration
- Center for Translational Research in Neurodegenerative Disease
- Click Commerce
- Department of Epidemiology
- Department of Health Outcomes & Policy
- Diabetes Institute
- Electron Microscopy Core
- Emerging Pathogens Institute
- Florida Innovation Hub
- Harrell Medical Education Building
- High-Performance Computing Center (HPC)
- Informatics Institute
- Institute of Food and Agricultural Sciences
- Institutional Review Boards
- Interdisciplinary Center for Biotechnology Research.

- Interdisciplinary Program in Biomedical Sciences
- Jacksonville Health Equity Research Organization
- Major Analytical Instrumentation Center & Particle Analysis Instrumentation Center
- McKnight Brain Institute
- MD-PhD Training Program
- Office of Medical Education
- Office of Research
- Office of Technology Licensing
- Powell Gene Therapy Center
- Research Administration and Compliance Program
- Science for Life
- Southeast Center for Research to Reduce Disparities in Oral Health
- Survey Research Center
- UF Center for Pharmacogenomics
- UF Genetics Institute
- UF Health Cancer Center
- UF Health Jacksonville
- Animal Care Services

#### **G. UF Colleges**

- College of Agricultural and Life Sciences
- College of the Arts
- College of Dentistry
- College of Engineering
- College of Health & Human Performance
- College of Journalism and Communications
- College of Liberal Arts & Sciences
- College of Medicine
- College of Nursing
- College of Pharmacy
- College of Public Health & Health Professions
- College of Veterinary Medicine

## **A. Institutional commitment and setting** (Section required by the RFA)

We have very strong institutional support for the OAIC research and training program and excellent resources on which we draw to enhance our productivity. The College of Medicine will support for the entire OAIC funding period **35 faculty members and post-doctoral trainees, in addition to 45 staff members** who work collaboratively to achieve the goals of the OAIC, as outlined in the **letters of support** of Dr. Guzick, Senior Vice President for Health Affairs and President of the UF Health, Dr. Good, Dean of the College of Medicine, Dr. Norton, Vice President for Research, and Dr. Fuchs UF President. Based on continued successful operation and outcomes of the OAIC, the UF leadership is also committed to developing plans to continue institutional support of the OAIC beyond the five years of this renewal application. Such a continued institutional support has been honored after the past UF OIAC cycle. The return on the initial UF investment in the IOA and OAIC has been exceptional in terms of grant funding, career development and publications (please see progress report in the Overall Research Plan section B.1.6.).

In addition, UF allocates **25% of the indirect dollars** to research development and support (10% to the PI of the grant, 7.5% to the department and 7.5% to the institute). These funds are of critical importance to sustain the infrastructure of the OAIC.

The University of Florida, its Office of Research, and the Office of the Provost support this proposal by supplementing trainee's tuition so that **100% of tuition** required for coursework for degree programs or specific acquired competencies will be available (see letter of support from Dr. Pearson in REC). That will include also the graduate certificate or a master's in Aging and Geriatric Practice offered by the UF Institute on Aging.

The OAIC has allocated approximately **30,000 sq. ft. of office space, 10,000 sq. ft. of clinical research space and 4,500 sq. ft. of renovated wet lab space** within the UF Institute on Aging and the Department of Aging and Geriatric Research, which provides infrastructure support for the OAIC. In addition, UF has renovated **6,400 sq. ft. in the Shands hospital complex to host the Aging Health Promotion Research Center**, including a walking track, a demonstration kitchen, offices and a meeting room, which are dedicated for exercise and behavioral interventions conducted by studies supported by the OAIC. The research space available to the **OAIC totals 50,900 sq. ft.**

In conclusion, the UF provides outstanding institutional support to the OAIC, which is of pivotal importance for gaining the research and training success experienced by the UF OAIC, and for successfully achieving the scope of work proposed in the OAIC competitive renewal application.

## **B. Relation of the OAIC to other activities in the applicant institution** (Section required by the RFA)

The OAIC has synergistic collaborations with colleges, cross-institutional research centers and institutes, which provide infrastructure and competencies (please see letters of support), including the Institute on Aging (IOA) directed by Dr. Pahor, which hosts the OAIC, the newly NIH funded Alzheimer's Disease Center, the Bioinformatics Core, the Brain Institute, the Cancer Center, the Clinical Translational Science Institute (CTSI), the Diabetes Institute, the Emerging Pathogens Institute, the Genetics Institute, the Informatics Institute, the Center for Movement Disorders; the Pain Research and Intervention Center of Excellence (PRCE); the VA Brain Research and Education Center (VA BRRC), and the Veteran Affairs Geriatric Research, Education and Clinical Center (VA GRECC). Institutional infrastructure and educational resources and programs available for the OAIC are summarized in Figure 1. The wealth and breadth of diverse Colleges, Centers and Institutes at the University of Florida and the VA represent a uniquely fertile environment for conducting multidisciplinary and interdisciplinary translational research. The OAIC is highly successfully capitalizing on these resources, including the multidisciplinary and interdisciplinary **scientific expertise** of the participating investigators in the OAIC Cores and projects, development of **translational research**, access to a **diverse pool of Junior Scholar candidates and mentors** for the Research Education Core (REC), access to a **diverse pool of research study participants** for RC1, and access to **equipment and resources** described below.

The **letters of strong support** from the UF leadership, UF College Deans, Institute Directors, Center Directors, and VA leadership, testify the **relevant impact of the OAIC** on campus-wide clinical and translational multidisciplinary and interdisciplinary research and research education on aging.

Particularly important are the **synergies and the integration** of several functions of the UF OAIC with the Clinical Translational Science Institute (**CTSI**). The OAIC is one of the CTSI relevant research units, providing outstanding resources and environment to conduct clinical translational research focused on aging (please see resources below). There is a close synergy of the CTSI KL2 program with RCDC goals, which translates into co-funding for research scholars (please see REC). The Clinical and Translational Research Informatics Program (CTRIP) serves both the CTSI and the OAIC for data management and research study participants recruitment (please see RC3 and RC4). The CTSI provides key support with Institutional Review Board (IRB) and Investigational New Drug (IND) applications for OAIC projects. The OAIC takes advantage of the CTSI Clinical Research Center for clinical trials. Finally the OAIC takes advantage of the CTSI repository for biological samples for OAIC supported studies (please see RC2 and below). **These are examples of how the environments of the CTSI and OAIC are leveraged to achieve common goals by optimizing utilization of resources.**

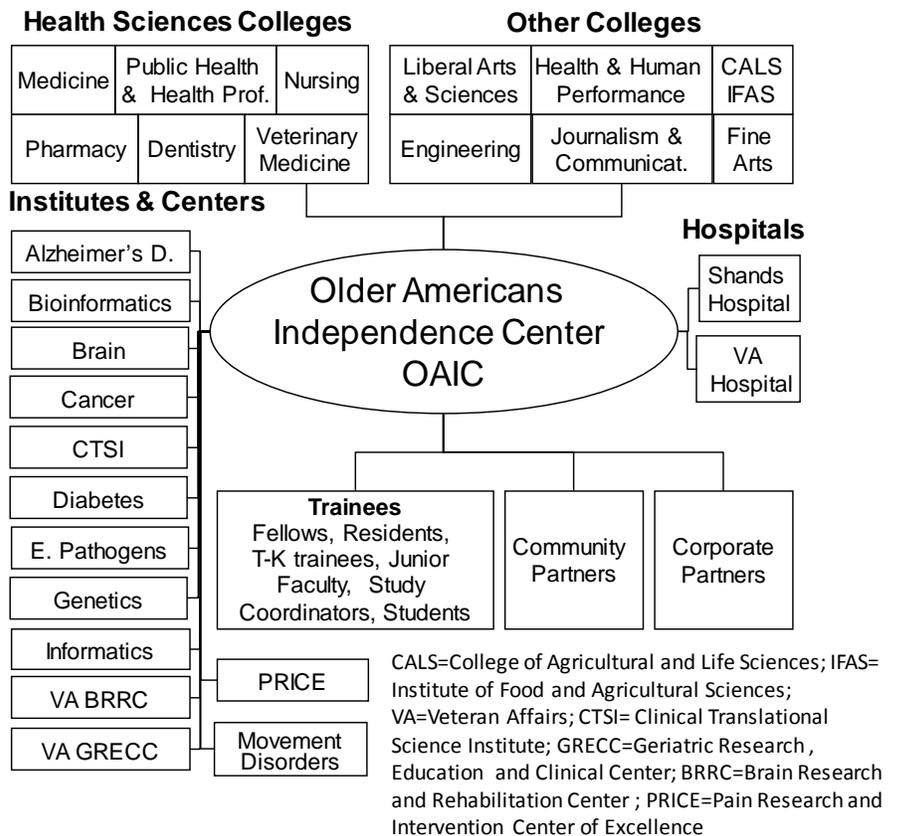
In addition the excellent productivity in terms of external funding and research training, the UF OAIC has a major **impact on the UF clinical translational research enterprise** as follows:

- The OAIC played a key role in the successful competitive renewal of the **CTSI award** in 2015. The UF OAIC interdisciplinary and translational research infrastructure, and the successful track record in funding and research education have been instrumental for the funding of the CTSI application. The UF OAIC are part of the CTSI clinical research structure and Dr. Pahor directed the CTSI KL2.
- The OAIC played a key role in the **construction grant award** NIH NCRR (C06RR029852, PI Dr. Pahor) to construct a 40,000 sq. ft. IOA Clinical Translational Research Building (IOA-CTRB) to host the UF IOA and OAIC (completed in 2013). The IOA-CTRB construction grant award played a key role in UF Health Sciences strategic planning for research which resulted in the **additional 80,000 sq. ft. expansion** of the CTRB to create a hub for clinical translational clinical research which hosts the CTSI, and the Departments of Epidemiology and Biostatistics (completed in 2013).

### C. University of Florida

The University of Florida (UF) is an ideal setting for the OAIC. UF is a land-grant university with over 50,000 students and more than 4,000 faculty spanning 20 colleges and schools, which are all housed within a 2,000-acre campus. It is the largest university in the Southeastern United States, with an annual economic impact exceeding \$8.76 billion. The single campus fosters the development and continued success of several multidisciplinary programs. UF's commitment to research has been recognized by its selection in the

**Figure 1. Interactions of the OAIC with Colleges, Institutes, Centers & Other Organizations**



Association of American Universities and by its designation among the top 20 research Universities by the Carnegie Commission on Higher Education. Strategic investment and recruitment in the last decade have poised this university to merge as a national leader in several areas. UF ranks third in the nation among public universities in awarding the most earned doctorates. It ranks 10th in the number of patents awarded and 13th among public universities in research expenditures. In 2014, UF received more than \$701 million in research awards. Indeed, Florida's Governor and the Florida Legislature designated UF as a "preeminent" university in the spring of 2013 - the first time in state history the university has been set apart in this manner. The lawmakers also allocated \$15 million annually to UF for five years to support the university in its goal of joining the nation's top-ten public universities. UF will match these funds dollar-for-dollar through private fundraising, dedicating \$30 million annually largely to hiring new faculty. Thus, UF is in a robust growth phase, and this proposal's focus on mobility and prevention of disability in older Americans is one of the university's high priorities.

#### **D. UF Health Science Center**

The UF Health Science Center (HSC) celebrated its 50th year in 2006. The HSC is the largest and most comprehensive academic health center in the Southeastern US. This center spans six Colleges including Colleges of Dentistry, Medicine, Nursing, Pharmacy, Public Health and Health Professions, and Veterinary Medicine, teaches the full continuum of higher education from undergraduates to professional students to advanced postdoctoral students, enrolling more than 6,900 students and 1,100 interns and residents each year. The HSC provides over 3.7 million square feet of space for research, teaching and clinical activities. Furthermore, all of the HSC colleges are adjacent to each other facilitating the multidisciplinary collaborations and interactions within this rich academic environment. The UF HSC is a world leader in interdisciplinary research, generating over 50 percent of UF's total research awards.

#### **E. OAIC FACILITIES AND RESOURCES**

##### **Institute on Aging - Clinical Translational Research Building (IOA-CTRB)**

The IOA was awarded a building grant through the Recovery Act program of 2009. Ground breaking for the IOA-CTRB was in the fall of 2011 was completed in March of 2013. The OAIC research and training program is conducted in this 40,000 sq. ft. facility (picture of the building seen below), which serves as a campus-wide hub for clinical and translational research on aging at UF. The IOA-CTRB has a prime location in the heart of the

Health Sciences Complex between the Cancer-Genetics building, the Emerging Pathogens building, and the other Health Sciences colleges and institutes located within or in immediate proximity of the Shands Hospital, all of which are within short walking distance on pedestrian paths.



**Office.** The IOA, OAIC and Department of Aging and Geriatric Research which comprise a total of approximately 30,000 sq. ft. of office space in the IOA-CTRB. The space is partitioned in individual offices, cubicles, work rooms, common interaction areas and meeting rooms. Each office is fitted with a state-of-the art personal computer and printer. The Department of Aging utilizes the latest Intel-based workstations. Color photocopiers and scanners, and fax machines are dedicated to the IOA-OAIC investigators and administrative support.

The offices of faculty members are in close proximity to the space where clinical research assessments are performed. The space is also situated immediately adjacent to the office/work areas of study coordinators, student assistants. The office is equipped with desk and chair, two guest chairs, printer with scanning and copying capability, dry erase board, bookshelf and hutch, two 2-drawer file cabinets, and one 2-drawer double-wide file cabinet. The office is also furnished with desktop computer hardwired to the university's server and high-speed T1-internet access, phone, as well as a PC laptop and iPad with access to the University's wireless network. These computers have software critical for inter-investigator communication and data analysis including programs such as Microsoft Office, Adobe Acrobat Professional, Adobe Photoshop, STATA, SAS, StatTransfer, GraphPad Prism, Skype, and FaceTime (iPad). The research assistant and research coordinators have dedicated office space in the building that is adjacent to the data collection laboratories and is readily accessible to the PI. The clinic laboratory layout (proximity to the data collection and staff) and facilities assure that the PI has the necessary space to formulate experiments, focus groups, team meetings, analyze results, and prepare manuscripts for publication.

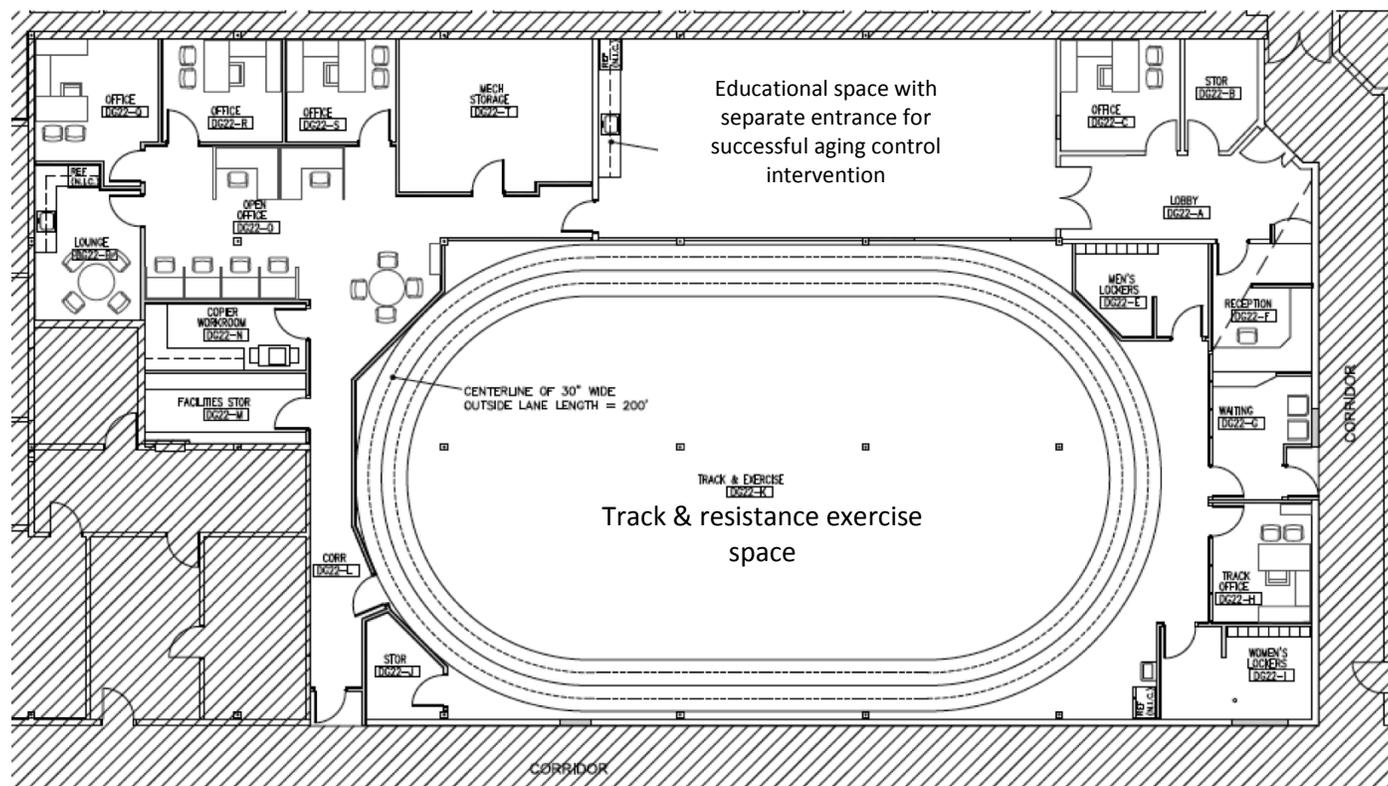
### **Clinical Research Core - RC1**

Approximately 10,000 sq. ft. in the IOA-CTRB are dedicated to clinical research space. That space includes 1,000 sq. ft. of physical performance laboratory and 15 dedicated interview, assessment and examination rooms and a 25 meter corridor specially dedicated to perform walking testing. The facility has a street address, dedicated parking lot in front of the building and a direct entrance to facilitate access of research participants, a reception and waiting area, exam and interview rooms, meeting rooms, procedures rooms, a biological specimens processing laboratory, data entry stations, study coordinators offices, a study drugs storage room, and several secured storage areas for study documents and areas for freezers for biological specimens.

### **Health promotion research center**

The Institute on Aging UF OAIC hosts the Health Promotion Research Center, a 6,400 sq. ft. facility which is dedicated to lifestyle intervention studies (physical activity and counseling programs), contains a walking track area with adjacent space for counseling sessions (please see floor plan below). The participants have free parking located in the hospital visitor parking lot that is approximately 100 yards from the intervention facility. The participants are greeted in an aesthetic atmosphere containing appropriate pictures and magazines prior to the intervention session. There are two separate waiting rooms and two changing/shower rooms for research study participants. Restroom facilities are located in three locations within a 50 ft radius. Interventionists, staff and faculty have offices located on site with access to computers and phones. Staff will have offices located on site including a dedicated track office with access to computers, phones, two AED's, and first aid equipment for monitoring adherence and safety of participants.

The track is a cushioned surface with two walking lanes. The walking distance is 200ft/lap just under 1/27th of a mile. The track area is also equipped with various strength, balance training equipment and space for conducting a wide variety of physical activities. A balance bar is bolted to the walls at a height of 1 meter and stretches across (8 meters) of floor to ceiling mirrors to aid in balance for studies on compromised older adults. The facility also has a large conference area (25 x 15 feet) equipped with kitchen and audio/video equipment for holding focus groups and team meetings. The educational room is highly versatile. Rolling tables can be arranged in numerous ways to promote group interaction or 1:1 collaboration with participants and staff. The equipment can be easily transition into storage for when classrooms need additional space for stretching and mobile activities such as yoga or dance class. A portable projector (Dell Liquid Crystal Display) and laptop (Dell Precision) is provided for healthy aging presentations and guest speakers. A demonstration kitchen is used for classes on nutrition, healthy eating and meal preparation. Three 4' x 8' dry erase boards are available to promote classroom discussion (please see floor plan below).



**Floor plan of the Health Promotion Center in SHANDS medical complex completely dedicated for the lifestyle interventions.**

**Resources for Research Study Participant Recruitment**

The RC1 Core of the UF OAIC is tasked with ensuring (a) a steady flow of prospective participants to supported studies, (b) that participants are diverse and heterogeneous with respect to disability status and race/ethnicity, and (c) that affiliated investigators (especially junior scholars) have access to necessary information regarding feasibility, participant availability, and strategies for communicating with prospective participants. A key goal of the RC1 Core is to support the generalizability and external validity of study findings. To ensure adequate representation of low functioning older persons in its studies investigators have developed substantial experience with the recruitment of older adults, especially minorities, both in the Gainesville/Alachua County region, and in the more general North Central Florida catchment area of the center.

The RC1 Core directly provides services to support recruitment, including development and implementation of recruitment strategies, monitoring and reporting recruitment progress, and development of recruitment materials. The RC1 Core also helps OAIC-affiliated studies and investigators, especially Junior Scholars, to develop strategies for monitoring and improving participants' adherence and retention in clinical research studies. This core also facilitates enrollment of women, ethnic minorities, and elders with disabilities, all of whom have often been under-represented in both observational and intervention studies. The RC1 Core in partnership with Investigators to evaluate the real-time progress of each study, and ensure integration of recruitment, screening, and data acquisition/randomization. The RC1 Core continuously evaluates the success of strategies to facilitate participation, retention and adherence in OAIC-associated research, and seeks to identify the most effective and efficient RC1 strategies. In both the services provided and studies conducted by the RC1 Core, a particular emphasis is on the participation of ethnic minorities and persons into research on aging. The following resources are utilized by the RC1 Core to facilitate participant recruitment.

**OAIC Registry.** Since July 2007, the OAIC has maintained a participant registry. This is an IRB approved database containing contact information and minimal demographics (age, race, sex, ethnicity) for persons who consent to be contacted with recruitment opportunities. The registry contains no information regarding health or functional status (since these are labile phenomena, and need to be rescreened by each individual study at time of recruitment). Registrants are recruited at the time they consent to participate in individual studies; they are also recruited if they fail to qualify for an OAIC-supported study. Registrants have also been identified through a direct-mail campaign (10,000 pieces sent to elders in the

catchment area), community presentations as well as persons screened for various studies. Unsolicited inquiries from elders seeking to participate in research are also directed to the registry. Each registrant receives a consent form (which is reviewed with a member of the RC1 staff prior to signing), and then a contact record (name, address, phone, email) and a demographic questionnaire. The contact information is entered and stored separated from the demographic information. The registry contains 2700 older persons. Regular communication with registrants is an essential element of retention. When specific studies are recruiting, registrants are contacted in one of three ways: (1) the quarterly newsletter, THRIVE, highlights specific studies and also includes summary "blurbs" for individual studies; (2) direct mail of flyers to eligible registrants; and (3) follow-up phone calls to eligible registrants.

**Minority Outreach Program (Church and Community Communicators).** We have established several efforts to achieve minority recruitment goals for trials conducted within RC1. The strategy here is to build a presence in the community through outreach efforts. This presence is expected to build trust in the community and enhance minority recruitment. We will leverage several existing contacts including (a) the University of Florida Health Disparities Initiative, managed by Dr. Carolyn M. Tucker; in combination with this office, the Institute on Aging recently held nine "Relationship Building" luncheons at African American churches and community centers throughout Gainesville, and can leverage these relationships to hold additional recruitment meetings; (b) the UF/Shands Eastside Community Outreach office, which maintains a corps of "Church Communicators" who can bring recruitment messages to most of the major churches in the Gainesville/Alachua County area; (c) the "Health Street" initiative, directed by Dr. Linda Cottler (a Co-I on this core), which is the UF community engagement effort of the Clinical and Translational Science Institute, is a model that utilizes community health workers to assess needs and concerns of the population in order to link them to medical and social services as well as opportunities to participate in health research. The reach of HealthStreet has been North Central Florida, with a database of over 6500 persons. HealthStreet is described further below; (d) the Gainesville Guardian, a weekly newspaper for the African American community, which has previously been receptive to feature stories on OAIC studies. We can also pursue targeted advertising on local Gospel and Smooth Jazz radio stations, which are relatively popular with the local older African American audience. We have also identified, in our direct mailing lists, using data from the 2010 Census, census blocks that have particularly high representation of African American residents. These blocks can be scheduled to receive repeated mailings, often using customized (IRB-approved) marketing materials. Local events (e.g., church/community talks) can also be targeted for the areas surrounding these census blocks.

**UF Consent2Share.** Data previously collected during clinical inpatient and outpatient care has tremendous retrospective and prospective value for planning studies, studying usage patterns, understanding comparative effectiveness, matching phenotypic and genotypic results, matching phenotypic and therapeutic approaches and much more. We have the ability to store and track medical, encounter, genome, pharmaceutical and other information and associate this information to outcomes is being created through the UF Health Integrated Data Repository (IDR). Patients under UF care can consent to be contacted about opportunities to participate in research. The UF Consent2Share initiative was launched to develop, pilot and expand such a consent process at UF Health. This effort is led by Peter Iafate, Chairman of the UF Institutional Review Board.

The UF Consent2Share project has developed a large group of potential research participants who have consented to be re-contacted for future research studies. Having this consent data available in combination with the other data in the IDR will make it much faster and more feasible to identify potentially willing research participants who meet the study criteria. Creating a consent process with tracking will create new opportunities for our ability to study and improve human health.

Here's how the process works: At check-in, trained admissions staff briefly discuss UF Consent2Share with patients, who then receive the research consent form to review. Saying yes to one or both options is completely voluntary and is not required to receive care. Patients are offered a copy of the consent form to keep, and their responses are recorded and managed as part of their Epic electronic medical records. For patients who have questions about or wish to change their consent, a helpline and CTSI research subject advocate are available as resources. The protection of patient privacy and personal health information is of paramount importance. For patients who choose to participate, their related medical information will be stored on a password-protected and encrypted computer server and will only be

available to researchers conducting IRB-approved studies. Access to data will be expertly managed by the IDR and CTSI Biorepository staffs.

**UF StudyConnect.** In collaboration with the four UF IRBs, UF Health and UF research teams, the UF CTSI maintains and promotes UF StudyConnect as a central resource for listing UF clinical research studies that are seeking volunteers. In addition to being displayed on UF StudyConnect, the study listings appear on UFHealth.org Research Studies & Clinical Trials.

#### How Studies Get Listed on the Site

As part of its ongoing Study Registry project, the UF CTSI has a team of trained individuals collecting data about human research studies approved by the four UF IRBs since 2008. This team identifies studies that may be enrolling participants for inclusion on StudyConnect. In addition, UF research teams can easily request that listings for IRB-approved studies be added, modified or removed from the site at any time. The CTSI Study Registry Team gathers the data required for the listings and provides investigators an opportunity to review their study information before publishing it on the site. All that's required of research teams is to notify the CTSI when they have an actively enrolling study and/ or when enrollment for a study has ended. The CTSI Study Registry Team will update the site accordingly.

**ResearchMatch.** UF CTSI subscribes to ResearchMatch— a national volunteer research registry that brings together researchers and willing volunteers who want to get involved in research studies. This national registry, developed by institutions affiliated with the Clinical and Translational Science Awards (CTSA) program, provides a secure, web-based approach to address a key barrier to advancing research: finding research participants.

Volunteers register for ResearchMatch at [researchmatch.org](http://researchmatch.org) – it only takes 5 to 10 minutes to register. Volunteers of any age, race, ethnicity and health status are invited to join. By registering in ResearchMatch individuals are not registering to participate in any study. They are showing interest to be contacted about studies that may be a good 'match' for them. The goal of ResearchMatch is to better connect volunteers with potential study opportunities.

**Health Street.** Health Street is a community-based effort that works every day to reduce disparities in healthcare and research by linking the medically underserved to medical and social services and opportunities to participate in research. Community Health Workers (CHWs) meet residents at health fairs, special events, bus stops, parks, laundromats, grocery stores, Libraries, and other locations in North Central Florida. Community members can also visit HealthStreet to access free services, including health screenings, use of computers, classes, and many more. The aim is to improve relationships between community members, health care providers, community organizations, and researchers in the University of Florida community.

HealthStreet has enrolled 6500 members through the efforts of our Community Health Workers; the model allows us to directly contact individuals in the community and link them to studies based on their primary health concern, medical history, and eligibility criteria. If HealthStreet staff members meet community members who fit the eligibility criteria for ongoing studies, they are referred to the study coordinator for screening. HealthStreet organizers also routinely check our population database for persons who may fit general criteria for ongoing studies and refer them accordingly.

Recruitment through HealthStreet is free, and provides opportunities for University of Florida researchers to learn from and improve the health of diverse and underrepresented populations in North Central Florida.

#### **Investigational Drug Service**

The Investigational Drug Service (IDS) is provided by the Department of Pharmacy at Shands Hospital and available to all investigators at Shands. It has been established to provide a safe, effective and efficient means of delivering investigational drugs to patients. In addition, compliance with federal, state, and JCAHO requirements regarding investigational drug control is ensured. The IDS is staffed by PharmD and residency trained pharmacists. IDS services investigators of clinical trials in both the inpatient and outpatient settings. Currently there are approximately 200 clinical trials being supported.

## **OAIC Metabolism and Translational Science Core - RC2**

The OAIC Metabolism and Translational Science Core (RC2) Laboratory occupies approximately 4,500 sq. ft. of laboratory space. These facilities are under the direction of Dr. Leeuwenburgh. Equipment pertinent to this grant includes: Millipore MILLIPLEX® Analyzer 3.1 xPONENT System (multiplex assays); microplate readers (a Spectramax GEMINI XS dual-scanning fluorescence and luminometer plate reader; a UV-VIS microplate reader from Molecular Devices; NanoDrop® ND-1000 UV-Vis Spectrophotometer, and a high-performance top and bottom reader Synergy HT multidetection microplate reader from Bio-Tek for fluorescence, absorbance and luminescence measurements); BioTek Instruments ELx405™ HT Microplate Washer - for 96-well plates (accommodates biomagnetic separation and vacuum filtration protocols along with conventional ELISAs); a microplate incubator; a TD-20/20 luminometer for ATP analysis; a Shimadzu RF-1501 spectrofluorophotometer; 1 HPLC system with UV-VIS and fluorescence detectors; 1 HPLC system with electrochemical detector; a Beckman UV-VIS spectrophotometer; an Applied Biosystems, Inc 7300 Real-Time PCR System; tissue homogenizing equipment; sonicator system; polytron system; electrophoresis equipment and film developer (Kodak); a four-megapixel superior performance fluorescence, chemiluminescence and visible imaging system (FluorChem SP; Alpha Innotech), including a cooled CCD camera and software for gel, film and membrane imaging and culture and microplate based assays; Bio-Rad Gel Doc XR high-resolution gel/blot imaging system; three respirometer systems: the Intech's SYS203 oxygen sensor and two high resolution Oxygraph-2k (Oroboros) for tissue, cell and mitochondrial oxygen consumption measurements; a Beckman ultra-centrifuge; 3 Eppendorf high-speed refrigerated table top centrifuges and 3 microcentrifuges; 2 ultra-low freezers (-80oC); 3 standard freezers (-20oC); 4 refrigerators (0-5oC); 2 liquid nitrogen (-180oC) storage units; (2) Class 2A Biological Safety Cabinet; CO2 Incubator (37oC); several incubators/shakers; several digital balances; an ice machine; a lyophilizer; a benchtop incubator; 3 water baths; water bath shaker; a drying oven; 3 analytical balances; cryostat osmometer; 4 rockers/rotators; 3 pH meters; a water purification system; a nitric oxide detection system; an isoflurane system with anesthesia cart as well as a guillotine for rapid decapitation. (35) Mouse cages with running wheels monitored by Clocklab Software (Coulbourn Instruments), a double-wall sound isolation booth (GretchKen Industries); Intelligent Hearing System with Smart-EP v10 software; Tucker Davis Technologies Evoked Potentials and EEG system; Minispec (Bruker Optics Inc.) Time Domain - Nuclear Magnetic Resonance (TD-NMR); Activity Monitors (Med Associates); Five-lane Rodent Treadmill (Panlab/Harvard Apparatus); Automated Grip Strength Meter (Columbus Instruments, Columbus Ohio); Noldus Ethovision automated tracking system; Zeiss 510 NLO multiphoton laser scanning confocal microscope equipped with a META spectral detector and a Coherent Chameleon XR tunable femtosecond pulsed Ti-Sapphire laser

### **CTSI Biorepository**

The CTSI Biorepository collects biospecimens that can be used for research purposes by any investigator with IRB-approved protocols. The UF CRC Processing Laboratory assists with DNA extraction, and the UF Molecular Pathology Core provides histology and immunopathology services on remnant retrospective and prospective tissue samples. The Biorepository occupies 2000 sq ft of laboratory space equipped with (8) manual -80C ultra low temp freezers, each with CO2 back-up and emergency back-up power as well as sensaphone alarm systems and a Rees Scientific system to remotely monitor freezers and the environment on a 24/7 basis. It is also equipped with two Hamilton SAM systems, small volume robotic freezers with 28,000 sample capacity each, which have similar back-up and remote monitoring. The current capacity of the Biorepository is 500,000 samples, with a current inventory of ~20% capacity. All barcoded specimens are tracked using the OnCore Database. This facilitates inventory control as well as aids in the efficient and timely distribution of stored specimens to investigators for analyses.

The CTSI Biorepository follows strict Standard Operating Procedures that are based on the current best practice guidelines set forth by the International Society for Biological and Environmental Repositories (ISBER) and the Office of Biorepositories and Biospecimen Research (OBBR), and the College of American Pathologists (CAP). The CTSI Biorepository is one of the first 12 biorepositories in the country to receive CAP accreditation. The CTSI CRC processing laboratory is equipped with standard instrumentation for DNA extraction on remnant retrospective and prospective tissue samples.

## **Biostatistics Core - RC3**

**Department of Biostatistics.** The Department of Biostatistics is dual-governed by the colleges of Public Health and Health Professions and Medicine and is now primarily located in the new state-of-the-art Clinical and Translational Research Building (CTRB), occupying 6,700 square feet of the fifth floor. The Department has a secondary campus location in Dauer Hall and o\_-campus space leased at 6011 NW 1st Place. Six full-time staff members provide the academic and departmental functions. The department has two "smart" conference rooms including a large digital at-screen, a computer that is web-linked and a conference phone as well as collaboration areas for informal research collaboration meetings. CTRB is the headquarters for Clinical and Translational Science at UF and in the State of Florida. The building houses patient-oriented research venues for the Institute on Aging and the Clinical and Translational Science Institute. Approximately 120,000 gross square feet is available in three wings and units include Clinical and Translational Science Institute, Institute on Aging, UF Clinical Research Center, Department of Aging and Geriatric Research, Department of Biostatistics, D Department of Epidemiology, and Department of Health Outcomes and Policy.

Dr. Wu (Core Leader) and Dr. Datta will use their regular offices at the CTRB building for the OAIC. The offices have access to public printers, copying machines, etc. The other investigator (Dr. Chen) also has regular office at the university. In addition, there is dedicated office space in the Department of Biostatistics for research staff.

### Data Science and Applied Technology Core - RC4

**The UF Health Integrated Data Repository (IDR) and I2B2.** The IDR was created to serve as a common source of information to be used by clinicians, executives, researchers and educators. The IDR enables new research discoveries as well as patient care quality and safety improvements through a continuous cycle of information flows between our clinical enterprise and research community. In its simplest form, a data repository is a collection of disparate data organized in a manner that lends itself to understanding relationships between data elements to answer questions.

The UF Health IDR currently consists of a Clinical Data Warehouse (CDW) that aggregates data from the various clinical and administrative information systems, including the Epic EMR. The CDW contains demographics, inpatient and outpatient clinical encounter data, diagnoses, procedures, lab results, medications, select nursing assessments, co-morbidity measures and select perioperative anesthesia information system data. The CDW data contains "Fully Identified Data" and is fundamental to institutional business processes and secured per UF&Shands policies. The UF Health IDR Team is a multi-disciplinary group comprised of members from Shands Decision and Support Services (DSS), AHC IT, AHC faculty, IRB and the Clinical and Translational Science Institute (CTSI). Access to IDR data is provided through the NIH-funded i2b2 tool, which provides researchers access to a HIPAA-compliant and IRB-approved "Limited Data Set." Faculty researchers can query the i2b2 Limited Data Set to identify cohort counts as they prepare grant proposals, plan clinical trials, and write IRB protocols.

**RC4 Data repository.** A data repository of de-identified data has been created for investigators to address age-related questions. A brief description of data available in the repository is listed in the table on the right.

**Department of Biomedical Engineering resources directly available to RC4.** Dr. Rashidi will contribute resources available in her laboratory - *intelligent HEALth Lab* (i-HEAL). The i-HEAL lab is located at the New

**Table RC4 Data repository. Databases available for secondary data analyses**

Study name	N	Age	Design
ADAPT	316	65+	RCT
ENRGISE*	300	70+	RCT
GEM	3069	75+	RCT
LEAPS	408	62	RCT
LIFE	1,635	70-89	RCT
LIFE-Pilot	424	70-89	RCT
LOOK-AHEAD	5,145	45-75	RCT
SHEP	4,736	60+	RCT
TRAIN	290	50+	RCT
TTrial	790	65+	RCT
ChoresXL*	250	20+	OCS
EPESE	14,000	65+	OLC
Health ABC	3,075	70-80	OLC
InChianti	1,020	65+	OLC
mtDNA genomic sequence	3,499	70-89	OLC+RCT
NHANES	1,286	65+	OCS
UDS-NACC Alzheimer's	32,364	50+	OLC
UF Health medical records*	21,615	65+	OCS
UF OAIC pilot studies	519	60+	RCT, OLC
UF INFORM**	9,000	50+	OLC
WHAS	1,002	65+	OLC
WHI	161,808	50-79	RCT, OLC
WHIMS	4532	50-79	RCT, OLC
<b>Total</b>	<b>271,083</b>		

\*=new study; RCT=Randomized Clinical Trial; OLC= Observational Longitudinal Cohort; OCS= Observational Cross-Sectional

Engineering Building (NEB). It includes desk space for up to 10 students. It contains a Dell Precision T5610 server with 64GB of memory and Dual Intel® Xeon processor and five networked workstations, each being equipped with four microprocessors. The software licensed to Dr. Rashidi's lab for advance data analysis and programming include MTLAB, Visual Studio, Enthought Canopy (Python), WinEdt for LaTeX editing, and Microsoft suite for text and graphics processing.

**UF Research Computing.** Additionally, the researchers in this core will also have access to the resources at the HPC center at University of Florida. These resources will be used for our scaling experiments. The HPC Center runs several clusters with about 23,000 cores in multi-core servers. Further details on UF Research Computing can be found in the section below on High-Performance Computing Center (HPC).

**Computing resources in the Department Computer and Information Science and Engineering (CISE).** RC4 has access and utilizes the resources in CISE under the supervision of Dr. Ranka. The CISE data science cluster has twelve subsystems (8 AMD and 4 Intel based systems) connected with Infiniband (40Gbit/s) and Gigabit internet. Each AMD subsystem has 64 2.3 GHz cores, 512 GB and 24 4 Terabyte hard drives. Each Intel based subsystem will have 16 2.1 GHz cores, 128 GB main memory and 10 2TB hard drives. The total capacity of the cluster will be 576 cores, 4.6TB main memory and 848 TB disk space with 30GB/s cross network bandwidth. The data science cluster also has a number of GPGPUs/Video Cards: 2 NVidia Tesla K20, 5GB RAM each 2 NVidia Tesla K40, 12GB RAM each; 1 ATI Sapphire, 16GB RAM; 3 Intel Phi 3120a, 6GB RAM each; 1 Intel Phi 5120; 2 NVidia GTX 790, 3GB RAM each. These are connected to a subset of Intel subsystems. This system will be used for conducting the big data research described in this proposal.

CISE also provides a computer cluster consisting of a head node with dual Opterons, 16GB of memory and 3.5TB of storage with 20 worker nodes with dual Opterons and 32GB of memory running Linux (Ubuntu Server 10.04). These will be used for prototype software development. All graduate students have access to a workstation that can be used to access this cluster. All faculty offices are equipped with a Windows or Linux workstation with standard software installations. Wireless access is available throughout the CSE Building and all of campus.

**Florida cyberinfrastructure.** Eleven universities in the state of Florida joined forces in the Sunshine State Education & Research Computing Alliance (SSERCA) to build a robust cyberinfrastructure to share expertise and resources. The current members are Florida Atlantic University (FAU), Florida International University (FIU), Florida State University (FSU), University of Central Florida (UCF), University of Florida (UF), University of Miami (UM), and University of South Florida (USF). The affiliate institutions are Florida Agricultural and Mechanical University (FAMU), University of North Florida (UNF), and University of West Florida (UWF). The Florida Lambda Rail (FLR) provides the underlying fiber optic network and network connectivity between these institutions and many others. The FLR backbone will complete the upgrade to 100 Gbps by June 2015. The University of Florida is connected to this backbone at the full speed of 100 Gbps and has been connected at that rate to Internet2 backbone since Jan 2013.

**OneFlorida Clinical Data Research Network.** RC4 will actively utilize the resources provided by the OneFlorida Data Trust. Following an investment of \$100 million, in 2011 UF Health opened a new electronic medical record system and a clinical data warehouse that was the foundation for the development of an integrated data repository. Over the past 4 years, the IDR system expanded to the OneFlorida Network— a statewide Clinical Data Research Network (CDRN) that will join the PCORnet to optimize opportunities for conducting comparative effectiveness research (CER). In 2012, One Florida cared for 7,506,370 unique patients, or 39% of all Floridians, through a network of 22 hospitals, 416 practices, and 3,250 physician providers. The centerpiece of the One Florida CDRN is the OneFlorida Data Trust, a secure, de-identified data repository in which UF Health, Orlando Health, Florida Medicaid/CHIP, and the Florida Department of Health currently participate. To date, the OneFlorida Data Trust houses data on 5M patients, including demographic information, diagnoses, procedures, lab results, personalized medicine genotyping data, health care visit details, nurse assessments, bio-specimen availability, and vital statistics records.

## **F. Other resources applicable to support the OAIC**

### **Clinical and Translational Science Institute**

Connected to the IOA-CTRB a 80,000 square foot complex houses the Clinical and Translational Science Institute (CTSI), the UF Clinical Research Center, clinical trial regulatory oversight offices, diabetes, muscular dystrophy and other clinical research programs, biostatistics, bioinformatics and epidemiology research, and a geriatric medicine multispecialty clinic. This provides a unique opportunity to have basic science, clinical, epidemiology and health services researchers working under the same roof with the common goal of improving the health and independence of older adults.

UF has a rich environment of distinguished colleges, state-of-the-art research facilities and statewide health education and health delivery systems. These resources position UF at the forefront of institutions to train the next generation of clinical and translational investigators and to help overcome two major obstacles in our nation's clinical research enterprise: the translation of basic science discoveries to early investigations in humans and the translation of clinical research into better medical practice and healthcare delivery. The CTSI's goals are: (1) to create an environment through which individuals from diverse disciplines can interact, resources, services and technologies can be identified and accessed, and local and regional barriers to collaborative research can be overcome; (2) to train a workforce of clinical and basic science investigators, clinical trialists, laboratory technicians, study coordinators and other related personnel who are required to establish and support multi- and interdisciplinary clinical and translational research teams; (3) to enhance the quality and availability of cutting-edge technologies and novel research programs to accelerate the discovery, development and application of new diagnostic and therapeutic modalities; and (4) to create new opportunities for clinical scientists and the citizens of Florida to collaborate in advancing education and research into the causes, prevention, diagnosis, treatment and cure of human disease.

### **Senior Care at University of Florida**

The University of Florida Physicians Senior Care Clinic, which is located within the IOA-CTRB, provides specialized outpatient health care services for older patients. The medical team, which is led by Laurence Solberg, M.D., includes physicians who are board certified in Internal Medicine with advance fellowship training in Geriatrics. Currently there are 7 geriatricians, 3 nurse practitioners, and a clinic manager. The geriatric practice is closely integrated with the RC1 Core. Physicians from the group practice serve as study physicians or safety officers and perform muscle biopsies, while other medical team members inform patients of ongoing clinical trials.

### **Shands Hospital at the University of Florida**

The primary clinical facilities for the University of Florida are located in Gainesville, Jacksonville, Starke, and Lake City, Florida. There are nine hospitals at these sites with 2,200 licensed beds. Shands Hospital at the University of Florida in Gainesville is the primary on-site teaching hospital for the HSC. The Jacksonville campus has a 528-bed University Medical Center. UF and Shands also have an inpatient physical rehabilitation facility, an inpatient behavioral health facility, and 12 home health care agencies. Together, the facilities and physician network under the University of Florida Health System have created the Southeast's largest and most comprehensive academic medical center. The average occupancy for Shands Hospital at the HSC complex is 90%.

### **The North Florida/South Georgia Veterans Health System**

The Veterans Health System consists of two medical centers (Gainesville and Lake City), three large multi-specialty outpatient clinics, and five small community-based primary care outpatient clinics. The Malcom Randall Veterans Administration Medical Center (VAMC) is a tertiary care facility and teaching hospital, which is physically and functionally connected to UF. The Gainesville VAMC combines a full range of patient care services with state-of-the-art technology that is enhanced and supported through education and research. North Florida/South Georgia Veterans Health System workload exceeds 106,000 unique patients and 990,000 outpatient visits. Over 180 University of Florida medical school residents, interns, and students are trained at the Gainesville and Lake City VA Medical Center each year. Programs are also in place with the University of Florida for dentistry, nursing, physical therapy, health services administration, and pharmacy.

The VAMC also has a Geriatric Research Education and Clinical Center (GRECC). The GRECC is a center of excellence designed for the advancement and integration of research, education, and clinical achievements in geriatrics and gerontology. Clinical investigators from medicine, dentistry, pharmacy, and health-related professions collaborate on multidisciplinary research projects in this center. In 2008 GRECC members received \$3.5 million in total extramural funding. Areas of research included, geropharmacology, dementia, coronary risk factors, exercise in the frail elderly, and rehabilitation care.

### **Brooks Rehabilitation Hospital and Health System**

Jacksonville, Florida is a 127-bed not for profit hospital dedicated to treating patients with brain injury, strokes, spinal cord injury, and comprehensive orthopedic problems. It also has a network of over 18 outpatient facilities and under construction now is a 60,000 sq foot medical wellness facility that is designed to serve training and physical activity needs of those with disability and the frail elderly. The Brooks Health system in Jacksonville, Florida has an ongoing research partnership with the University of Florida through the Brooks Center for Rehabilitation Studies. The Jacksonville campus of the Brooks Health system is home to a 4,000 sq. ft. human performance lab that is equipped with the latest equipment to evaluate mechanisms of walking recovery (force plates, VICON Motion Analysis, Treadmills). This clinical research facility is supported by endowments and directed gifts to UF. We are already collaborating with the Brooks team in recruitment for the LIFE trial, a major dual-sited study supported by the OAIC RC1.

### **Research Informatics and Information Technology Strategy for recruitment**

The relevant value of information and technology provided by the UF Health to research is demonstrated starting with strategic decisions. There was a recent investment of over \$10 million by the UF Health Academic Center to implement the EPIC electronic medical record in its inpatient and outpatient operations. Twelve of 40 clinics are live on EPIC and inpatient went live in April of 2011. EPIC research features the ability for the UF human-based research community to set up studies in the EPIC database, and alert physicians during their visit with a patient, of a study for which their patient may be eligible.

### **Computing Environment:**

The UF Health & Shands Information Technology (IT) Department serves the information and technology needs for the patient care, academic *and research* missions of the UF Health, which includes Shands HealthCare and the UF Health Science Center. The centralization of IT functions at the UF Health, and its support of the tri-part missions fosters the secure flow of information from the clinical enterprises to the research environment. Two UF&Shands IT organizations play significant roles in data management as described below.

#### UF&Shands AHC IT – Systems Administration and Database Administration

The UF&Shands AHC IT department provides Systems Administration (SA) and Database Administration (DBA) services. These teams support and manage approximately 1,200 servers of which 439 are physical and 734 are virtual. These servers run on the following platforms: Windows Server, VMware ESX, IBM AIX, Redhat Linux, Debian Linux, and Sun Solaris We support and manage over 1,300 databases that house the clinical, financial, and administrative data critical to the UF&Shands AHC entities; Shands Healthcare, Faculty Group Practice, and the UF Health Science Center colleges and institutes. The database management systems supported are: InterSystems Cache, Oracle, MySQL, IBM DB2 LUW, IBM DB2 for the Mainframe, and Microsoft SQL Server.

Trend Office Scan protects Windows servers from viruses and spyware. Trend provides real time scanning, scheduled scanning, and reporting. Each Windows server downloads its virus definitions, spyware definitions, and engine updates automatically from a centralized Trend server managed by the UF&Shands AHC IT Systems Administration team. Pattern file updates and cleaners are automatically installed following release from the anti-virus vendor.

Lumension Endpoint Management and Security Suite software provides automated deployment of Windows Security updates and auditing of server patch compliance. Patches are automatically downloaded to a centralized Lumension server managed by the AHC IT department. Patches are tested before deployment and, if no issues are found, installed to all managed servers in a phased rollout. Server reboots occur during scheduled downtime. Patches are deployed on a monthly basis or when an out of band patch is released by

Microsoft. Workstations are patched and audited for patch compliance via LANDesk Patch Manager.

Nimsoft Monitoring Solution Software (NMS) provides centralized monitoring, alerting, and historical reporting of IT hardware, software, database, and application availability, health, and performance. NMS integrates with specialized monitoring tools such as HP System Insight Manager, Oracle Enterprise Manager Grid Control, and Idera Diagnostic Manager for SQL Server to provide a comprehensive solution. The health of critical applications and core systems is displayed in a centralized tree of dashboards that is monitored 24x7 by the Data Center Operations department. Automated alerting and escalation is provided by NMS integration with the UF&Shands AHC's On-call and Paging system.

Tivoli Storage Manager (TSM) provides backup and recovery of server Operating systems, application files, and data. TSM utilizes the incremental forever model, backup to disk, "active data", open file support, and collocation groups to provide the quickest and most reliable backup and restore times possible. The TSM infrastructure is spread between two physical locations on campus. Backup data is replicated between these two campus sites providing protection of data via a remote data vaulting process. In addition, the "active files" disk feature of TSM is used to provide the fastest full server restore time possible by keeping the most recent copies of server files on the backup disk array at all times.

#### UF&Shands AHC IT – Enterprise Storage and Disaster Recovery

The UF&Shands AHC IT Storage and Disaster Recovery team manages 500 terabytes of 10-gigabit enterprise clustered network attached storage that is replicated between IT data centers and scalable to 16 petabytes. In addition, the team manages a dual core storage area network infrastructure that is extended between 4 distinct IT data centers. Storage is delivered by multiple storage arrays and vendors and is a mix of Tier 0, Tier 1 and Tier 2 storage with the ability to dynamically move data between tiers based on performance needs. Current SAN storage capacity is approximately 2 petabytes. The backup/recovery environment is located in a separate data center from the actual servers providing separation of data at the time of backups. All data is backed up to a 500-terabyte disk pool, providing a quicker recovery in the event of disaster. In addition a copy of the data is replicated to tape for protection against a potential disk pool failure.

#### **UF Library**

The University of Florida Library System, made up of 9 libraries, constitutes the largest information resource in the State of Florida. It contains more than 4,000,000 volumes, 1,000,000 government documents, 4,200,000 microforms, and 550,000 maps and images. In addition, the Libraries provide over 425,000 links to online resources, including e-books, databases, government documents, and full texts of journals. The Digital Library Center is developing the UF Digital Collections and contributes to the Publication of Archival, Library & Museum Materials (PALMM) initiative of the State University System. All of the Libraries serve the University's faculty and students; however, each has a special mission as primary support of specific colleges and degree programs. Six Libraries in the system are known as the George A. Smathers Libraries of the University of Florida. The other two (Health Sciences and Legal Information) are attached to their respective administrative units.

The University of Florida Health Science Center Libraries serve as a primary information center for the staff, faculty and students within the HSC. The HSC Libraries are part of the National Network of Libraries of Medicine and have an extensive public computing area that provides access to MEDLINE, CINAHL, Web of Science (Science/Social Science Citation Indexes), Health Reference Center, AIDSLINE, TOXLINE, Dissertation Abstracts International, Journal Citation Reports, the Cochrane suite of Evidence-Based Medicine resources, and multiple additional databases available through Cambridge Scientific Abstracts, EbscoHost and WilsonOmniFiles. Remote Library access is provided through a campuswide fiber optic backbone, proxy and dial-up services, and a downloadable Virtual Private Network software package. Classes on database searching, catalog instruction, and use of bibliographic software packages such as EndNote and RefWorks are taught each semester for UF faculty, staff, and students (Note: PPHP has a site license for EndNotes and supports this software to networked computers in its system). UF Library classes help to improve Library and information searching skills. Some classes are taught through course-integrated instruction while others are offered for the whole UF community. Several private-study rooms can be reserved for group discussion or private work, as well as the primary student study area — available 24/7 — called the "blue room." The HSC Libraries' collection supports instruction and research for the six HSC colleges. The Collection Management

department orders all formats of materials and evaluates the quality and use of the materials received. The HSC Libraries provide public access to electronic resources in the Informatics Lab, located on the second floor. There are approximately 89,660 books, 251,090 journal volumes, and 9,000 audiovisual resources. The HSC Libraries also provide liaison services to individual departments and programs. The liaisons scan the literature and alert faculty members to recently published resources in their disciplines. They also participate in student orientations and provide classes on specific topics within courses in the College. The HSC Library staff includes a public health specialist, Nancy Schaeffer who provides services and training for faculty and students.

### **Laboratory of Applied Neuromechanics in the Department of Applied Physiology and Kinesiology**

**(APK):** The mission of the Department of APK is to study the anatomical, physiological and psychological consequences to human movement and their relationship to health and disease. As such, there is a seamless collaboration between the researchers at the OAIC and APK. Currently, there are several collaborative efforts with investigators from the clinical research core that are affiliated with the Department of APK. Our collaborations stem from work on gait characteristics where resources in the Applied Neuromechanics Laboratory are being utilized. The Applied Neuromechanics Laboratory is comprised of 6 rooms that provide space for personnel, equipment, data collection, and data analysis. The lab houses a large, open area (4m x 7m x 10m and 3x 6x6) used primarily to house data collection equipment for human movement studies including gait analysis and to perform data collections. It also contains three computers, a preparation area as well as a small work area available to faculty and students. Additional space (18'x20') is available for Research Assistants and Post-Doctoral Researchers. It contains seven computers and two laser jet printer (HP LaserJet 4 Plus) all of which are networked.

### **Biobehavioral Core**

The CTSI Biobehavioral Core facilitates translational research by providing research personnel trained to administer a core set of behavioral assessments; coordinating access to biobehavioral research resources across collaborating colleges; providing/facilitating training for the administration of core assessments; serving as a training site for pre- and postdoctoral trainees in the behavioral sciences; and providing consultation regarding potential assessment tools for both animal and human work. Identifying potential avenues for biobehavioral integration is a key role of the core. The core director and staff work with investigators to identify areas of potential integration. The core maintains a central library of behavioral and paper/pencil assessments often used in health-related research, including standard assessments of depressive and anxiety symptoms, reading skill (as an estimate of premorbid functioning), basic perceptual-motor, learning/memory and problem-solving tasks, and demographic information including family trees/pedigrees.

### **Biomedical Informatics Program**

The CTSI Biomedical Informatics Program at UF works to enhance and extend informatics infrastructure for transforming and translating discovery; create and manage the Center for Advanced Data Capabilities; establish biomedical informatics as an academic discipline at UF; and further national collaboration to accelerate the multidirectional flow of informatics ideas, best practices, technologies, and standards. The Biomedical Informatics Program is supported by both the CTSI and the Department of Health Outcomes and Policy, which hosts and supports the program's biomedical informatics graduate certificate. Program faculty and staff have access to campus computing resources such as GatorVault, a private cloud for research data storage, and HiPerGator, Florida's most powerful high performance computer. Clinical and Translational Science Informatics and Technology (CTS IT), a CTSI informatics support unit with 21 employees and 3,645 square feet of office space, is part of the Biomedical Informatics Program. CTS IT staff offer design and development of custom software applications for research including RED-I, UF's software application to move data from UF's Integrated Data Repository, and other institutions' EHR data, to REDCap. CTS IT also offers informatics consults, research system hosting in accordance with UF's strategic plan for biomedical informatics, data workflow development and management of research software.

### **CTSI**

The University of Florida Clinical and Translational Science Institute (CTSI) was founded in 2008 to speed the translation of scientific discoveries into improved health by strengthening the university's ability to conduct clinical and translational research. To prepare and nurture future health researchers, the CTSI offers

multidisciplinary training programs. The CTSI undertakes transformational initiatives and provides services and resources to facilitate health research in any disease area and to advance knowledge across the translational spectrum – from laboratories to health-care settings to the public health and policy arenas, and back again. As a catalyst and hub connecting resources, people and ideas, the CTSI expands collaboration and advances science across UF's 16 colleges, the state of Florida and the national Clinical and Translational Science Award consortium. The UF CTSI is supported by multiple NIH grants, most notably a Clinical and Translational Science Award (CTSA) from the National Center for Advancing Translational Sciences, and by significant matching funds from the UF Office of Research and the UF College of Medicine. Additional support comes from in-kind efforts of most of the UF colleges. The UF CTSI is hosted in the Clinical Translational Research Building (see description above in the UF OAIC facilities).

### **CTSI Clinical Research Center**

The CTSI's Clinical Research Center (CRC) occupies 10K square feet on the first floor of the north wing of the Clinical and Translational Research Building (CTRB). The dedicated research space includes 10 exam rooms, four private exam rooms, an eight-bed infusion room, two procedure rooms, and a large exercise physiology room. The unit also includes administrative offices and is equipped for complex exams such as bronchoscopy, liver biopsies, and gene therapy. Other available equipment includes pulmonary function equipment, dental chair, Bod Pod, Body Box, Basal Metabolic cart, Ultrasound machine, EKG machine, and blood pressure monitors. Located within the CRC is an investigational pharmacy, a conference room, work areas for nursing and study staff, and a sample processing lab which houses refrigerators, centrifuges and -80° freezers.

The CRC provides a highly trained research staff including registered nurses, a medical technologist, a research dietitian, and administrative staff. All staff is trained in Good Clinical Practice. Services include administration of investigational medications, specimen collection including pharmacokinetic sampling, monitoring of vital signs, administration of glucose tolerance tests, euglycemic clamp procedures, diet recalls, specimen processing, and exercise testing.

### **CTSI Communications and Dissemination Program**

The CTSI Communications and Dissemination Program (CDP) facilitates research collaborations among UF's clinical and translational researchers and health communication researchers in the UF College of Journalism and Communications (CJC) and other UF departments involved in health communication research. The goal of the CDP program is to contribute to translational communication research and practice through theoretically informed and evidence-based health message design, dissemination, and evaluation. Specifically, the CDP supports the formation and development of interdisciplinary teams focused on improving communication with patients, caregivers, and community members.

Established in 2008, the CDP facilitates interdisciplinary, translational communication research by connecting scholars affiliated with the CTSI and CJC with similar interests. Since its inception, the program has grown to not only connect researchers with similar interests, but to also provide funds to support preliminary studies and offer seminars, workshops, and colloquia for faculty and students. Developing this critical infrastructure has resulted in successful collaborations on a range of topics, including cardiovascular disease, eating disorders, genetic testing, hospital falls, infectious diseases, smoking and alcohol use, sexual violence, and sickle cell anemia. Research collaborations among CDP faculty and students have resulted in over 30 peer-reviewed publications and conference presentations as well as several federally funded grants.

The program director, Janice Krieger, PhD, as well as several faculty affiliated with the CDP, have direct expertise in the area of patient participation and retention in clinical research and health inequities. The CDP research program in this area includes research on topics including message framing, physician-patient communication, family-patient communication, and community engagement as related to health inequities regarding research study participation. This background, coupled with extensive experience working in interdisciplinary, federally-funded research teams, will support the development of theoretically informed and evidence-based interventions to promote recruitment and retention of research participation as described in the current proposal.

The CDP has a number of resources in place to support continued success in collaborative efforts. One is significant commitment of effort by the director to actively participate in the proposal. Another is a PhD level research assistant who is available to consult (under the direct supervision of the director) with CTSI researchers about communication issues related to research participant recruitment and retention. Finally, the CDP has access to resources and dedicated space associated with the STEM-H Translational

Communication Research program located within the CJC. Resources include half-time administrative personnel, office space, and a meeting room with top of the line technology for conducting interviews and focus groups.

### **CTSI Service Center**

The CTSI Service Center facilitates rapid activation of research for investigators performing translational research across the UF campus and provides a range of research services and resources, including biostatistical and regulatory support, data support through the Clinical and Translational Science-IT and Research Electronic Data Capture (REDCap) teams, and facilities to conduct research through the UF Clinical Research Center. Through the Regulatory Knowledge and Support (RKS) program, the Service Center provides access to a Research Subject Advocate, informed consent expertise, IND and IDE assistance, ClinicalTrials.gov assistance, ethics consults, data safety monitoring assistance, and Standard Operating Procedure development. RKS can also provide Good Clinical Practice, Good Laboratory Practice and Good Manufacturing Practice training. The CTSI Service Center's Research Navigators advise research teams on available resources and help them navigate research-related processes. Navigators are well versed in IRB application preparation, protocol development, Good Clinical Practice guidelines, and NIH research rules and standards for the design, conduct, performance, monitoring, data collection, management, analysis, and reporting of clinical trials. Through consultation, Navigators help investigators assemble research teams to conduct studies, provide budget reviews, oversee study management, assist with recruiting and aid in the timely completion of the study. The CTSI Service Center also links investigators to other CTSI resources and core facilities. The CTSI Service Center works closely with investigators, the UF Institutional Review Boards, the UF College of Medicine Research and Compliance office, and numerous service providers across the CTSI and the university.

### **Human Imaging Core**

The CTSI Human Imaging Core provides infrastructure and support for research and educational activities using Magnetic Resonance Imaging (MRI) technology, with particular emphasis on translational MRI research in humans. The Core is open to UF researchers as well as academic and industrial researchers from outside UF and operates with three professional staff members, including one MRI scientist and two radiological technologists. The Core began in June 2012 as a strategic component of the CTSI to advance MRI research in humans. Since its inception, the Core has successfully facilitated growth in MRI research in UF, evidenced by the fact that the number of UF PIs conducting human MRI research has doubled from 26 to 52 as of October 2014. To meet the fast and ever-growing needs of the human MRI research community at UF and beyond, UF is in the process of purchasing a second research-dedicated, whole-body human MRI system that is expected to be installed during summer 2015.

The Core is located on the ground floor of McKnight Brain Institute (MBI). The centerpiece of the Core is a 3.0 Tesla, 32-channel Philips whole-body human MRI scanner dedicated to research, the only research-dedicated human MRI scanner in the state of Florida. The scanner is equipped with a series of coils for imaging human organ systems, including a 32-channel head coil for neuroimaging applications with significant gains in signal-to-noise ratio and acquisition speed. The newest addition is a transmit/receive whole brain 31P/1H coil that allows imaging and spectroscopy of metabolism. An ESys® system by Invivo is available for presenting video and audio signals including functional MRI task paradigms to the subjects during scanning. In conjunction with two higher magnetic field magnets (4.7T and 11T) for imaging animals and/or tissue samples in the AMRIS Facility, which is housed on the same floor in the MBI and is the biological arm of the DoE- and NSF-funded National High Magnetic Field Laboratory, the CTSI Human Imaging Core is a state-of-the-art facility for cutting-edge translational MRI research in human health and diseases.

The CTSI Human Imaging Core capabilities include performing structural, functional, and metabolic MRIs, developing methods and protocols for MRI data acquisition, teaching investigators data acquisition and analysis techniques, and assisting researchers in designing experimental protocols and developing advanced MRI imaging and spectroscopy methodologies. Image quality assurance and quality control as well as image acquisition, transfer support, and archiving support are available through the CTSI Human Imaging Core. Implementation Science Program Created in 2013, the CTSI Implementation Science Program strengthens the capacity of UF Health as a learning health system and advances implementation science across the state. Implementation science emphasizes outcomes that consumers, practitioners, and communities value and thus takes a participant- and community-centered approach. The Implementation Science Program is positioned to build on the model of the CTSI-led UF Health Personalized Medicine Program, which develops

and pilots implementation strategies at UF Health and then adapts and tests them for use in other healthcare settings.

The program offers Implementation Science Studios to Investigators who wish to incorporate implementation science into their research. The program collaborates with the CTSI's statewide research partners and networks, including the Health IMPACTS for Florida practice-based research network.

### **Mentor Academy**

The CTSI Mentor Academy, supported by UF Health, the UF College of Medicine, and the CTSI, was launched in June 2013 to promote the development of the next generation of clinical and translational scientists by promoting a culture of support for mentoring and by providing training in optimizing mentoring relationships for mentors and mentees at all levels of career development. Roger Fillingim, PhD, leads the academy with support from Marian Limacher, MD, Director of the CTSI Training and Professional Development Program and Senior Associate Dean for faculty affairs and professional development in the UF College of Medicine.

Currently, the academy offers a Master Mentor program structured around a yearlong seminar series on topics relevant to successful mentor-mentee interactions. Topics from the current schedule include ethics and professionalism, dealing with conflicts, benefits and challenges of diversity, tracking success, and transitioning from mentor to colleague. UF faculty members who attend at least eight sessions are inducted as members of the CTSI Mentor Academy. The first cohort of members consisted of nine faculty, many of whom are active in CTSI initiatives. These Master Mentors continue to participate in sessions and serve as role models for junior faculty who are developing mentoring skills. Planning is now under way to develop training programs for early career mentors as well as for mentees, including junior faculty, postdoctoral fellows, and graduate students.

### **OneFlorida Clinical Research Consortium**

The OneFlorida Clinical Research Consortium is a collaborative statewide network that seeks to improve health research capacity and opportunities in the State of Florida through the facilitation of clinical and translation research in communities and health care settings. Central to the statewide vision for the OneFlorida Clinical Research Consortium is the collaborative development of an enduring research infrastructure serving all Floridians and Florida health researchers.

Infrastructure components supported by the OneFlorida Consortium include Shared Governance Structure; Cooperative Institutional Review Board; Community Research Facilitator Program; Community Engagement Program; Consent2Share Program; Information Technology Resources (collaborative portal – ResearchACTS software for study management, data collection and point-of-care risk assessments); Data Analytics Warehouse; Training and Education Programs (community clinician-, patient- and caregiver-as-scientist programs, pragmatic trials and implementation science minority education program); and Statewide Biorepository Capability.

### **Pain Research Center of Excellence**

Pain Research Center of Excellence, which provides a patient-oriented research venue designed to facilitate and foster clinical and translational pain research at UF. The Pain CRU's primary facility consists of four examination rooms located in the Clinical Research Center in the north wing of the Clinical and Translational Research Building (CTRB). Satellite locations of the Pain CRU are available on the second floor of the Dental Tower at the UF Health Science Center and in the Institute on Aging Geriatric Clinical Research Facility.

Altogether, the Pain CRU comprises nine fully equipped quantitative sensory testing (QST) units and several flexible-use examination rooms. The Pain CRU is staffed by well-trained research staff, including an advanced registered nurse practitioner, a phlebotomy-trained research coordinator, a lab manager, multiple research technicians and numerous trainees, including undergraduate, graduate and professional students, post-doctoral fellows and junior faculty members.

### **Research Coordinator Consortium**

The CTSI supports the Research Coordinators Consortium (RCC), which provides a forum for networking, educating, and resource sharing to assist research staff in navigating their professions while prioritizing and ensuring optimal human subject protections. As a network for all allied research professionals, the RCC presents an opportunity for research professionals to share best practices and discuss common issues and concerns. RCC Research Coordinator Training initiatives integrate and align resources across the

enterprise, tapping the Institutional Review Board and Research Administration Compliance programming, as well as content from national research professional organizations.

The RCC works to raise awareness of human subject protections and to assist navigation across the clinical trials life cycle. The RCC hosts webinars from the Association of Clinical Research Professionals (ACRP) conference library, and facilitates a web presence on the CTSI website with a mentorship contact list, articles of interest, certification options and other resources. The RCC offers online resources for informed consent training intended to give research team members certain skills when designing, constructing and obtaining an informed consent, and reviews the process for teaching, training and supervising those who will be responsible for obtaining informed consent.

The RCC hosts Research Coordinator Certification Study Groups. These are facilitated study groups run for clinical research professionals seeking national certification in a professional organization. The RCC produces short-course GCP training for annual GCP training documentation for research staff, PIs and coordinators. The RCC also offers a Training Overview of Human Subjects Research Coordination directed towards novice coordinators and addressing common research-navigation concerns.

### **ResearchMatch**

ResearchMatch is a national volunteer research registry that brings together researchers and willing volunteers who want to get involved in research studies. This national registry, developed by institutions affiliated with the Clinical and Translational Science Awards (CTSA) program, provides a secure, web-based approach to address a key barrier to advancing research: finding research participants. The goal of ResearchMatch is to better connect volunteers with potential study opportunities.

### **Southeast Center for Integrated Metabolomics**

The Southeast Center for Integrated Metabolomics (SECIM) offers services in mass spectrometry (MS) and nuclear magnetic resonance (NMR) -based metabolomics and is developing a fully integrated platform for analytical measurements and statistical analysis. SECIM offers untargeted global metabolomics using NMR and liquid chromatography–mass spectrometry (LC-MS) and targeted assays using LC-MS on amino acids, organic acids, acyl-carnitines, acyl-CoAs, and NAD metabolites through partners at Sanford Burnham Medical Research Institute in Orlando. Biomarkers are identified by state-of-the-art NMR and MS. SECIM is developing new methods for de novo structure prediction with the Brüscheweiler lab at The Ohio State University and also joint NMR/MS analysis with the Nicholson lab at Imperial College. SECIM users are able to conduct isotopic ratio outlier analysis (IROA) experiments to measure global metabolomic changes in response to external perturbations or mutations using LC-MS through our partnership with IROA Technologies and Thermo Fisher.

SECIM technical cores include: Mass Spectrometry Services for global and targeted metabolomics (Garrett and Gardell, Co-PIs); Nuclear Magnetic Resonance for global metabolomics and biomarker identification (Edison, PI, Walter, Co-PI); Advanced Mass Spectrometry for biomarker identification, imaging mass spectrometry and IROA (Yost, PI); and Bioinformatics for SECIM pipeline development and analysis (McIntyre, PI). Additionally, the Promotion & Outreach Core unifies the technical cores' activity by expanding the user base and providing education and training in SECIM capabilities.

### **Study Registry**

The CTSI Study Registry project is a comprehensive dataset with consistently defined data elements for all research studies involving human subjects that have been approved by the UF Institutional Review Board (IRB) since 2008. This registry expands access to information about UF's actively enrolling research studies and improves the University's ability to understand, promote, and strengthen UF's portfolio of human-subjects research. Data collected for this registry will be posted on the UF StudyConnect website as a searchable database of actively enrolling studies seeking participants. Additionally, the data collected for the registry will be used by the CTSI and other stakeholders to analyze UF's human-subjects research portfolio in new ways by, for example, looking at studies' translation stages.

### **Training and Research Academy for Clinical and Translational Science**

The Training and Research Academy for Clinical and Translational Science (TRACTS) is a two year, tuition-funded, mentored training program for faculty and senior fellows at UF who have a passion to pursue clinical/translational research in the health sciences as a major component of their careers. TRACTS is designed to provide clinicians with sufficient research experience, didactic knowledge, and publishable

research outcomes to be competitive for a K-level (NIH) mentored research award or equivalent. Scholars develop and conduct, with the guidance of their mentor(s), a research project that is patient-oriented, human-subject-related, and translational in nature.

Candidates are clinician junior faculty with a full-time appointment within a UF department, or a fellow or post-doc who will be appointed to a full-time faculty position at the UF upon completion of training. TRACTS Scholars receive tuition for core coursework and up to 30 credit hours total (including core courses) toward a Master of Science with a concentration in Clinical/Translational Science (MS-CTS). Participants in TRACTS also receive oversight of course and research progress by the TRACTS Advisory Committee, pre-review of their grant applications, statistical support through the CTSI's Biostatistics, Epidemiology and Research Design (BERD) program and opportunities for collaboration with other research scholars. TRACTS Scholars are allotted 20 hours per week dedicated time from their departments/divisions to pursue M.S. coursework and conduct the approved research study, and to attend other CTSI multidisciplinary workshops and seminars.

They are expected to submit and publish at least two manuscripts based on the TRACTS research project by the end of year two, in addition to presentation at the annual CTSI Research Day. The Advisory Committee works with the scholar to identify the best research mentor team, to support and advise the scholar, oversee the scholar's research efforts, and monitor progress in didactic coursework, publications and grant applications.

### **UF Health Personalized Medicine Program**

The UF Health Personalized Medicine Program (PMP), partners with health professionals and patients at UF Health and across the state to develop, implement, study, and refine methods that allow genetic information to be used routinely as part of patient care. The program's initial focus is on pharmacogenetics. PMP is led by faculty from the UF College of Pharmacy and brings together a large and multidisciplinary team that provides complementary clinical, informatics, laboratory medicine, and administrative expertise required to implement genomic medicine. The program has launched three drug-gene implementations and performed clinical pharmacogenetic tests for more than 1400 patients. The Personalized Medicine Program is currently focused on expanding evidence-based genomic medicine to other inpatient and outpatient settings throughout Florida, leveraging existing OneFlorida partnerships.

### **VIVO**

VIVO is a scholarly networking and discovery tool that enables understanding and collaboration among all disciplines. VIVO represents scholarship using the VIVO-ISF ontology and its data is publicly available in Resource Description Framework (RDF), a World Wide Web Consortium (W3C) standard. Thirty-six CTSA institutions provide data using the VIVO data standard. In 2012, the CTSA network recommended all CTSA to provide data regarding their scholarship using the VIVO data standard. This was the first, and to date the only, network-wide recommendation. At UF, VIVO is automated to collect person contact and employment data from Human Resource Services, grant data from the Division of Sponsored Programs, papers and other publications from BibTeX exports from Thomson Reuters Web of Science, and teaching data from the Office of the University Registrar. Data is updated weekly. Individuals may sign on to VIVO using their GatorLink username and password to edit their profile information. The SPARQL query language is used to extract data for ad hoc reports, standardize website content and provide data for CTSI operations, including evaluation, governance, network science and training programs. VIVO provides a comprehensive view of the university and its scholarship. As of October 1, VIVO at UF contains information on 13,052 organizations, 182,913 people, 56,737 publications, 22,651 grants, 8,051 courses, and 87,268 course sections. Originating at Cornell, VIVO was further developed as the result of an NIH ARRA award (2009-2011) to UF and a consortium of six schools (Cornell, Weill Cornell Medical College, Indiana University, Washington University at St. Louis, Scripps Research Institute, and Ponce Medical School in Puerto Rico). VIVO is an open-source, sponsor-supported software project managed by Duraspace, a not-for-profit corporation dedicated to the representation and presentation of the academic record. VIVO is now used by more than 100 organizations worldwide, including the USDA and the American Psychological Association.

### **Advanced Magnetic Resonance Imaging and Spectroscopy**

Advanced Magnetic Resonance Imaging and Spectroscopy (AMRIS) is a state-of-the-art nuclear magnetic resonance (NMR) facility located on the ground floor of the McKnight Brain Institute at UF. AMRIS was developed in part through a grant from the Department of Defense. The National High Magnetic Field

Laboratory supports an External Users Program in AMRIS through funds from the National Science Foundation. All AMRIS systems are available to UF researchers and external academic and industrial scientists.

AMRIS currently offers users nine NMR spectrometer systems with different magnetic fields and configurations for a full spectrum of magnetic resonance experiments including high resolution solution NMR, solid-state NMR, microimaging of biomolecular systems and tissues, animal imaging, and human imaging. AMRIS has nine professional staff members to assist users, maintain instrumentation, build new coils and probes, and help with administration.

Several of the AMRIS instruments offer users unique capabilities: the 750 MHz wide-bore provides outstanding high-field microimaging for excised tissues and small animals; the 11.1 T horizontal MRI is the largest field strength magnet in the world with a 400 mm bore; the 600 MHz 1.0 and 1.5 mm HTS cryoprobes are the most mass-sensitive NMR probes in the world for <sup>1</sup>H and <sup>13</sup>C detection, respectively, and are ideal for natural products research; and the 3T human whole body has 32 channels for rapid parallel imaging and is the only whole body instrument in the state of Florida dedicated to research. Most recently (2013) AMRIS added a 5T Dynamic Nuclear Polarization (DNP) polarizer with helium cryostat. These systems support a broad range of users with tasks from natural product identification to solid-state membrane protein structure determination to cardiac studies in animals and humans to tracking stem cells and gene therapy in vivo to functional MRI in humans.

### **Animal Care Services**

Animal Care Services (ACS) serves nearly 600 UF faculty and approximately 1,400 animal care and use protocols in various research and teaching programs. The UF animal care program has been continuously accredited by the Association for the Assessment and Accreditation of Laboratory Animal Care International since 1966 and is registered with the United States Department of Agriculture as a research site. ACS manages 12 animal housing facilities totaling approximately 200K square feet that include environments ranging from ABLSL3 to rodent barriers, which are essential to the development and maintenance of unHarique transgenic rodents and the conduct of experimental protocols.

The housed species range from mice and other rodent species to large animals such as pigs, sheep, horses, cattle, and nonhuman primates. The ACS has a veterinary staff that consists of eight board-certified veterinarians and ten veterinary technicians primarily involved in providing or supervising veterinary care, protocol review, surgical services, pathology services, diagnostic laboratory services, training of investigators, and investigator staff and compliance. ACS has a total staff of approximately 130 employees who provide daily animal husbandry and veterinary care.

### **Cell & Tissue Analysis Core**

The McKnight Brain Institute's Cell & Tissue Analysis Core (CTAC) consists of two facilities that provide the UF research community with a wide array of imaging modalities as well as basic histology equipment for tissue sample preparation. The CTAC Imaging facility maintains instrumentation for both in vitro and in vivo imaging experiments.

Microscopes for in vitro imaging include laser scanning and spinning disk confocal systems, an automated live-cell time-lapse and tile-mapping system, and standard wide field systems in both inverted and upright formats for fluorescent, bright field, and H&E projects. Instrumentation for in vivo experiments includes high resolution ultrasound, preclinical bioluminescent and fluorescent imaging, and an intra-vital laser scanning fluorescent microscope.

The imaging facility also has software available for image deconvolution, quantification, and 3-D rendering. The CTAC Histology Resource Lab provides researchers with access to cryostats, microtomes, microwave processing, paraffin embedding, laser capture micro-dissection, and other tissue-processing equipment. CTAC's skilled technical staff is available to train new users, assist, or operate each piece of equipment.

Center of Excellence for Regenerative Health Biotechnology Established in 2003 with a launch of operations in 2006, the UF's Center of Excellence for Regenerative Health Biotechnology (UF CERHB) is a biomedical translational research support center with the mission to stimulate promising research leading to commercialization of technologies that will create new companies and high-wage jobs, and develop the workforce talent to support the bioscience industry growth. UF CERHB functions at the intersection of academia and industry and is proximal to the cluster of biotechnology companies in the Gainesville/Alachua area. The center provides expertise, training programs, and biologics manufacturing services to the biotechnology industry and to biomedical research institutions.

One Innovation Drive is a 24K square foot building with dedicated biomedical product manufacturing and testing operation for therapeutic proteins (enzymes, antibodies, hormones), vaccines, gene transfer vectors, and cell banks and cell therapies using mammalian culture systems. This contract manufacturing operation (Florida Biologix) supports phase I and phase II human clinical trials from industry and academic clients requiring FDA and EMEA compliant manufacturing of their investigational drugs. Client sponsors currently include Florida companies, multi-national and foreign companies, and domestic private and public companies.

Two Innovation Drive is a 23K square foot building which houses the UF CERHB Education and Training Center (Biotility) and includes classrooms, conference areas, a cleanroom simulator, and wet labs outfitted with state-of-the-art equipment. Proximity to Florida's northeast bioindustry cluster facilitates student internships, incumbent employee training and retraining, pre-employment training, and participation of industry leaders as teachers. Certificate short courses that integrate industry concepts and skills into traditional biomedical research are offered to undergraduate and graduate students, researchers and faculty, and companies throughout the state. Topics of focus include product and process development, biomanufacturing processes, analytical methods, quality systems, and regulatory compliance. Faculty also teach graduate level courses at the Education and Training Center as part of the UF College of Medicine master's program in translational biotechnology. Due to Biotility's commitment to preparing a pipeline of students for emerging industry needs, the U.S. Department of Education recognized Biotility for the development of Florida's secondary program in industrial biotechnology, teacher training, and Florida's industry-recognized "Biotechnician Assistant" credential.

### **Center for Health Equity and Quality Research**

The Center for Health Equity and Quality Research (CHEQR) is an important research resource for the UF Community Based Participatory Research. CHEQR core faculty include a MD/MPH with a background in pediatrics, preventive medicine, and health services research, a cardiologist/epidemiologist, a PhD level biostatistician, five PhD researchers with training in health education and evaluation research, health services and outcomes research, and mental health services research, two master's level biostatisticians, and six research coordinators. CHEQR faculty and staff are expert in the use of a wide range of research methods including community evaluation research, community-based participatory research, quality of care and outcomes research, clinical trials, and translational research.

CHEQR provides the research infrastructure for UF Health Jacksonville by providing research design and analysis consultation services to faculty, residents and fellows, including help with IRB preparation and submission, development of protocols, grant development, data collection, data analysis, and report generation; assisting UF faculty in the development of research teams through collaborations with investigators from UF Gainesville and other institutions; providing data management and analytic support to quality management initiatives for the enterprise; providing education to faculty, residents, and fellows on biostatistics, research design, and epidemiology through annual lecture series and online courses; and providing mentoring on research and project management support for fellows to help develop the next generation of faculty at UF Health.

CHEQR is housed at the Jacksonville campus and occupies more than 2,300 square feet of office space. CHEQR currently has statistical software, robust internet medical library search capacity and access to electronic journals. Other data resources include Research Electronic Data Capture (REDCap), which is an internet-based data collection tool that can capture data into an IRB-approved secure system for surveys and longitudinal information-gathering.

### **Center for Movement Disorders and Neurorestoration**

UF founded the Center for Movement Disorders and Neurorestoration in 2002 with the vision of creating a world class clinical research center to provide a single destination for patients, families, doctors, and leading edge scientists. The clinical research center has 13K square feet of dedicated space on the fourth floor of the UF Orthopedics and Sports Medicine Institute. The space for movement disorders and neurorestoration includes 21 dedicated patient exam rooms as well as tailored space for clinical trials, research, telemedicine, and one of the world's largest movement-disorders databases with 8,200 enrolled patients.

The center possesses strengths in movement disorders neurology, neurosurgery, neuropsychology, psychophysiology, imaging (MRI, fMRI and others), technology development, psychiatry, biomechanics, PT, OT, and speech/swallowing. The movement disorders group has collaborative research projects with 40 faculty from more than 10 UF departments. The deep brain stimulation (DBS) program is one of the most

productive and published in the country and has a track record of significant NIH funding. The Center for Movement Disorders and Neurorestoration research laboratory occupies 1K square feet of space dedicated to clinical research, specifically deep brain stimulation (DBS) physiology research. Laboratories are equipped with several private rooms for study visits, and the center has access to a soundproof room for the administration of testing to prevent outside physiological interference. The laboratory houses an SQL server dedicated to the movement disorders database. The laboratory has a full-time data manager and a scannable data entry system. The laboratory also houses a Sun microsystems computer networked to the operating room which can be used for CT-MRI fusions, target planning and discussion, and postoperative lead locations. The space is also equipped with areas for full physical therapy, occupational therapy, speech therapy, and convenient in-building access to an MRI and swallow suite.

### **Center for Translational Research in Neurodegenerative Disease**

The Center for Translational Research in Neurodegenerative Disease (CTRND) occupies the entire fourth floor (10K ft<sup>2</sup> of laboratory and 2100 ft<sup>2</sup> of office space) of the Biomedical Sciences Building (163K ft<sup>2</sup> total); a research facility which opened in November 2009. The laboratory is designed as a typical molecular biology or biochemistry laboratory with waist height benches.

The CTRND is well equipped, with more and newer equipment planned for purchase. There are six cell culture suites, including one dedicated to AAV production, each of which contains at least one biological safety cabinet and two incubators. There are several micro-centrifuges of varying capacities and capabilities, two super speed centrifuges, two floor ultracentrifuges, and three tabletop ultracentrifuges housed within the CTRND. The center houses several light microscopes; both upright and inverted, some with fluorescent capability, as well as a video microscope with both bright field and false color fluorescence. Additionally, the CTRND has both Aperio bright field and Aperio fluorescent digital slide scanners along with their associated analysis and storage server on site and operational. The center also has several plate readers, a plate washer, multiple thermal cyclers of PCR, and a Q-PCR machine. The CTRND is currently creating and equipping a histopathology suite with multiple cryostats, both sliding and rotary microtomes, paraffin embedding station, and an automatic tissue processor. Additional equipment purchases being evaluated for the histopathology suite include both standard and immunohistochemistry autostainers, and possibly a cover slipper and slide printer/labeler.

THE CTRND runs a brain bank which currently houses ~200 neuropathologically characterized brains with ongoing addition of ~20 brains per year. Tissue, both frozen and paraffin embedded, is available to all University investigators with proper regulatory approvals.

The CTRND Animal Facility is a state-of-the-art SPF rodent facility (~10K ft<sup>2</sup>) on the first floor of the BMS building, operated by University of Florida Animal Care Services (ACS). In addition it has ~1,500 square feet of space within the adjacent Communicore building for behavioral studies. It houses the equipment necessary for common motor and cognitive assessments of mice and rats. The CTRND is well equipped with networked computers and servers to support the digital image analysis.

### **Click Commerce**

UF implemented Huron's Click Commerce IRB module for processing and managing human subject research submissions. UF's implementation of this interactive web-based platform facilitates four major benefits: integration with other research units, in-line education, enhanced compliance, and improved efficiency to its human subject research enterprise. UF's Click system integrates data capture, education, and real-time parallel review for multiple research related offices (e.g. billing compliance, radiation review, etc.) beyond just the IRB. Adaptive submission forms simplify the process for researchers and serve as a research enterprise roadmap by targeting instructions for relevant requirements. Facilitating navigation of the UF research enterprise maximizes researcher efficiency and improves compliance with all applicable requirements. Robust, integrated validations improve submission quality, thereby reducing submission rejections as well as insuring compliance oversight units comply with all applicable regulatory requirements.

### **Department of Epidemiology**

The Department of Epidemiology, formed in 2011, is dual-governed by the colleges of Public Health and Health Professions and Medicine. Four full-time staff members provide the academic and departmental functions alongside 12 full-time and five part-time faculty. Located in the new state-of-the-art Clinical and Translational Research Building, the department occupies 6,700 square feet of the fourth floor. HealthStreet, the community engagement arm of the CTSI, is also part of the Department of Epidemiology.

The department offers four academic programs, including a Master of Science in Epidemiology and a Certificate in Psychiatric Epidemiology. The epidemiology concentration in the Master of Public Health Program is typically the largest cohort within the program, and the PhD in Epidemiology Program is rapidly growing, now with eight graduates. The department is also home to two training programs: a National Institute on Drug Abuse T32, UF Substance Abuse Training Center in Public Health, currently in its first year; and a Fogarty International Center D43, Indo-US Training in Chronic Non-Communicable Disorders and Diseases Across the Lifespan, with ten past and current trainees from India. The department is also home to the Southern HIV and Alcohol Research Consortium, which provides research infrastructure, training, and mentoring to improve health outcomes and reduce HIV transmission among the diverse range of populations affected by alcohol and HIV infection in the Southeastern United States.

Faculty are active in research, garnering about \$4M in extramural funding yearly. Fields of expertise include community engaged research, public health surveillance, global health, methodology, healthcare safety and quality, violence and victimization, and areas within epidemiology such as psychiatric, behavioral, cancer, cardiovascular, environmental, and infectious disease. Epidemiology faculty engage in numerous collaborations throughout UF and across the country.

### **Department of Health Outcomes & Policy**

The UF Department of Health Outcomes and Policy (HOP) is located in two on-campus buildings. The first is the 1329 Building, which neighbors UF Health Cancer Hospital and is directly across the street from the College of Medicine and UF Health Shands Hospital. The building is a modern research office space. The offices for the department's faculty and professional staff are located in a convenient cluster on the 5th floor, including conference space to foster collaboration. The second is the new Clinical and Translational Research Building (CTRB). The CTRB serves as the headquarters for clinical and translational science at the UF and in the state. The building houses a range of clinical and health services research faculty, many of whom have extensive expertise in the area of children's health, quality of care, and health outcomes. The department's 17 faculty members provide leadership in prevention science, health promotion, policy evaluation research, health disparities, and health outcomes studies. Areas of focus include health care outcomes and preventive interventions for low-income children and adolescents, risk behavior reduction, alcohol and drug abuse prevention, community intervention trials, community-engaged research, health care quality and outcomes for disadvantaged populations, cancer outcomes including health promotion related to the prevention and early detection of cancer and cancer survivorship, and health care economics and delivery system factors related to the quality and outcomes of cancer care. The 17 full time faculty members have joint appointments with the HOP and Institute for Child Health Policy (IHP). There are also more than 60 professional and support staff. The extramural funding portfolio in HOP and IHP is diverse and includes current funding from the National Institutes of Health, the Robert Wood Johnson Foundation, Health Resources and Services Administration – Maternal and Child Health Bureau, State of Florida, State of Texas and the National Cancer Institute. The current annual extramural funding is approximately \$18M annually.

### **Diabetes Institute**

The Diabetes Institute includes more than 100 investigators from multiple College of Medicine departments as well as investigators from the UF colleges of Engineering, Pharmacy, and Nursing, IFAS, the Institute on Aging, and the Genetics Institute. All are active collaborators and contribute to an atmosphere conducive to and supportive of comprehensive diabetes research. UF has led multiple studies on the pathogenesis and natural history of Type 1 diabetes, which involved the analysis of tens of thousands of individuals. UF has stored serum, plasma, and/or DNA samples (as well as associated clinical laboratory data) from more than 75K individuals (i.e., type 1 diabetes patients, their relatives, persons with other autoimmune disorders, healthy controls) throughout the U.S. as well as developed relationships with lay organizations (i.e., ADA, JDRF, Children with Diabetes) in order to aid investigators in terms of subject recruitment. UF serves as both the lead Administrative Unit and the Organ Procurement and Processing Core for the JDRF-funded Network for Pancreatic Organ donors with Diabetes (nPOD) program. It is the world's largest repository of whole pancreata and lymphoid tissues from subjects with Type 1 diabetes, persons at increased risk for the disease, control subjects across a variety of ages, and those with other pancreatic disorders relevant to address questions about Type 1 diabetes.

The core research facilities for Type 1 and Type 2 diabetes measure in excess of 50K square feet, including modern laboratories. More than 20K square feet of laboratory space within the Biomedical Sciences Building is dedicated to molecular biology, immunology, and pathology core facilities. Equipment operated and owned

by the Diabetes Institute include thermocycler, flow cytometers, scintillation and chemiluminescence counter gamma counter, ELISA readers, cell sorter, Coulter counter, photomicroscope, biosafety cabinets, incubators, centrifuges, automated cell harvester, DNA, RNA and protein purification system, and a qPCR system. In addition, the Diabetes Institute has access to two different confocal microscopes as well as a laser capture microscopy unit.

### **Electron Microscopy Core**

The Electron Microscopy Core (EM Core) occupies approximately 1,800 square feet in the basement of the UF Academic Research Building. The facility is part of the Department of Medicine, but it also provides access, assistance, and services to researchers in other UF colleges as well as researchers outside of UF. The mission of the EM Core is fourfold: to provide investigators with access to instruments necessary for ultrastructural research; to teach faculty, staff, and students methods in ultrastructural research; to provide technical services; and to consult with faculty, staff, and students on projects and advise them regarding possible approaches to their research questions involving ultrastructural research.

The EM Core houses a transmission electron microscope and support equipment for light and electron microscopy sample preparation and image processing, plastic polymerization, cold processing, and vibratome sectioning, light microscopy sample processing, sample storage, and digital light microscopy. It also houses all necessary support equipment and technical expertise for ultrastructural morphologic, morphometric, and immunolocalization research. In addition to standard laboratory equipment and computers, the support equipment includes a Leica DM2000 microscope, a Nikon LaboPhot-2 microscope, four ultramicrotomes, a EM TP automatic tissue processor, fume hood for TEM tissue processing, microtome for sectioning polyester wax and paraffin embedded samples, two Lancer Vibratome sectioning systems for preembedding immunolocalization studies, a Pelco BiowavePro laboratory grade microwave with temperature regulated by a Pelco SteadyTempPro for microwave-assisted immunohistochemistry, antigen retrieval, and tissue processing; a cold room, and a Leica AFS automated freeze substitution unit for EM tissue processing at cold temperatures.

### **Emerging Pathogens Institute**

The Emerging Pathogens Institute (EPI), created in 2006, provides a research environment to facilitate interdisciplinary studies of emergence and control of human, animal and plant pathogens. Major areas of research include Vector-borne diseases, influenza, tuberculosis, enteric and foodborne illnesses, plant pathogens and antibiotic resistance. In 2010 EPI is housed in an 88K square foot research building dedicated for institute use. The building includes 16 BSL3 laboratory modules as well as extensive BSL2 space and space for biomathematics; it has 50 faculty offices, 150 spaces for graduate students and post-doctoral fellows, multiple conference rooms (including a 70-seat seminar room), and a large administrative suite. The building is immediately adjacent to the UF Genetics Institute and the UF Cancer Center. The Genetics Institute houses the Interdisciplinary Center for Biomedical Research, which includes substantial high-throughput sequencing capacity as well as the University proteomics laboratories and associated bioinformatics faculty and staff. The EPI building is connected directly to the campus High Performance Computing Laboratories, permitting immediate utilization of their high volume/high speed capabilities.

### **Florida Innovation Hub**

The Florida Innovation Hub at UF is a 50K square foot, multiuse incubator that is currently home to over two dozen startups. Its mission is to provide an innovation ecosystem for connecting all the elements critical to creating and supporting technology-based companies. It is one of the only incubators in the nation to house a leading university technology transfer office, numerous service providers, and other partner organizations that nurture high-tech companies. It was built with an \$8.2M grant from the Economic Development Administration and a \$5M match from UF. It opened its doors in October 2011 and has already nurtured the creation of more than 400 jobs. It is located in Innovation Square, a unique 24/7 live, work, and play community located just blocks from campus and blocks from downtown Gainesville.

### **Harrell Medical Education Building**

The Harrell Medical Education Building is a 94K square foot, four-story facility that is the new home of medical student and physician assistant student education. The building is located in close proximity to the UF Health Hospital and to the Health Science building. It features state-of-the-art experiential learning theaters and facilitates the collaborative education of health sciences students at the UF College of Medicine.

## **High-Performance Computing Center (HPC)**

Established in 2011, UF Research Computing has a permanent staff of 10.25 FTE. Research Computing runs several clusters with about 21K cores in multi-core servers. Most of the servers are part of one of two distinct InfiniBand fabrics. The clusters share more than four PetaBytes of distributed storage via the Lustre parallel file system. In addition, the Research Computing houses about one PB of storage for the High Energy Physics collaboration of the CMS experiment. In Spring 2013, a new cluster (HiPerGator) was installed with 16K cores and 2.88 PB of raw storage to hold a fast, highly available, parallel Lustre file system for scratch data. A small cluster with 80 GPUs is also available for experimental and production research, as well as for training and teaching.

The HPC clusters are spread over two buildings. The machine rooms are connected by the 200 gigabit per second Campus Research Network (CRN), now commonly called Science DMZ. The CRN connects the HPC systems to the Florida Lambda Rail, from which the National Lambda Rail and Internet2 are accessible. UF meets all Internet2 Innovation Platform requirements, which implies the use of software-defined networking (SDN), the implementation of a Science DMZ, and a connection at 100 Gb/s to the Internet2 backbone. An upgrade of the CRN (Science DMZ) to 200 Gb/s has been operational since winter 2013.

Eleven universities in the state have joined forces in the Sunshine State Education & Research Computing Alliance (SSERCA) to build a robust cyber infrastructure to share expertise and resources. The current members are Florida Atlantic University (FAU); Florida International University (FIU); Florida State University (FSU); University of Central Florida (UCF); UF (UF); University of Miami (UMiami); and University of South Florida (USF). The affiliate institutions are Florida Agricultural and Mechanical University (FAMU); University of North Florida (UNF); and University of West Florida (UWF). The Florida Lambda Rail (FLR) provides the underlying fiber optic network and network connectivity between these institutions and many others.

## **Informatics Institute**

Information technology provides remarkable opportunities to create, collect, compute, and communicate huge quantities of data. Future research in a host of fields will depend on the ability to leverage access to these massive and complex data sets. One key application of these concepts in the future of health care is predicting disease and designing personalized treatments from a person's genetic code.

To meet these challenges and create a campus-wide presence that is identifiable both internally and externally, the university has created the Informatics Institute (UFII) as a part of the UF Rising preeminence initiative. Its purpose is to facilitate leading edge informatics research in all sectors of the campus. The institute reports to the UF Vice President for Research.

The Informatics Institute consists of four interrelated thrust areas. Informatics Techniques and Technologies performs research into the hardware, software, algorithms, and mathematical approaches needed to develop the next generation techniques and technologies for Big Data. Biomedical and Life Science Informatics utilizes informatics to address the fundamental questions in genetics, genomics, biodiversity, environment, and agricultural science as well as its application for improved human health outcomes. Informatics for Engineered Systems and the Physical Sciences studies the application of intense computation and complex informatics to understanding and designing complex engineered systems, and for uncovering the fundamental nature of our physical world and universe. Informatics in Social Science, Humanities and Education addresses leveraging the explosion of data in understanding people, culture, political development, education, and human behavior.

Since its inception in August 2013, the UFII has successfully launched a seed funding program and a seminar series. Six teams of researchers were the recipients of the first round of seed funds. All the funded grants were characterized by interdisciplinary research relevant to the mission of the UFII. The UFII will also sponsor several educational programs starting in Fall 2015. Dr. George Michailidis was recently recruited to be the director of the institute.

## **Institute of Food and Agricultural Sciences**

The UF Institute of Food and Agricultural Sciences (UF/IFAS) is an integrated unit with missions dedicated to teaching, research, and outreach. The research mission is pursued through the Florida Agricultural Experiment Station, where faculty conduct cutting-edge research in agriculture, natural resources, and life sciences through the Florida Agricultural Experiment Station in order to facilitate solutions in Florida, the

country, and the world.

UF/IFAS conducts groundbreaking research in program areas vital to people and the environment such as sustainability, energy, climate change, water, food systems and human health, ecosystem health and services, and resource production. With nearly 500 faculty members with research appointments in 15 academic departments, UF/IFAS research is robust across disciplines. UF/IFAS scientists collaborate among departments and fields and with researchers at other UF colleges and institutions in the United States and abroad to address key issues in agriculture and natural resources.

UF/IFAS research is located throughout Florida, including 12 research and education centers, four research and demonstration sites, a research forest, a biological field station, and a tropical fish hatchery. UF/IFAS has 10 members in the American Association for the Advancement of Science and three members in the National Academy of Sciences. UF/IFAS researchers receive more than \$100M in contracts and grants annually. The diversity and complexity of UF/IFAS research projects are astounding, from studying waterways in Florida's backyard to researching how microbes grow on Mars. Among many other topics, UF/IFAS scientist UF/IFAS research projects encompass topics such as how to are contributing knowledge that will help breed tastier tomatoes, combat citrus greening, produce more efficient biofuels, create better pine forest management techniques, discover linkages between digestive tract bacteria and Type 1 diabetes, and grow rice in aerobic conditions using less water.

### **Institutional Review Boards**

In total, the Institutional Review Boards (IRBs) at UF oversee 3,500 research protocols. There are three on-campus IRBs and one contracted IRB. IRB-01, the largest IRB in the UF system, reviews and oversees biomedical research conducted on the Gainesville, Florida campus, for the North Florida/South Georgia Veteran's Health System (NF/SG VHS), and for all of the hospitals and facilities owned by UF Health. IRB-03 reviews and oversees biomedical research on the Jacksonville, Florida campus. IRB-02 reviews and oversees social and behavioral research on the Gainesville, Florida campus. Several years ago, UF contracted with the Western IRB (WIRB) to offset some of the workload for IRB-01. UF faculty conducting multicenter drug or device protocols sponsored by industry are able to submit their protocols for review by the WIRB. Annually, WIRB reviews an average of 110 protocols a year, allowing the investigators who conduct industry-sponsored protocols to compete nationally due to faster review times.

Seventeen staff members at the three on-campus IRB offices provide investigator education, protocol design consultation as it relates to regulatory considerations, and compliance monitoring. No human subject protections issues have been identified during recent FDA audits, CTSI competitive grant renewal reviews, or AHCA VA licensure accreditation surveys. IRB-01 has had experience serving as the central IRB for the United States' portion of a 150-site, multinational, 23K-subject research protocol.

All IRB-01 new study submissions are made through the electronic myIRB program. The electronic submission program will be implemented in the IRB-02 and -03 offices in the near future. IRB-01 provides a monthly newsletter on current topics and monthly educational presentations. IRB-01 meets twice a month and investigators are encouraged to attend so that changes can be made by the investigator during the meetings to facilitate rapid turnaround time. A robust IRB-01 website is available for investigators, which provides them with all current forms, educational bulletins, required standard language, IRB position papers on common topics, and links to frequently used web sites.

IRB-01 also serves as the Privacy Board for UF Gainesville Campus and the NF/SG VHS in accordance with the Health Insurance Portability and Accountability Act (HIPAA) and implementing its regulations. All waivers and any other HIPAA-related issues are provided as part of the IRB review.

### **Interdisciplinary Center for Biotechnology Research.**

The Interdisciplinary Center for Biotechnology Research (ICBR) is the major biotechnology science and instrumentation service provider at UF. Established in 1987 and leveraging strong state and University support, ICBR maintains a reputation for acquiring, housing, and providing access to state-of-the-art instrumentation and advanced services to all researchers at UF.

ICBR is organized into eight life science facilities offering extensive services ranging from visualizing microscopic structures to producing and analyzing small molecules and big data. ICBR also supports the education mission of the University with hands-on workshops, training, and seminars hosted by the core scientists. Most ICBR facilities are concentrated in 25k square feet of the Cancer and Genetics Research Complex with auxiliary laboratories in the Microbiology and Cell Science building and the McKnight Brain Institute. While highly centered on its more than \$20M stable of instrumentation technologies, ICBR is devoted

to engaged scientific services that are provided by 22 PhD-level scientists and 25 trained staff with more than 500 combined years of experience in biotechnology science. This provides UF researchers with access to both technical expertise and advanced instrumentation as well as informed interpretation of the resulting data with a concept-to-data workflow that enables scientists to actively propose, develop, and engage in advanced technologies, extending the scope of their individual laboratories

ICBR organizational structure includes a center director who receives advice on core operations and direction from UF administration, especially through established faculty advisory groups that meet annually or biennially. ICBR organizational infrastructure provides its facilities with full administrative support for human resources, billing/payables, and compliance with federal cost standards. In addition, ICBR cyber infrastructure supports the scientific cores with computational capabilities for cutting edge analysis, data security, and data delivery to and through the high speed Campus Research Network.

The laboratory infrastructure and established research support programs at ICBR are recognized for providing the theoretical knowledge and practical expertise that make the instruments run at optimal capacity and at the limit of their expected sensitivities. These facilities are universally recognized for providing equal and fair access at low cost as well as for their commitment to excellence. It is the commitment of ICBR to support and maintain current and future instrumentation for its lifetime and to ensure highest performance and availability to all interested researchers according to a well-developed usage plan while charging fees to cover disposable or consumable reagents or components.

### **Interdisciplinary Program in Biomedical Sciences**

The Interdisciplinary Program in Biomedical Sciences is a predoctoral educational experience that trains experimentalists and scholars for a wide range of careers in biomedical science. The curriculum is designed to provide maximum flexibility for the training of biomedical research scientists. The educational goals are to promote biological literacy by providing core and advanced curricula covering key chemical, biological, and genetic principles using molecular, cellular, and physiological approaches; and to promote scholarship in biomedical science through mentored, original research.

### **Jacksonville Health Equity Research Organization**

Jacksonville Health Equity Research Organization's (JaxHERO) is a primary care practice-based research network that conducts community-based research in order to improve the quality of care and promote health equity for persons living in Northeast Florida and Southeast Georgia. JaxHERO is composed of 33 primary care centers from UF Health Jacksonville, 12 primary care centers from the Florida Department of Health – Duval, Mayo Clinic Jacksonville and the St. Vincent's Family Residency program. This network of primary care centers serves more than 150K patients in five counties (Duval, Baker, Clay, Charlton GA, Camden GA), many of whom are disproportionately minority and poor with high rates of diabetes, hypertension, cancer and other conditions. This network is currently fielding or developing four investigator-initiated studies. JaxHERO administration and activities is supported by faculty and staff from the Center for Health Equity and Quality Research at the University of Florida College of Medicine – Jacksonville. JaxHERO provides the foundation for translational and evidence-based research focused on studying and reducing health disparities while building on institutional commitments to the underserved population. The Jacksonville Health Equity Research Organization enables the conduct of translational research in a wide range of settings, thereby bringing the benefits of medical innovation to our entire community.

### **Major Analytical Instrumentation Center & Particle Analysis Instrumentation Center**

The Major Analytical Instrumentation Center (MAIC) and the Particle Analysis Instrumentation Center (PAIC) are two of the Research Service Centers in the College of Engineering at UF. Both are multi-user materials characterization and analysis facilities established to provide service to the UF, the state university system (SUS) and the industrial and commercial community.

Most of MAIC instrumentation is concentrated at building Mechanical and Aerospace Engineering C with facilities also located at the Materials Engineering building. Techniques and instrumentation include scanning electron microscopy, transmission electron microscopy, electron probe microanalysis, energy dispersive spectroscopy, electron backscatter diffraction, X-Ray diffraction, Auger electron spectroscopy, X-Ray photoelectron spectroscopy, atomic force microscopy, focused ion beam, optical profilometry, and environmental scanning electron microscopy including a cryo-stage.

PAIC instrumentation is housed at the Particle Engineering Research Center building, and facilities include particle size analyzers, rheometer, Raman spectroscopy, UV-Vis spectroscopy, Fourier Transformed infrared

spectroscopy, total organic content analysis, porosimetry, picnometer, goniometer, ion couple plasma analysis, and zeta potential measurements.

Teaching and training are important aspects of the mission of the centers. The teaching component of the MAIC activities is accomplished through formal graduate courses offered by MAIC staff through the Department of Materials Science and Engineering. MAIC and PAIC staff also conduct individual and group training for all instruments and techniques. In addition, an online graduate certificate in materials characterization has been offered through the Engineering Delivery of Graduate Education (EDGE) program since Fall 2008.

MAIC and PAIC function on a user-fee structure that provides internal subsidized rates for the use of instrumentation. Thus, use rates are established based on the use of the instrument and expenses related to service contracts, maintenance and consumables of the system and are subsidized to render access to the use of instruments at rates comparable to peer centers and facilities. Rates are reviewed annually to accommodate changes on user base and operating costs.

### **McKnight Brain Institute**

The McKnight Brain Institute (MBI) at UF is one of the nation's most comprehensive and technologically advanced research and teaching centers, conducting integrated research in neuroscience, neurology, neurosurgery, psychiatry, cognitive science, and related areas. To aid research in these areas, the MBI operates several facilities that provide advanced (up to 17.5 tesla) magnetic resonance imaging and spectroscopy, cell and tissue analysis, flow cytometry, brain tissue banking, gene therapy, and more. The MBI has 300 faculty from 51 academic departments and 10 colleges, entailing research and educational programs in nearly all aspects of basic, clinical, and translational neuroscience. The College of Medicine departments of Neuroscience, Neurology, Neurosurgery, and Psychiatry along with the centers for Smell and Taste, Structural Biology, and Addiction Research and Education are housed together in the MBI to promote numerous interdisciplinary programs and projects, including facilitating more than 320 lectures and seminars each year involving the best scientists from around the globe. Many of these take place in the Laretta & John DeWeese Auditorium, which offers over 2,300 square feet of space and stadium seating for 162, including wheelchair accommodations. Featuring a 10-foot by 15-foot screen, this room offers high definition video conferencing as well as live web-streaming and archival of lectures.

The MBI develops new therapies for nervous system afflictions. Some of the research initiatives comprising the MBI are the Advanced Magnetic Resonance Imaging and Spectroscopy Facility (AMRIS), the Cell and Tissue Analysis Core (CTAC) and CTAC Histology Resource Center, the Radiosurgery/Biology Research Lab, the Movement Disorders Center, the Age-related Memory Loss (ARML) Program, the Brain and Spinal Cord Injury/Stroke Program, and the Addiction Program. With a design theme of beyond the-state-of-the-art, the conceptual mission of the extramurally funded, \$60M, 210K square foot MBI building is to serve as a catalyst and focal point for widely diverse but synergistic multidisciplinary research programs. Thus, in addition to an obvious emphasis on high technology, the strategic design of the MBI includes a strong emphasis on multiuser facilities within a research and clinical setting that includes highly dedicated and gifted basic science and clinical researchers.

### **MD-PhD Training Program**

The MD-PhD program trains clinician-scientists for a career in academic medicine with the full expectation that these students will become future leaders at academic medical centers worldwide. The MD-PhD program takes a broad view toward the development of the entire spectrum of skill sets necessary to complete the "clinical translational mission" and essential for closing the gap in health disparities.

Consequently, MD-PhD students are currently enrolled in four different colleges (Engineering, Health Professions, Medicine, and Pharmacy) for their graduate work.

The MD-PhD Training Program office, totaling 301 square feet, is located on the first floor of the Medical Science Building (MSB) and consists of a two-room suite that includes a conference space. It is adjacent to the Medical Admissions Office and directly across from the Office of Research Affairs of the College of Medicine.

The program has ready access to conference rooms in the Department of Ophthalmology and the McKnight Brain Institute. The MD-PhD Training Program's location within the College of Medicine provides scholars with access to a broad array of medical experts and allows it access to eight full-time faculty (executive committee members) to provide leadership in mentor selection, program policy assessment and MD-PhD candidate evaluations.

## **Office of Medical Education**

The College of Medicine Education Center serves several functions in the College of Medicine, including the coordination of all teaching activities as well as the selection and scheduling of the senior elective courses and clerkships for all four years of medical school. The office is responsible for the preparation of course syllabi, handouts and examinations. Information provided by course directors may be distributed during classes or through this office. Students may come to this office any time they have questions on any course materials. The office coordinates the evaluation of courses, faculty, and teaching programs within the College of Medicine. Office personnel compile and summarize data on the teaching programs including course and faculty evaluations. Course debriefings are also scheduled and conducted through this office. The debriefings are meetings held at the end of courses in which student representatives meet with course faculty and representatives of the College of Medicine Curriculum Committee and Dean's Office. The sessions provide an opportunity for students to provide feedback and influence the future planning of the course as the strengths and weaknesses of each course are discussed. The Office of Medical Education coordinates the advisor program. Advisors are assigned through the office. They are then informed of students' progress in academic course work. Any issues associated with the advisor program are also reported to this office.

## **Office of Research**

The UF accounts for approximately 40 percent of sponsored research performed in the State University System of Florida. In FY2014, annual sponsored awards to UF eclipsed \$700M for the first time. During the last 20 years, annual research funding to UF has grown more than 300 percent, consistently placing UF among the top 20 public research institutions. Led by Dr. David Norton, Vice President for Research, the Office of Research is committed to being a highly valued and effective organization whose leadership and service make the UF's vision of being a top 10 university a reality.

The Office of Research is committed to providing necessary institutional leadership, infrastructure and service, ensuring accountability to regulatory agencies and stakeholders, and investing toward future opportunities and challenges. The Office of Research is responsible for all proposal submissions, grant and contract negotiation and acceptances, and the execution of other research-related agreements. The Office of Research also manages and supports all research compliance obligations related to fiscal, human subject, animal use, export control, conflict of interest, responsible conduct of research, and research misconduct. The Office of Research invests in research programs by providing resources and overseeing internally funded seed programs and initiatives.

Support for faculty also includes identifying external funding opportunities, facilitating industry outreach, supporting complex proposal development, and connecting researchers to funding agencies. Through the resources and infrastructure within the UF Research Foundation and Office of Technology Licensing, the Office of Research facilitates technology transfer and economic development through patenting, licensing, startups, and business incubation. In FY2014, UF issued a record-setting 86 licenses and options and the Sid Martin Biotechnology Incubator was selected as the top biotech incubator in the world. In addition, the CTSI targets the translation of basic research into health care outcomes. The Office of Research manages research-centric shared resources that include Animal Care Services, the Interdisciplinary Center for Biotechnology Research, and various interdisciplinary centers and institutes whose cross-disciplinary missions include genetics, water, climate, informatics, smell and taste, and emerging pathogens. Using print, electronic, and social media, Research Communications promotes the UF research enterprise within the state and around the globe. Recent efforts include the formation of the Science Communications Academy, a collaborative effort between the College of Journalism, College of the Arts, and Office of Research, designed to assist scientists in refining their communications skills for a general audience.

## **Office of Technology Licensing**

The UF Office of Technology Licensing (OTL) has launched 157 biomedical and technology startups in the past 12 years, generating more than \$1B in private investment. This is a testament to the collaborative relationship between UF's world-renowned faculty and OTL working to bring together the elements necessary to create successful startups. In addition, UF faculty generates an average of 300 new discoveries annually. A portion of these discoveries can be found on the OTL website, all of which are available for licensing. Additionally, users can sign up for free tech alerts for a specific technology of interest. UF also has several incubators, including the Florida Innovation Hub and the Sid Martin Biotech Incubator

that are home to dozens of startups

### **Powell Gene Therapy Center**

The Powell Gene Therapy Center's (PGTC) mission is to provide institutional and external investigators with the expertise to support preclinical and clinical studies in gene therapy with an emphasis on the development of translatable protocols to facilitate clinical trials initiation. The Center has three components; the Vector Core, the Human Applications Laboratory and the Toxicology Core.

The Vector Core, located in the Academic Research Building (ARB) and operated as an auxiliary, performs up to 400 research and GLP-grade rAAV preparations per year for individual investigators and program grants.

Research-grade preparations support both in vitro and in vivo pilot phase studies for proof of principle. The core also manufactures FDA-approved test articles for toxicology and bio-distribution studies in compliance with GLP. An important research activity is dedicated to process and development of novel production and purification methods. Working together with the Human Applications Laboratory, methods are developed as translatable platforms in compliance with cGMP.

The Human Applications Laboratory, located in the McKnight Brain Institute (MBI), manufactures and releases clinical grade rAAV products and cell vaccines with a current track record of eight manufacturing campaigns for phase I/II trials. The production facility occupies approximately 1,900 square feet and consists of two suites designed to function independently. Production Suite A is dedicated to cell processing, cell banks and cell-based vaccines. Production Suite B is used for the purification, filtration and aseptic fill of viral vectors. The Quality Control Laboratory within the HAL operates independently and conducts product release testing and environmental monitoring. An independent Quality Assurance Unit of the CTSI oversees raw material as well as in-process and final product lot release with audits and inspections of all procedures.

The Toxicology Core conducts exhaustive FDA-reviewed GLP toxicology and bio-distribution studies for IND submission as well as intermediate proof of concept studies. It often operates in coordination with the Vector Core and HAL. To date, the core has contributed to the initiation of 14 clinical trials in man.

### **Research Administration and Compliance Program**

The Research Administration and Compliance Program (RAC) provides fiscal review and approval for all intramural and extramural research proposals for the College of Medicine. In conjunction with Division of Sponsored Programs, RAC provides clinical trial contractual services and ClinicalTrials.gov PRS support for investigators. RAC develops and incorporates policies, processes and standards to guide investigators, research staff, UF and Shands employees and/or agents with regard to clinical services fiscal activities. RAC conducts fiscal review of clinical research study documents and, in partnership with the Institutional Review Board, provides the fiscal language for all HSC Informed Consent Forms for applicable clinical research promoting compliance with all federal and state regulations that concern clinical trials billing. RAC provides a robust research billing compliance based training program to investigators and designated staff to facilitate the successful and fiscally compliant conduct of research throughout UF Health Physician and Shands Hospital facilities. RAC also monitors billing compliance throughout all stages of a study from startup to study closure to assess compliance, identify potential noncompliance and provide a corrective action plan, as well as provide a mechanism for reporting suspected instances of possible billing noncompliance and investigate all allegations. RAC promotes appropriate, transparent relationships with industry collaborators while assisting faculty and the Institution to reduce or mitigate potential conflicts of interest.

### **Science for Life**

The UF Howard Hughes Medical Institute (HHMI) Science for Life (SFL), program to foster early undergraduate student research involves the Science for Life Research Seminar, a course that provides new students with presentations from research-active faculty at UF as well as partner institutions throughout the United States, illustrating opportunities available for student research. The program also includes an undergraduate cross-disciplinary laboratory (X-Laboratory) which is a two-semester, inquiry-based laboratory curriculum focusing on major themes and concepts in biology, chemistry, and physics with modern and quantitative research. The SFL program engages teachers from high-poverty, low-performing urban schools in inquiry-based, content-rich, professional development in laboratory science through a series of UF Summer Science Institutes. High school teachers receive state-of-the-art training in biotechnology and bioscience experimentation. Teachers nominate outstanding students to attend the Summer Science Training Program (SSTP)

The SFL program administers six awards for students and faculty. The Intramural Undergraduate Research Award allows talented students at UF to get a rapid start in research and connect with outstanding faculty mentors at UF as early undergraduates. The Extramural Undergraduate Research Award allows outstanding undergraduates with previous research experience to get a significant off-campus research experience at dozens of locations around the world. The Undergraduate Publication and Travel Award allows students to conduct research in faculty laboratories early in their undergraduate careers that result in submissions to scientific journals or presentations at national conferences and meetings. The Graduate Student Award recognizes excellence in graduate students who are able to mentor their undergraduates to a point where the undergraduates achieve co-authorship in peer-reviewed publications. The Distinguished Mentor Award recognizes faculty excellence in undergraduate mentoring. The Science for Life Ambassadors is a group of SFL awardees that have been chosen by the program to lead student activities. The Ambassadors organize many events throughout the year to promote the SFL Program.

### **Southeast Center for Research to Reduce Disparities in Oral Health**

The Southeast Center for Research to Reduce Disparities in Oral Health (SCRRDOH) is a multidisciplinary center at the UF College of Dentistry that aims to reduce disparities in oral health among Florida's rural populations through community-based research and intervention projects. SCRRDOH projects are based on community participation combined with the best science available. Local residents are involved in all phases of research projects, from designing projects to collecting data to publicizing results and influencing public policy.

### **Survey Research Center**

The UF Survey Research Center (UF SRC) is a 93-station, computer-assisted telephone survey lab which operates as part of the UF Bureau of Economic and Business Research. The UF SRC conducts large-scale telephone, mail, web and face-to-face surveys, particularly focused on health care. Among the ongoing contracts is the cell phone module of the Behavioral Risk Factor Surveillance Survey. All telephone survey data collected by the UF SRC is stored on internal servers in a locked server room behind three locked doors. Survey software includes Wincati, Sensus and Qualtrics.

### **UF Center for HIV/AIDS Research, Education & Service**

The UF Center for HIV/AIDS Research, Education & Service (UF CARES) is the only comprehensive pediatric and family-focused HIV and AIDS program in Northeast Florida and South Georgia. At UF CARES Rainbow Center (located on the third floor of UF Health Jacksonville's Clinical Center building), clinicians provide primary, secondary, and tertiary care for HIV-exposed and infected individuals and families. In addition to basic medical care, the center provides medical case management, pharmacy services, health education, nutrition, and mental health counseling. UF CARES doctors are trained in general pediatrics and internal medicine with additional specialization in infectious diseases and women's health. UF CARES employs a full time psychologist and part time psychiatrist and gynecologist who provide specialty services. UF CARES also works to provide services through collaborations and partnerships with Children's Medical Services, a state sponsored program to provide health care to low income children with special needs.

In the last five years, the center has conducted 23 NIH-sponsored clinical trials, 11 pharmaceutical-sponsored studies and several investigator studies, serving more than 900 research subjects. The center actively collaborates with the Department of Obstetrics and Gynecology in Jacksonville and colleges of Medicine, Public Health and Health Professions, Veterinary Medicine, and Emerging Pathogens Institute in Gainesville. UF CARES is part of the AHRQ registered Community Based Research Network and collaborates with Investigators in Gainesville and Jacksonville.

### **UF Center for Pharmacogenomics**

The UF Center for Pharmacogenomics (UFCPGx) has 2,033 square feet of renovated laboratory space (five laboratories) in the UF Health Sciences Center. The laboratories are divided based on workflow and for reasons of quality control. The Pre-PCR laboratory contains three Laminar flow hoods, a refrigerator, minus 20C freezer and a computer. The PCR laboratory contains one Labconco Purifier Filtered PCR Enclosure, four Applied Biosystems (ABI) Verti fast Thermal Cyclers and one ABI GeneAmp 9700 PCR System Thermal Cycler, which can accept single tubes, 96-well plates or 384-well plates. It also contains QIAGEN QIAcube Automated RNA, DNA and Protein isolation instrument and a 96- and 384- well plate centrifuge, and two Eppendorf liquid handling/sample processing robots (Eppendorf epMotion 5070, and Eppendorf epMotion

5070 PC 96 qPCR system large robot). The clinical sample processing and DNA isolation laboratory has 96- and 384-well plate reader (Bio-TEK Synergy HT), NanoDrop (ND-1000, and ND- 2000) Spectrophotometers, BioRad Criterion™ Protein Gel System and Blotter, BioRad large Protein Gel System, BioRad Gel Documentation System ( Bio-Rad Gel Doc XR System PC) and a digital camera. The analytical laboratory contains extensive analytical equipment including three Vertical Gel Electrophoresis Systems, 10 Horizontal Electrophoresis Systems, Multichannel Pipettors and a pH Meter. General equipment shared between the labs includes a variable speed refrigerated centrifuge, variable and fixed speed microcentrifuges, two variable speed nonrefrigerated centrifuges, one 96 and 384-well plate centrifuge, a liquid nitrogen system, a controlled water bath, microwave oven and three computers. The analytical and genotyping laboratory is the largest laboratory and contains the major genotyping systems, including LifeTechnologies QuantStudio TaqMan-Based OpenArray Multiplex Genotyping System, Pyrosequencing high-throughput genotyping system (PSQ HS 96), Applied Biosystems (ABI Taqman 7900 HT Real Time) high-throughput genotyping system, and a liquid handling/sample processing robot (Packard Multi Probe II HT Systems). The sample processing laboratory contains liquid handling/sample processing robot (Packard Multi Probe II HT Systems), LabConco Purifier Class I Safety Enclosure, electrophoresis units, three 384-well PCR thermal cyclers, five 96-well PCR thermal cyclers, a computer and three computers and an office for the laboratory manager. Labs are equipped with refrigerators, centrifuges (Eppendorf Microcentrifuge 5418 R, 5415 R, and Eppendorf Benchtop 5810 R centrifuge, and DAMON-IEC CRU-500 centrifuge), and standard lab equipment such as pipettes, glassware, etc.

Departmental shared space includes a freezer room that contains additional freezers, including four – freezers and five –20 C freezers consists of Enterprise class Linux RHEL 6.5 and Microsoft Window server 2008. User-level files are stored on two Dell R710 servers running Windows Server 2008 R2 Enterprise utilizing Distributed File System for redundancy. The labs' web-based information services are running on Linux based Apache 2.4 servers running in a VMWare ESXi cluster utilizing 6 Dell R710s. The backend database is running on a Dell R620 using a Linux based MySQL. All differential backups are performed to disk storage nightly, Monday through Thursday, with a full backup running on Friday. Differentials and full backups are kept on disk storage for 90 days with a copy of the latest full backup put on tape monthly and moved to offsite storage. The UF Center for Pharmacogenomics offers pharmacogenomic consults to Investigators.

### **UF Genetics Institute**

The UF Genetics Institute (UFGI) promotes genetics and genomics at the UF by building community, facilitating collaboration and creating opportunities for intellectual exchanges among investigators working in diverse taxonomic systems but with a common set of approaches in genetics and genomics; supporting recruitment and retention of outstanding faculty in the areas of genetics and genomics; supporting graduate education in the areas of genetics and genomics; and enhancing the ability of researchers at the UF to compete for multidisciplinary research grants in the area of genetics and genomics.

More than 240 UFGI faculty members represent seven different colleges and 49 different academic departments. Their research spans a broad array of organisms from prokaryotes to eukaryotes and a diverse collection of disciplines and approaches from strictly computational to laboratory and field studies. The UFGI occupies one wing (approximately 60K square feet) of the Cancer & Genetics Research Complex, completed in 2006. Thirty-three UFGI faculty members are housed in UFGI space, which provides a variety of shared equipment for molecular biology, biochemistry and genetics, as well as shared resources such as animal facilities, grow chambers for controlled environmental studies of plants, and a greenhouse facility.

### **UF Health Cancer Center**

The UF Health Cancer Center (UFHCC) consists of more than 250 researchers and clinicians drawn from two campuses, 12 colleges, 72 departments, two major teaching hospitals (UF Health Hospital in Gainesville and Shands Jacksonville and the nation's largest Veterans Administration hospital, the Malcom Randall VA Medical Center in Gainesville). The UFHCC is dedicated to providing state-of-the-art cancer treatment, prevention, control, and education to individuals of diverse races and ethnicities; conducting original scientific research aimed at discovering and comparing mechanisms of cancer-causing and normal cell growth; and fostering coordination and collaboration that facilitates clinical translation of novel research findings into new therapeutic, diagnostic or preventive trials.

The cancer research building houses laboratories for approximately 30 PIs and is equipped with workbenches,

shelves, sinks, centrifuges, refrigerators, -20°C and -80°C freezers, tissue culture hoods, tissue culture incubators, water baths, micro-osmometers, light microscopes, power supplies, electrophoresis apparatuses, PCR machines, real-time PCR machines, and flow cytometers. Laboratories provide technical expertise and advice in the areas of FACS analysis, protein sequencing, peptide synthesis, oligonucleotide synthesis, proteomics, mass spectroscopy, transgenic mouse production, and gene expression. Each floor in these facilities has an autoclave, dark room, library, small and large conference rooms, and walk-in cold and warm rooms. The molecular laboratory for the UF Interdisciplinary Center for Biotechnology Research (ICBR) is in the research building and is available to all UFHCC members. The ICBR houses 12 partially subsidized facilities, including computing and bioinformatics, DNA sequencing, electron and confocal microscopy, flow cytometry, hybridoma production, protein chemistry, proteomics, mass spectrometry, microarray, and bioinformatics labs. The building also includes a vivarium on the fifth floor and has all the facilities necessary for animal care, procedures and irradiation. The UFHCC Research Laboratories and the ICBR are accredited by the American Association for the Accreditation of Laboratory Animal Care.

Three cesium-137 irradiators are available for total body or local irradiation of mice, with one located in the animal vivarium on the fifth floor of the CGRC and two located in the main animal facility which is in the Biomedical Sciences Building. The animal facility in the Biomedical Sciences Building also has an XRAD 320 X-ray source for small animal irradiation. A Varian Clinac 6/100C, located in Radiosurgery Biology Lab (RSB) in the McKnight Brain Institute, is dedicated for use with animal models (non-human use) and image-guided stereotactic radiosurgery procedures.

### **UF Health Communications**

A division of 80 communication professionals, UF Health Communications provides integrated communications support to all UF Health executive and administrative divisions, colleges, institutes, physician practices, and hospitals. With staff in Gainesville and Jacksonville, UF Health Communications mobilizes expertise across six specialized teams to meet UF Health's full scope of internal and external communications needs. The Strategic Communications & Public Affairs team, which includes the CTSI strategic communications team, is responsible for strategic communications and public relations planning and execution; internal communications and employee-focused events; corporate communications; public affairs and government relations/advocacy communications; community health outreach and education programming; and issues and crisis management. The Creative Services team provides print layout and graphic design, creative consultation, video and audio production, voiceovers, multimedia design (including 3D animation), digital publishing, and photography. The Marketing team provides strategic marketing services for UF Health's clinical lines and affiliate and joint venture partnerships, including marketing consultation, marketing plan development and implementation, production of advertising campaigns and marketing collateral materials, and website content development. The Advancement Communications team provides strategic planning and execution for public functions, alumni relations, and fundraising initiatives. The News & Publications team maintains relationships with local, regional, and national news media and provides expertise in publications, editing, science writing, media training, and news dissemination. The Web Services team offers full-service website design and hosting, web application development, website refurbishment, usability testing, search engine optimization, analytics and metrics, social media consultation, and email newsletters. In addition, UF Health Communications has a long-standing collaboration with the UF College of Journalism and Communications to produce Health in a Heartbeat, a national consumer health radio program that airs on public radio affiliates in 18 states and in Washington, D.C. The program features two-minute segments providing the latest news on medical research, patient-care breakthroughs, and health-care trends.

### **UF Health Jacksonville**

UF Health Jacksonville, located in Northeast Florida, is an academic health center providing education for health professionals, a hub for clinical research, and a venue for patient care. With more than 5K faculty and staff, the academic health center in Jacksonville is the largest UF campus outside of Gainesville. At 37 clinical sites throughout Northeast Florida, UF physicians tallied more than 600K outpatient visits and more than 34K inpatient admissions in 2010. UF Health in Jacksonville consists of UF Health Jacksonville, a 695-bed academic health center; UF Health Science Center Jacksonville, which encompasses three UF colleges in Jacksonville (Medicine, Nursing, and Pharmacy); and UF Jacksonville Healthcare, Inc., a network of primary and specialty care centers offering patient care throughout Northeast Florida and Southeast Georgia.

## **UF Health Science Center**

UF Health (HSC) is the largest comprehensive academic health center in the Southeastern United States. The HSC encompasses six colleges (Medicine, Dentistry, Public Health and Health Professions, Nursing, Pharmacy, and Veterinary Medicine). The UF's 3.2M square foot HSC facility is home to over 2K full-time clinical and basic science faculty and approximately 8K students, including more than 4K graduate students. The HSC is a world leader in interdisciplinary research, generating 52 percent of UF's total research awards. The HSC Gainesville campus houses several clinics and three major hospital facilities, UF Health Hospital, which includes the North Tower, home to the Shands Childrens Hospital; the Cancer Tower; and the neighboring Veterans Affairs Medical Center of Gainesville.

## **Animal Care Services**

The University of Florida has diverse biomedical and agricultural research and teaching programs using live animals for scholarly and clinical investigation. The animal care and use program at the University of Florida has a USDA research registration, an Assurance statement on file with Public Health Service and has been accredited by AAALAC International since 1966. Animal Care Services (ACS) provides animal research support to investigators using animals at the University of Florida and is administratively located within the Office of the Vice President for Research.

ACS employs approximately 115 staff that consists of veterinarians who are diplomates of the American College of Laboratory Animal Medicine (ACLAM) and the American College of Veterinary Pathology (ACVP), veterinary technicians, administrative, animal care technicians and other support staff. The majority of the veterinary technicians and animal care technicians are certified by the American Association of Laboratory Animal Science (AALAS) at one or more levels. Many of the veterinary technicians have degrees in veterinary technology, extensive experience in animal research, and have Veterinary Technology National Exam (VTNE), the Florida State Certified Veterinary Technician (CVT) or the Academy of Surgical Research certification.

The Director of ACS also serves as the Attending Veterinarian for the University and has the responsibility for and authority over all animals used at the University of Florida for research, teaching and testing. ACS has five major subdivisions: Administration, Veterinary Care Services, UF/ACS Mouse Models Core, Operations and Pathology and Laboratory Services.

**Overview of Facilities.** The University of Florida provides a spectrum of facility types for housing a variety of different animal species. ACS manages 12 facilities housing all species used in biomedical research of laboratory animals. The environments range from ABLS-2/3, rodent barriers, and conventional housing. The majority of rodents are housed in positive pressure ventilated racks supplied with autoclaved bedding and cages, irradiated diet, and reverse osmosis water. Strict entrance requirements and operational guidelines are enforced for all animal facilities. The majority of animal facilities are equipped with biometric security devices and cameras. There is a total of 200,000 square feet of ACS managed space. Of that total 75,000 is animal housing and 125,000 square feet of support space. Temperature, humidity and room pressures are monitored via a Building Automation System (BAS) in the largest facilities where the majority of animals are housed.

## **G. UF COLLEGES**

### **College of Agricultural and Life Sciences**

The College of Agricultural and Life Sciences (CALS) administers the academic degree programs of the UF Institute of Food and Agricultural Sciences (UF/IFAS). With 21 undergraduate majors, more than 50 areas of specialization, and 23 graduate majors, CALS is an educational leader in the areas of food, agriculture, natural resources, and life sciences. CALS' mission is to provide undergraduate and graduate students with high quality education that results in knowledge and skills for gainful employment and additional education, productive citizenship, and lifelong learning in the areas of food, agriculture, natural resources, and life sciences as they relate to human resources, the environment, individual communities, and a global society. CALS is one of the largest colleges of its kind in the nation, serving nearly 5K students in programs ranging from horticultural sciences to geomatics and resource economics. CALS has 597 state-funded faculty and 313 county-funded faculty in extension offices throughout Florida.

## **College of the Arts**

The UF College of the Arts, previously known as the College of Fine Arts, is one of the 16 colleges and more than 150 research centers and institutes at UF. The current College of the Arts evolved from the School of Architecture, which was established in 1925. In 1975 the previous College of Architecture and Fine Arts was divided into two colleges, the College of Architecture and the College of Fine Arts. Many programs, however, have flourished since the University's earliest days. The UF Band Program got its start in 1913, and the Men's Glee Club was founded in 1907. The painting and drawing programs began in 1929 and became the basis for the School of Art and Art History. In May 2014, the college changed its name to the College of the Arts. In 2015 the college will celebrate its 40th anniversary.

The College of the Arts offers baccalaureate, master's and PhD degree programs in its three schools, the School of Art and Art History, School of Music, and School of Theatre and Dance. The college is home to the Center for Arts in Medicine, Center for World Arts, Digital Worlds Institute, University Galleries, and the college program of the New World School of the Arts in Miami. More than 100 faculty members and approximately 1,200 students work together daily to engage, inspire, and create. The college achieves the university's mission by training professionals and educating students as artists and scholars, while developing their critical thinking and inspiring a culture of curiosity and imagination. The college hosts more than 300 performances, exhibitions, and events each year. Faculty and students also exhibit and perform at other local, national, and international venues.

College of the Arts faculty members are active and productive researchers, scholars, and creative artists who engage in basic and applied research within the arts and across disciplines. Faculty research focuses on and occurs within the specific arts discipline and across sub-disciplines within their respective fields.

Interdisciplinary and multidisciplinary research brings arts researchers together with colleagues in other fields to create new areas of study that bring the complementary strengths of the arts to those fields. In each of these processes, both traditional and unique arts methodologies inform and enhance research across disciplines, and the results of this work contribute significantly to strengthening the human condition and improving quality of life.

Faculty researchers disseminate their work in multiple ways — books, articles, conference presentations, recitals, exhibitions and productions — both in print and electronically. This combination of traditional and unique arts delivery systems is a dynamic component of arts research, allowing all individuals multiple access points to the results of research activity in the college.

## **College of Dentistry**

The College of Dentistry consists of nine departments. The college's 120 faculty, who attract \$10M in external grants and contracts for research per year, are housed in the 173,179 square foot dental tower building, which includes dental clinics, teaching facilities, offices, laboratories, and classrooms. Roughly 35K square feet of the dental tower is dedicated to research, with much of this space classified as wet laboratory space. More than 90 percent of preclinical instruction is done in the simulation laboratory, which now has 98 patient simulators. The college has 269 dental operator chairs at its Gainesville location and more than 52,452 square feet dedicated to clinical operations. DMD clinical instruction also occurs in the nine-chair Oral Surgery Clinic, in the Pediatric Dental Clinic with six DMD student chairs, in the Endodontic Clinic with six DMD student chairs, and in the Orthodontics Clinic where there are 15 DMD student chairs available. College-owned clinics in Naples, Hialeah, and St. Petersburg have 20, 23, and 17 chairs, respectively. The college is home to the UF Health Periodontology and Prosthodontics Dental Center. This center, which houses 25 dental chairs and state-of-the-art surgical suites, represents the final step in consolidating all specialty clinics on the first floor, facilitating ease of patient access, and streamlining interdisciplinary care between dental specialties. In addition, students participate in clinical rotations in the department clinics of Oral & Maxillofacial Surgery, Orthodontics, and Pediatric Dentistry. The College of Dentistry's Dental Clinical Research Unit performs state-of-the-art clinical research in the field of oral care as well as collaborative research in all other areas of health care. The Dental Clinical Research Unit also assists with in vitro studies of antimicrobial compounds and susceptibility studies and test diagnostic methods and procedures.

## **College of Engineering**

The College of Engineering is the largest professional school, the second largest college, and one of the top three research units at UF. With eight departments and the Engineering School of Sustainable

Infrastructure and Environment as well as more than 20 centers and institutes both within the college and across disciplines, the College of Engineering offers students many career choices as one of the largest and broadest colleges of engineering in the country. Among public institutions, the college ranks 23rd in the nation in graduate engineering programs, 20th in undergraduate engineering programs according to U.S. News & World Report, and continuously places in the top 10 nationally for total numbers of both MS and PhD degrees granted across a large and diverse student body with approximately 8,600 students, which is composed of 6K undergraduate students and 2,600 graduate students.

The college is home to more than 260 tenured or tenure-track faculty members who attract a total of \$60M annually in extramural research awards and contracts. The college hosts a number of new interdisciplinary research centers and institutes including the Institute for Networked Autonomous Systems, the Institute for Cell Engineering and Regenerative Medicine, the Institute for Computational Engineering, the UF Transportation Institute, and the Center for Manufacturing Innovation. College of Engineering faculty members are also national leaders, translating the results of their research into the marketplace. Since 2009 the College of Engineering has produced 558 invention disclosures, 986 U.S. and foreign patent applications, 206 technology licenses and options, and 35 start-up companies.

The Major Analytical Instrumentation Center (MAIC), the Particle Analysis Instrumentation Center (PAIC), and the Nanoscale Research Facility (NRF) comprise the Research Service Centers (RSCs) in the College of Engineering. These are multiuser materials characterization, fabrication, and analysis facilities that provide service to all faculty and students at UF, research universities, and the industrial and commercial community. These facilities have provided teaching, training, and services for more than 30 years together and continue to be the largest and most successful hands-on, multiuser facilities at UF.

### **College of Health & Human Performance**

The College of Health & Human Performance conducts research focused on assisting individuals, families, and communities in promoting health and preventing disease as well as enhancing the quality of life of Floridians. The college's three departments (Applied Physiology and Kinesiology; Health Education and Behavior; and Tourism, Recreation, and Sport Management) contribute to the goals of improving human health by investigating applied physiology and kinesiology; improving health behaviors and health status of individuals and communities through research, education, innovation, and collaboration; and understanding the psychosocial factors that lead individuals, families, and industry to value and benefit from tourism, recreation, parks, and sport.

The college houses three multidisciplinary research centers that facilitate research endeavors by undergraduate and graduate students, post-doctoral researchers, and faculty. Principal investigators in the Center for Exercise Science are pursuing questions about the cardiovascular system, skeletal muscle, heat stress, space flight, movement biomechanics, movement variability in the elderly, and human brain impairments that cause movement disorders. Faculty in the Center for Digital Health and Wellness are exploring ways to revolutionize health behavior and healthcare with information and communication technology. Members of the Eric Friedheim Tourism Institute pursue tourism, travel, and hospitality research questions focusing on the long term sustainability of Florida and global communities.

### **College of Journalism and Communications**

The College of Journalism and Communication (CJC) is ranked in the top 10 for all communication disciplines taught at CJC, which include advertising, journalism, public relations and telecommunications as well as the science/health graduate track. The college is a home to several research programs focused on message dissemination, persuasion, and translation, and has several state-of-the-art facilities that support communication research.

CJC established the STEM-H Translational Communication Research Program as a strategic, university-wide preeminence initiative. The program aims to create a research partnership between the public, the communication process, and science/health investigators. Communication is vital to the STEM-H disciplines for translation and dissemination of consequential science and health knowledge to individuals and stakeholder groups. Needed communications research about these areas can generate understanding of how people come to know science and health and its associated benefits and risks and how people make informed decisions about science and technology areas that affect their health, security, and the environment.

The Innovation News Center (INC) is a real-world, working newsroom producing content for the UF's seven broadcast and affiliated digital properties, including our PBS and NPR public media stations. The

two-story, 14K square foot INC facilities include almost 100 seats for student reporters, producers, and editors, breakout rooms for team meetings, tablet publishing, television, and radio editing rooms, audio booths, and a mini-studio (or “live-shot area”) to create video content for broadcast and online streaming. The Summer Journalism Institute is a weeklong camp at the UF CJC for high school students. Started in the 1960s, the camp immerses the participants into the INC where they work with faculty and professionals on news stories and broadcasting on our multiple television and radio stations and WUFT.org.

The CJC Shared Research Lab comes equipped with digital recording devices and 22 research stations to provide the tools for conducting both quantitative and qualitative research. The college provides access to the web-based Qualtrics Research Suite, a comprehensive research system that can be used to design and conduct surveys, polls, and experimental studies.

The Agency is an integrated, strategic communications initiative that enables Advertising and Public Relations students to develop and test messages and communication campaigns by working in a professional environment with external customers. The Agency has more than 2K feet of dedicated space equipped with computer workstations, collaborative workrooms, and meeting space.

The Science Communications Academy offers scientists an opportunity to develop the core skills they need to explain the significance of their work to policymakers, journalists, and potential collaborators from other disciplines. Through a six workshop series, scientists learn to create compelling and visual presentations, engage the news media, and work with policymakers.

### **College of Liberal Arts & Sciences**

The College of Liberal Arts & Sciences (CLAS) is one of the largest and among the first of the 16 colleges to be established at UF. CLAS forms the intellectual core of the University and is home to the humanities, the social and behavioral sciences, and the natural sciences and mathematics. The college's 600 faculty members are responsible for teaching the university's core curriculum to more than 35K students each year. CLAS has more than 10K undergraduate students pursuing a variety of disciplines through its 42 majors and minors. Additionally, close to 2K graduate students pursue advanced degrees in the college and work with faculty to advance the frontiers of knowledge.

Faculty in CLAS rank among the best in the nation and have received a variety of national and international awards, including Guggenheim Fellowships, Senior Fulbright Awards, National Science Foundation Fellowships, Presidential Young Investigator Awards, and National Endowment for the Humanities Fellowships. They hold memberships in the National Academy of Science, the Nobel Prize Committees, the Swedish Royal Academy of Sciences, and the Royal Societies of London and Edinburgh. The college's external research funding profile CLAS amounts to \$30M per year.

Scientists in the college are engaged in a wide array of world-class research efforts spanning diverse topics and fields. For example, UF physicists participated in the discovery of the Higgs particle using the Large Hadron Collider at CERN, and maintain a high profile involvement with the National High Magnetic Field Laboratory. Chemistry department research includes developing methods for the nanofabrication of the next generation of electronic devices and developing more sensitive techniques for diagnosing and treating cancer. CLAS biologists focus on the ecology, evolution, systematics, genetics, and molecular biology of plants and animals. Astronomers search for earth-like planets outside our solar system using UF's share of the Gran Telescopio Canarias, the world's largest telescope. Members of the mathematics department apply their modeling skills to issues such as reducing the wait times in hospital emergency rooms and controlling the effects of citrus greening on Florida's agricultural industry. Researchers in geological sciences study the changes that have occurred over the past 4.6B years in order to meet the challenges the earth is experiencing today. Research efforts in the psychology department focus on human health and techniques to improve it.

Faculty in the humanities publish books with leading presses and in leading journals and have garnered grants from a number of prestigious foundations, as noted above. All of these examples provide ample evidence for the breadth and depth of the research enterprise in the College of Liberal Arts & Sciences.

### **College of Medicine**

The UF College of Medicine (COM), founded in 1956, encompasses 26 clinical and basic science departments staffed by 1,050 faculty on the Gainesville campus and 320 faculty on the UF Health Science Center's urban campus in Jacksonville. The college attracts nearly \$200M in external grants and contracts for research per year and is the leading educator of outstanding physicians, physician assistants, and

biomedical scientists for the state of Florida. Through UF Health, COM physicians provide cutting-edge care to residents of Florida and patients around the world who travel to Gainesville and Jacksonville for specialized care.

More than 1,500 students, residents, and fellows receive education and training at the COM each year. In addition to the medical degree, the college offers a variety of educational opportunities, including the Interdisciplinary Program in Biomedical Sciences, which leads to a PhD or an MS degree, and joint programs for both MD and PhD degrees. Also part of the COM is the School of Physician Assistant Studies. The college plays an important role in the continuing education of resident physicians and fellows through its collaboration with UF Health.

Patient care occurs at two principal locations, Gainesville and Jacksonville, and at more than 40 clinical practices. Its clinical strengths are in cancer, neurosciences, aging, gene therapy, psychiatry, addiction medicine, transplantation, and children's services. In Gainesville, patient care is provided by UF Health, the Malcom Randall Veterans Affairs Medical Center and several community healthcare sites and other affiliated hospitals in Florida. The UF Health Shands Hospitals serve a variety of inpatients, including those receiving diagnostic and therapeutic oncology care and emergency and trauma services. The UF Health Florida Proton Therapy Institute, located in Jacksonville, is one of only five proton therapy treatment centers in the U.S., delivering a highly precise and effective form of radiation to destroy tumors with little or no damage to adjacent healthy tissues.

The COM has attained national leadership in research related to the brain and spine, cancer, diabetes, drug design, genetics, and organ transplantation. Collectively, the faculty are responsible for nearly half of UF's total extramural research awards. The college has more than 350K square feet of research laboratory space in more than 20 buildings on campus.

### **College of Nursing**

The College of Nursing (CON) is recognized nationally and internationally for innovative education, dynamic programs of research, and creative approaches to practice. Approximately 70 faculty members, the majority of whom are prepared at the doctoral level, are involved in regional/national research and in practice throughout the state. The CON graduates the largest number of baccalaureate-prepared RNs in the state and is consistently ranked in the top 10 percent of all baccalaureate and graduate degree-awarding nursing schools in the nation. Currently the average GPA for BSN graduates is between 3.5 and 3.6, and 70 percent of these students pursue graduate education within three years of earning the BSN. The CON also offers, in conjunction with the UF Graduate School, a Doctor of Philosophy (PhD) degree with a major in nursing. CON enrollment currently consists of approximately 700 undergraduate students and 370 graduate students in three departments: Adult and Elderly Nursing; Health Care Environments and Systems; and Women's, Children's and Family Nursing. Nursing students have an opportunity to learn and work with students from other Health Science Center colleges in collaborative healthcare teams. The college maintains and participates in nursing and interdisciplinary clinics for women, children, adults, and elders in a variety of settings with special emphasis on medically underserved and rural areas. The CON is located within the 173,133 square foot HPNP complex, which provides educational, administrative, and research space for the CON, the College of Public Health and Health Professions, and the College of Pharmacy. More than 1,500 square feet of research space are available in the CON, located in close proximity to the offices of the associate dean for research. A large conference room and space to house 10 research assistants complete the area. Additional space in the HSC is available to faculty with funded grants to house their research staff.

### **College of Pharmacy**

Founded in 1923, the College of Pharmacy (COP) consists of five clinical and basic science departments (Medicinal Chemistry, Pharmaceutics, Pharmacodynamics, Pharmaceutical Outcomes and Policy, and Pharmacotherapy and Translational Research) staffed by 96 faculty. The college's research programs reside on two campuses in Gainesville and Orlando. The college attracts approximately \$10M in external grants and contracts for research per year. The largest pharmacy educator in the state of Florida, the college is nationally and internationally recognized for its professional and graduate programs. As a UF Health college, the COP clinical faculty serve as a part of interprofessional teams in community health care clinics and at UF Health Shands Hospital for residents of Florida who travel to Gainesville and Jacksonville for specialized care. The college's Medication Therapy Management Communication and Care Center serves more than 150K Medicare patients nationwide.

More than 1,600 students receive professional degree education and training leading to the doctor of pharmacy (PharmD) degree. The college offers graduate programs to more than 100 students leading to a PhD or an MS degree in one of five areas: medicinal chemistry; pharmaceuticals/ pharmacometrics; pharmacoepidemiology/ pharmacoconomics; pharmacodynamics; and clinical pharmaceutical sciences/pharmacogenomics. The college also provides MS training in one of 11 online programs in specialized areas of pharmaceutical science to more than 800 students worldwide. Students in the online MS programs usually work in a clinical or applied science field while gaining their advanced education. The college also offers numerous continuing education programs for pharmacists, residents, and fellows. Patient care occurs at UF Health Shands hospitals in Gainesville and Jacksonville and other clinical pharmacy locations around the state of Florida. Clinical strengths are in ambulatory care, diabetes, infectious disease, patient safety, and medication therapy management.

The college has 109K square feet of space for education, administration, and research in the UF Health Science Center in Gainesville and at the UF Research and Academic Center at the Lake Nona medical community in Orlando. Both the specialized and the multidisciplinary research space at these sites support nationally and internationally recognized research programs in drug discovery, drug development, pharmacokinetics/pharmacometrics, pharmacoepidemiology, and pharmacogenomics/personalized medicine.

Faculty from across campus conduct research within one of three active interdisciplinary research centers in the college, the Center for Pharmacogenomics (CPG), the Center for Natural Products Drug Discovery & Development (CNP3), and the Center for Pharmacometrics and Systems Pharmacology (CPSP). The CPG is recognized for its translational research, teaching, and service focused on genetically guided drug therapy decision-making. The CPG also houses the UF Health genotyping core laboratory. The CNPD3 provides both drug discovery expertise and the infrastructure to screen for novel therapeutic targets and chemical entities that modulate target activity. The CPSP uses a systems biology approach to study drug activities, their targets, and clinical effects to support and advance translational research and improve the process of bringing new drugs to market for improved patient therapies, including personalized medicines.

### **College of Public Health & Health Professions**

The College of Public Health & Health Professions (PHHP) is one of the largest and most diversified health education institutes in the nation. Today, PHHP is one of six colleges that comprise the UF Health Science Center. The college has nine departments: Behavioral Science and Community Health; Biostatistics; Clinical and Health Psychology; Environmental and Global Health; Epidemiology; Health Services Research, Management and Policy; Occupational Therapy; Physical Therapy; and Speech, Language and Hearing Sciences. The college offers a bachelor of health science, seven masters programs, eight doctoral programs, and two professional degree programs with 155 faculty teaching a total of 2,168 students. Additionally, the college's research funding has more than doubled during the last decade, with nearly \$20M in external grants and contracts for research per year. PHHP faculty work collaboratively with many investigators across UF and on research projects locally, nationally and globally on a diverse range of topics.

The PHHP's home is in the Health Professions, Nursing, and Pharmacy (HPNP) building, completed in 2003, and includes 11 classrooms, four lecture halls, one auditorium, and a distance learning room for a total of 7,783 square feet. The college also includes the PHHP Research Complex, which is located in the Dental Wing (Ground Floor) of UF Health and totals 15,690 square feet of dedicated research space. PHHP has 452 affiliation agreements that allow students to participate in site visits and to be placed at various organizations to complete internships, clinical rotations, supervised research, and other practical experiences. The agreements include 147 with health departments, hospitals, health centers, and Veteran's Administration facilities, 275 with clinics and private practitioners, and 30 with other universities/educational institutions.

### **College of Veterinary Medicine**

Florida's only veterinary college, the UF College of Veterinary Medicine (CVM) is presently home to 132 full-time and 13 part-time faculty, 390 DVM students, 44 residents, 12 interns, more than 120 PhD and MS students, 16 post-doctoral associates/fellows, and 276 staff members. Clinics, research space, offices, and teaching rooms in the college occupy a total of 352,808 square feet of space, including 71,760 of research space. The college attracts nearly \$10M in external grants and contracts for research per year. The Veterinary Academic Building houses a large portion of the basic science faculty in CVM

as well as a number of laboratory facilities, including BSL3 Research Laboratories. The college is organized into six functional and administrative units: College Administration; the Department of Large Animal Clinical Sciences; the Department of Infectious Diseases & Pathology; the Department of Physiological Sciences; the Department of Small Animal Clinical Sciences; and the UF Veterinary Hospitals.

CVM, fully accredited by the American Veterinary Medical Association Council on Education, offers a four-year DVM program and a joint DVM/MPH program in addition to masters and doctoral degrees in Veterinary Medical Sciences. The more than 2,400 graduates of its professional degree program are active throughout Florida, the United States, and overseas in areas ranging from in-depth scientific research to traditional small and large animal practice, zoological and aquatic medicine, public health, epidemiology, and the military.

Through Veterinary Extension, a part of UF's Institute of Food and Agricultural Sciences, CVM provides scientific knowledge and expertise to Florida residents on aquatic animals, equine research, beef and dairy cattle, and poultry. Additionally, the UF Large Animal Hospital and Small Animal Hospital offer cutting-edge veterinary medical services and facilities to the community.