**CENTER OVERVIEW**

**FACILITIES AND OTHER RESOURCES**

The **University of Colorado Anschutz Medical Campus (UC AMC)** is one of the newest health sciences campuses in the nation. The campus brings together educational, administrative and research facilities for all six health science schools (Medicine, Pharmacy, Nursing, Dentistry, the Graduate School, School of Public Health), University of Colorado Hospital (UCH), and The Children’s Hospital (TCH). In 2017, a new Colorado Veterans Affairs medical facility that includes a nine-building medical complex opened on campus. The campus provides educational, research and clinical facilities all within walking distance of each other. The Research Complexes I and II (RC1 and RC2; completed in 2010) house research laboratories totalling 1.2 million sq. ft. of gross research space to the campus, and includes many of the Type 2 diabetes (T2D) research labs on campus. The Barbara Davis Center for Diabetes (BDC), a four storey 108,000 sq. ft. building is situated between RC1 and the UC AMC administation building, is the primary site of Type 1 diabetes research and clinical operations on campus. UCH and TCH also provide additional facilities and resources for diabetes clinical care. The DRC administrative offices are housed within the BDC. The clinical and research core facilities are housed in the BDC and adjacent research buildings that are designated Research Complex 1, North and South (RC1N and RC1S) and Research Complex 2 (RC2). UC AMC represents a campus with state-of-the-art facilities and a collaborative, interactive environment that fosters collaborative, interdisciplinary research. The facilities available across campus are readily accessible for collaborative use.

**Fig.1 The UC Denver Anschutz Medical Campus.** The DRC administration is located at the Barbara Davis Center (Bldg. 20). Core facilities are located at the BDC, RCI (Bldg. 18) and RC2 (Bldg. 15) buildings. Clinical resources are also available at the University Hospital outpatient (Bldg. 12) and inpatient clinics (Bldg. 25) and The Children’s Hospital (Bldg. 26). Central UC AMC administration is in Building 500 (Bldg. 5). The Perinatal Research Unit (Bldg. 60) and Nutritional and Obesity Research Center and Center for Women’s Health Research are located nearby on campus (Building N).



**DRC FACILITIES**

**Administrative Core Facilities**

Dr. Sussel has an office on the 4th floor of the BDC and Dr. Reusch has permanent offices in RC1S and at the VA, and will have access to office space at the BDC. The DRC administrative support staff will be centralized on the 4th floor of the BDC. Dr. Sussel’s office is located in an “Executive Suite” adjacent to an outer administrative area where staff involved in DRC administration, financial and budgetary management, and information technology/website support are located. The office suite is equipped with the necessary computers, printers and scanners for these services. A dedicated server for DRC operations and data storage.

**Bioresources Core Facilities**

Four Biomedical Cores are proposed in the application that will provide services and resources to DRC investigators primarily on the UCDenver campus with outreach to the School of Pharmacy and departments on the UC Boulder campus 30 miles to the north of Aurora. Each of the Cores have assigned space on campus, either on the fourth floor of the BDC or in RC1 and RC2 (see individual core facilities). Adequate space devoted to each of the laboratory-based research cores has been assigned to each core to accommodate its services, equipment and personnel. Detailed information about core facilities and resources in included in each specific core description, but includes the following:

Clinical research core

The major clinical facilities are located in the BDC, University Hospital, Children’s Hospital and VA. The first floor of the BDC houses pediatric and adult diabetes outpatient clinics and an eye clinic. The second floor is a diabetes clinical research facility that accommodates major clinical trials and studies (DAISY, TEDDY, CACTI, TRIALNET etc). The basement of the building (12,500 sq. ft) includes two 1500 sq. ft.“freezer parks” for clinical and biological sample storage with conditioned uninterruptible power supply. The campus hospitals house both in-patient and out-patient clinics, resources for patient consultation and faculty and administration offices. Many of our faculty see patients at several of these sites. The VA hospital has recently moved onto the UC AMC campus and provides additional facilities and resources.

Disease Modeling Core

The DM core is housed at several sites around campus, including RC1, RC2 and the BDC. Dedicated core space is available on 4th floor of the Barbara Davis Center for the human stem cell work and molecular services. There is a dedicated tissue culture suite that contains the necessary equipment for human stem cell procedures. There is also a 650 sq ft procedure room that is dedicated to the molecular services provided by the core. The majority of the animal models are housed in a centralized facility (see below). The organogenesis facility is located on the 3rd floor of the BDC, situated next to the Colorado Center for Transplantation Microsurgery and Training. Transgenic services, including Crispr/Cas9 mediated genome editing of mouse embryos is available from the UC AMC Bioengineering core, which is institutionally supported by the Gates Center for Regenerative Medicine, the Dean of the Medical School, the CCTSI and the Skin Disease Research Center, is located on the 8th floor of Research Complex 1 North. The HI3 supported Translational Research Networking and Preclinical Models facility is also located on the 8th floor of Research Complex 1 North.

Tissue Procurement and Processing Core

There is 1000 sq. ft. of dedicated laboratory space for the Tissue Processing & Procurement Core at the Barbara Davis Center. The laboratory is composed of 3 individual rooms located in close proximity on the 4th floor. The room for islet isolation contains general cell and animal biology equipment including bench top refrigerated centrifuge, standard centrifuge, freezers, and stereomicroscopes. The second room dedicated for tissue & cell culture is equipped with two laminar flow hoods, two CO2 incubators, refrigerated centrifuge, and inverted microscope. The third room for processing histology samples contains two microtomes, three cryostats, a tissue processor, an automated embedding system, and automated staining system. Three large liquid nitrogen containers are located in the basement of the BDC. Each is equipped with an alarm monitoring system. The HI3 offices and laboratories are located in the RC1 North. A dedicated human tissue procurement site is located in RC1North, 8th floor.

Cell and Tissue Analysis Core

The Advanced Light Microscopy center (ALMC) shared resource occupies 1000 sq ft of space within Research Complex 1 and Research Complex 2 on the UC Anschutz Medical campus. The space is well-equipped with several microscope systems (see Equipment), and additional resources, including incubators, shakers that are available to maintain biological samples prior to imaging. The Flow cytometry shared resource (FCSR) occupies 1400 sq ft of space within the University of Colorado Cancer Center in Research Complex 1. Dr Kim Jordan occupies an additional 200 sq ft of space for sample processing for mass cytometry analysis. At the BDC, there are two procedure rooms totaling approximately 600 sq ft that house DRC-specific confocal microscopy, fluorescent microscopy and flow cytometry systems for DRC member use.

**Other relevant UC Denver Facilities**

**Colorado Clinical Translation Science Institute (CCTSI)**

The **CCTSI** is a collaborative enterprise between University of Colorado Denver, University of Colorado at Boulder, six affiliated Hospitals and health care organizations, and multiple community organizations with resources to promote research and training that will advance health care and improve the public health. The CCTSI was created in 2008 with funding from the Clinical and Translational Science Award (CTSA) initiative ofthe National Institutes of Health (NIH). The availability of outpatient and inpatient research facilities and support is vital for performing clinical and translational research in the 21st century. The CCTSI has transformed the former General Clinical Research Centers (GCRCs) into a centrally administered and coordinated network of Clinical and Translational Research Centers (CTRC) located at four affiliated sites. CTRCs are located at: University of Colorado Hospital (UCH CTRC), The Children’s Hospital (TCH CTRC), National Jewish Health (NJH CTRC), and University of Colorado at Boulder (UCB CTRC). All former GCRC services are now offered in the CTRCs, with the exception of biostatistics, informatics, and Research Subject Advocacy, which are now accessible through other CCTSI programs. Clinical trials support is offered through the CCTSI at the UCH Clinical Trials Office. The DRC has a close relationship with the Colorado CTSI. Many DRC investigators interact with and are supported by the CCTSI (see letter of support from Dr. Sokol, Director). The CCTSI has many programs that we will augment as part of our DRC P&F and enrichment programs. These include a “Research Studio” that meets ~5 times a year to review specific aims for grants and a K-to-R mock study section program. Reviewers are selected based on the research subject; DRC members will actively participate in the review process for grants related to diabetes research.

**Colorado Nutrition Obesity Research Center (NORC)**

The **Colorado Nutrition Obesity Research Center (NORC)** is housed in the Human Wellness and Obesity Center on the AMC. The Colorado Nutrition Obestiy Research Center is funded by a P30 grant, operates three core facilities, including the Energy Balance Core, Molecular and Cellular Analytical Core and a Clinical Intervention and Translational Core. A subset of DRC investigators are affiliated with the NORC. The center fosters collaborations to promote interdisciplinary research, including with DRC researchers, and is committed to development of young investigators (see letter of collaboration, Paul MacLean, Interim Director). We will partner with the NORC to sponsor a subset of joint seminars. Dr. MacLean is on the DRC Internal Advisory Board and will work closely with Drs. Sussel and Reusch to coordinate center activities and link core functions when appropriate

**University Hospital & The Children’s Hospital**

Both **Colorado University Hospital** and **The Children’s Hospital** are located on the Anschutz Medical Campus. The **Veteran’s Administration (VA) Hospital** has also relocated into a nine building state-of-the-art complex at the Anschutz Campus. These hospitals provide in-patient and out-patient clinical care facilities for individuals suffering from diabetes and its complications. Detailed information is provided in the Clinical Resource Core.

**NCI Cancer Center**

The **NCI Colorado Comprehensive Cancer Center (CCCC)** at the University of Colorado Denver provides many excellent services and shared resources, several of which are utilized by DRC members involved in cell and molecular biology research. Many DRC investigators are also members of the Cancer Center. Of these services, the DNA Sequencing Core Laboratory is particularly helpful, as it enables large-scale sequencing of DNA with rapid turnaround of results. In addition, DRC researchers have access to the animal imaging core (see CTA core), biostatistics and bioinformatics, human primary tissue procurement, flow cytometry and protein analysis. The DRC will not duplicate services offered by the CCCC, but will leverage their services for DRC members. For example, we have partnered with the CCCC tissue biorepository core to assist with the procurement of diabetes-relevant tissues (pancreas, liver, spleen, thymus, etc). We are working with their core to develop a new program on campus to acquire diabetes-relevant tissue from the transplant surgeons.

**Center for Women’s Health Research (CWHR)**

The mission of the **Center for Women’s Health Research** (CWHR) is to improve the health of women by pioneering rigorous research in women’s health, attracting and training new scientists dedicated to the study of women’s health, and promoting information regarding women’s health care to the lay public and health care professionals. Students and faculty at the CWHR are actively engaged in the conduct and publishing of research which will advance our knowledge regarding the specific impact of illnesses on women, including diabetes. The CWHR is located in the Anschutz Health and Wellness center on campus.

**Perinatal Research Center**

The 20,000 square foot Perinatal Research Facility is located in the middle of the Anschutz Medical Campus. The Center is an entirely unique state-of-the-art facility for in-vivo studies in reproductive biology carried out using chronically catheterized pregnant sheep. The Perinatal Research Center has all the resources for delicate fetal and maternal surgery and maintenance of chronically catheterized animals throughout pregnancy. Most of the established physiological approaches in this research area were developed in this laboratory. A principal expertise of the lab and one for which it is internationally acclaimed is the capacity to perform chronic physiological studies of the pregnant mother, placenta, and fetus during major portions of gestation using the chronically catheterized sheep model. Diabetes studies are conducted at all levels of biological investigation from the gene/protein/molecular level, to cells, tissues, organs, and the whole animal. This capacity to study in vivo physiology with directly correlated in vitro approaches using cells and tissues from the same animals provides a unique and powerful approach to study developmental processes and adaptations of the fetus, placenta, and pregnant mother to pathological influences during gestation.

**The Charles C. Gates Center for Regenerative Medicine**

**The Gates Center** was established in 2006 with a generous give from the Charles C. Gates family. The center is located on the 8th floor of RC1 North. The major focus of the Gates center is adult stem cell research and the facility is multidisciplinary and includes many DRC researchers. The facility also houses the campus Bioengineering core for the genetic targeting of mice and other transgenic services (see letter of support, DM core).

In April 2015, the Gates Center opened a GMP biomanufacturing facility for stem cell processing at UC AMC. The Gates Biomanufacturing Facility provides: Process Development; Scaled-Up Cell production; Manufacturing of both cell therapy- and protein-based products to cGMP standards; and Process documentation. Utilizing their expertise in Quality Assurance and Control and Process Development and Manufacturing, their mission is to help translate bench scale processes to optimized clinical-ready manufacturing processes and perform productmanufacturing for early-phase clinical trials. By leveraging our existing current Good Manufacturing Practice (cGMP) facilities, trained staff, qualified equipment and best practices across each of our support services, investigators can significantly accelerate their timeline while minimizing their overall investment.

**Institutional Administration Offices**

The Dean’s office, Grants and Contracts, Procurement office, Finance office and all centralized UC AMC administrative divisions are centrally located in Building 500, which is adjacent to the BDC and RC1 North. The administration has worked closely with the CCTSI and UCCC to implement iLab Core Facility Management software, an online system to streamline the process of ordering and billing for core service requests. iLab is fully integrated with CU Denver PeopleSoft Finance; speedtypes designated to pay for services will be automatically charged and the lab will receive payment through an interface between the two systems. The iLAB system will be implemented in each of the UC Denver DRC core facilities.

**Animal Facilities**

The University of Colorado – Denver is an AAALAC Accredited (#00235), Public Health Service Assured (#D16-00171) and USDA Licensed (#84-R-0059) Institution. The Office of Laboratory Animal Resources (OLAR) is responsible for the daily husbandry and management of the animal care program for the University of Colorado Denver (CU Denver) and is dedicated to the care and use of research animals. The Center for Comparative Medicine is located on the Anschutz Medical Center campus and consists of two approximately 50,000 sq. foot vivariums connected by a common cage wash area. The cage wash area contains modern equipment such as robotic cage processing, rack washers, and large bulk autoclaves. The majority of the combined 30,000+ cage capacity facility utilizes ventilated caging to house multiple different species of rodents. Rodents are all housed in sterile caging with irradiated diets and hyperchlorinated RO water delivered primarily via an automatic watering system. The facility contains approximately 4 procedural areas per 3200 cages, as well as specialized housing areas for aquatics, rabbits, chinchillas, guinea pigs, cats and pigs. In addition, there is a surgical suite with two operating rooms, animal preparation and recovery rooms, diagnostic laboratory, necropsy, imaging modalities including small animal ultrasound/echo, MRI, SPECT/CT, PET/CT, and IVIS, and ABSL 2/3 containment rooms. MRI, PET/CT, ultrasound, x-ray, and fluoroscopy are also available for large species.

The OLAR is overseen by a full-time Director/Attending Veterinarian, a Diplomate of the American College of Laboratory Animal Medicine (DACLAM), and is supported by three additional full time veterinarians (all are DACLAM) and 11 veterinary technicians with specialty training in laboratory animal medicine, care, breeding, and management, including working with large animal surgical models. The facility has a total of 85 staff members who manage routine husbandry care, cage processing, administration, training, and animal health related aspects of the program for all CU-Denver animal facilities. The goal of the veterinary staff is to provide investigators with healthy, properly cared for animals while ensuring the animals’ welfare at all times. Veterinary care is available 24 hours a day, 7 days a week, 365 days per year. All animals are observed daily by OLAR animal care staff for health-related concerns and the veterinary staff is contacted if a concern is identified. Documentation of animal evaluations, diagnosis, and if indicated, treatment, are maintained as indicated by the Animal Welfare Regulations, PHS Policy, and the Guide for the Care and Use of Laboratory Animals. Routine preventative medicine, quarantine, and health screening programs are also in place to actively meet animal welfare needs and maintain high quality animals to aid in the production of valid research from all species cared for by the OLAR.

In addition, the vivarium maintains a specialty suite dedicated to DRC investigators for their diabetes-related strains, and in particular animal models of type I diabetes (e.g. NOD mouse and BB rat), immunodeficient animal strains. There is also a BDC Satellite Animal Facility (BDCSAF) which is a 330 sq.ft. conventional animal facility. It consists of one animal housing room and one storage anteroom. The BDCSAF contains 2 IVC Mouse Innoracks® (Innovive) and is capable of housing 384 mouse cages. Access is via ID card key. Program oversight comes from the CU Denver IACUC (program oversight, protocol and facility inspections) and the Director, Office of Laboratory Animal Resources (program oversight, animal care, and veterinary oversight).