

To assist researchers in the creation of standard proposal material The Office of Clinical Award Administration created templates for information commonly required in the submission process.

## **Facilities and other Resources**

### **School of Medicine Core Facilities**

The School of Medicine offers 18 different fee for service Core Facilities. Below are short descriptions of each that can be included in your facilities statements:

#### **BioBank**

The Stony Brook Medicine Biobank is a core facility within the School of Medicine. The Biobank provides biological specimens, and associated clinical data, collected under informed consent to Stony Brook researchers and their collaborators. Banking of biospecimens is performed in a state-of-the-art, dedicated laboratory to ensure complete molecular and morphological integrity.

The Biobank stores normal and malignant specimens including tissue samples, bodily fluids, and other biomaterial under liquid nitrogen vapor phase at  $-185^{\circ}\text{C}$ . This method of cryogenic storage allows for better cell preservation than  $-80^{\circ}\text{C}$  freezing. In addition, the Biobank controls access to the entire archival collection of H&E slides and formalin fixed paraffin embedded (FFPE) tissue blocks from all pathology diagnostic cases done at Stony Brook University Hospital. This collection of clinical specimens (more than half a million cases) is a valuable resource for investigators to determine protein and/or RNA expression in diseased tissue and correlate those findings with morphological and clinical data.

#### **Biological Mass Spectrometry**

The Biological Mass Spectrometry Shared Resource provides expertise in discovery and quantitative proteomics, metabolomics, and lipidomics.

#### **Proteomics**

- Discovery and targeted proteomics
- Identification and quantitation of post-translational modifications
- Protein/peptide quantitation approaches using iTRAQ, SILAC, and cI-CAT

- Full service proteomics and small molecule analysis from sample preparation through biological interpretation

#### Instrumentation for Proteomics

- Thermo LTQ-Orbitrap – orbitrap; with nanoHPLC
- Sciex 5600Plus – quadrupole time-of-flight (QqTOF); with nanoHPLC
- Thermo LTQ linear ion trap; with HPLC
- AB/Sciex
- Biacore Surface Plasmon Resonance (SPR) T200

#### Lipidomics

- Analysis of multiple lipid classes, notably sphingolipids and ceramides
- Large-cohort quantitative analysis is possible by use of internal <sup>13</sup>C labeled standards
- Discovery lipidomics now in place with new full-scan mass spectrometry instrumentation and multi-channel HPLC

#### Instrumentation for Lipidomics

- Thermo TSQ Quantiva - triple quadrupole with uHPLC (Vanquish)
- Agilent QqTOF with HPLC (VA [1])
- Thermo TSQ Quantum Ultra – triple quadrupole with HPLC [2]

#### Metabolomics

- Multiple targeted GC- and LC- mass spectrometry platforms covering a range of metabolic pathways
- Analysis of both steady-state levels and metabolic reaction rates (flux)
- Recent staff and equipment additions have added full-scan / discovery metabolomics for LC- mass spec

#### Instrumentation for Metabolomic analysis

- Agilent QqTOF with HPLC (VA)
- Agilent triple quadrupole with HPLC
- SeaHorse, NOVA, GC-MS, robotic sample prep, hypoxia chambers

#### **Additional Instrumentation for Pharmacokinetics, Small molecule and nucleic acid analysis**

- Thermo TSQ Quantum Access MAX – triple quadrupole with HPLC
- AB/Sciex Voyager STR MALDI – laser desorption mass spectrometer

## **Biostatistical Consulting Core**

The Biostatistical Consulting Core (BCC) aims to meet the increasing demand and serve the biostatistical needs in Stony Brook Medicine by providing biostatistical consultation, collaboration, education and support for all aspects of a research endeavor. The BCC is one of 18 core facilities under Office of Scientific Affairs at the School of Medicine. It is located in the Department of Family, Population and Preventive Medicine, School of Medicine. The core has two faculty members with PhD in Statistics and five master level biostatisticians.

The services provided by our core include:

1. General biostatistical consultation ranging from clinical trial/experiment design to statistical data analysis;
2. Biostatistical assistance in grant preparation from formulating the study hypotheses to writing the statistical analysis plan;
3. Statistical short courses or workshops.

Our core currently has grant support from NIH PPG, NIH R01, NIH R21, DoD and other internal grants. Since 2016, our core members co-authored approximately 20 published articles and 20 presented meeting abstracts every year. Our core has six working desktops (Dell Precision T1700 mini Tower with Intel® Xeon® Processor E3-1220 v3 (Quad Core, 3.10GHz Turbo, 8MB) and 16GB memory) and one computing server (Dell T710 Tower with Intel 56XX Processors and 48GHz RAM). The statistical software installed on these computers includes SAS 9.3, JMP, R, SPSS 19, STATA 13, PASS 12, and StatXact.

There is more statistical/computational software available in Virtual Sinc Site supported by Division of Information Technology, Stony Brook University (for example, MATLAB and GraphPad Prism).

## **Central Microscopy Imaging Center**

Central MIC is staffed with experience technical staff who can consult on experimental design and provide training on the instruments.

## Light Microscopy Resources – Instrumentation

### **Zeiss LSM 510 META NLO Two-Photon Laser Scanning Confocal Microscope** Coupled with:

- Zeiss Inverted Axiovert 200 M Microscope
- Zeiss CTI Controller 3700
- Zeiss Tempcontrol 37-2 Digital

#### **(1) Laser Lines**

- Argon: 458/477/488/514 nm, 25mW
- HeNe1: 543 nm, 1mW
- HeNe2: 633 nm, 5mW
- Chameleon XR Laser System: tunable, 705 nm – 980 nm

Chameleon laser excites fluorophores from Blue to Red range, but most efficient with UV and near-UV excitable dyes.

### **Olympus BX61WI InVivo Two-Photon Confocal Microscope**

#### **(1) Laser Line**

Coherent Chameleon XR Laser System: tunable, 705 nm – 980 nm

### **Nikon N-SIM Super Resolution Microscope System**

N-SIM can produce nearly two times the resolution of conventional optical microscopes by combining “Structured Illumination Microscopy” (SIM) technology and Nikon Eclipse Ti research inverted microscope, with lateral resolution to approximately 100nm and axial resolution to approximately 200nm. 3D capable. TIRF capable. Laser lines: 405nm, 488nm, 561nm, 640nm.

### **Nikon N-STORM Super Resolution Microscope System**

N-STORM can produce 10 times the resolution of conventional optical microscopes by combining “Stochastic Optical Reconstruction Microscopy” (STORM) technology and Nikon's Eclipse Ti research inverted microscope, with lateral resolution to approximately 20nm and axial resolution to approximately 50nm, extending the role of the optical microscope to near molecular level resolution. 3D capable. Laser lines: 405nm, 488nm, 561nm, 647nm.

STORM Protocol-Sample Preparation

## TEM Resources

### FEI BioTwinG<sup>2</sup> Transmission Electron Microscope (TEM)

- AMT digital camera for acquiring images as well as film capability
  - accelerating voltage of 120kV with goniometer/stage tilt capability
  - software for serial reconstruction
- Routine sample preparation (embedding, sectioning) as well as:
  - immunohistochemistry using immunogold techniques
  - negative staining
  - serial sectioning
- Leica EM UC7 ultramicrotome for ultrathin sectioning
- Individual tutorial for independent operation as well as assisted TEM support

### The Center for Understanding Biology using Imaging Technology (CUBIT):

#### PET Research Core

CUBIT is a team of image analysts, programmers and engineers, focused on extracting the most accurate quantitative information from medical images.

CUBIT facilitates image acquisition and analysis from Magnetic Resonance Imaging sequences including:

- structural MRI
- diffusion MRI (DTI and DSI)

We also aid in the acquisition and analysis of Positron Emission Tomography (PET) including:

- Drug Occupancy Studies
- Longitudinal Analysis
- Test-retest (stability) Analysis
- Full quantification with plasma/blood input / Reference region approaches

### Division of Laboratory Animal Resources (DLAR)

The Division of Laboratory Animal Resources (DLAR) at Stony Brook University is fully committed to the judicious, humane use of animals in research and teaching. The Division supports all SBU animal related research through the

provision of laboratory animal management and veterinary medical care and assures institutional compliance with all federal, state and local regulations and policies. DLAR is responsible for animal procurement; animal husbandry; veterinary care including health surveillance, preventative medicine programs, animal quarantine, personnel training and special technical support; and maintenance of animal facilities and equipment.

DLAR, with 26 administrative, veterinary and technical personnel, provides quality animal care for over 15 species of laboratory animals located in five facilities on campus. The School of Medicine, and the Departments of Anatomical Sciences, Biochemistry and Cell Biology, Ecology and Evolution, Neurobiology and Behavior, Marine Biology, Molecular Genetics and Microbiology, Physiology and Biophysics, Pharmacological Sciences, and Psychology, receive approximately \$36 million of funding for essential animals research annually.

Description of Animal Facilities: The on-campus DLAR facilities are located in the following four facilities. These facilities are administered centrally through the DLAR and directed and staffed as previously described.

- 1) Health Sciences Center (HSC) –This is the main and largest DLAR facility and is where the Director and her support staff are based. This 66,285 square foot, ground level facility has the following components: a dedicated loading dock; an animal receiving room; two veterinary treatment areas; four survival surgery suites with associated surgical scrub, animal prep and equipment prep areas; one non-survival surgical suite; a post-operative recovery room; a portable Xray machine and an automatic film processor; a large animal ultrasound machine; a rodent ultrasound machine, a rodent microCT machine, a portable C-arm fluoroscope; stationary fluoroscope and PET/CT/SPECT imagers, a 7.4T and a 9.4T rodent MRI imager, an IVIS bioluminescence imager, a Lietz Ortholuz microscope; a cesium irradiating unit for rodents; two dedicated biohazard autoclaves; two autoclaves dedicated to sterilizing clean supplies; 86 animal rooms for housing non-human primates, sheep, pigs, dogs, cats, rabbits, rodents, amphibians and birds; biohazard and quarantine rooms; laboratory areas for experimental procedures; a necropsy suite, with animal and radioactive animal carcass coolers; a walk-in cooler for storage of feed; two tunnel washers; one rack washer; equipment and supply storerooms; one classroom used for staff and investigator didactic training; a laundry area; 2 locker rooms; an employee lunch room and staff offices. In addition, DLAR space has been dedicated for shared mouse phenotyping equipment including a rodent ultrasound unit, GFP imaging unit, indirect calorimetry equipment, and a microCT unit.

- 2) Life Sciences Building – This is a 12,060 square foot, ground level facility located in the basement of the Life Science Building. It has a loading dock, 9 animal rooms, 5 laboratory areas, 1 store room, 1 surgical/experimental procedure room and 1 cagewash room containing a rack washer and a tunnel washer. Mice housed under maximum isolation conditions and conventionally housed mice, rats, amphibians and fish are located in this facility.
- 3) Computer Science Building – This 9,850 square foot animal facility is located on the ground floor. It is a single corridor facility with a loading dock, 7 animal rooms, 4 investigator laboratory/animal training areas, 1 storeroom, an autoclave and a cage/rack washer.
- 4) Psychology A – This 3,622 square foot, third floor facility has a key-locked, dedicated elevator off of the loading dock. There are investigator offices and laboratories that connect to the animal facility. The facility has 8 animal rooms, 2 rodent surgery suites, 1 necropsy room, 2 laboratories, 1 storeroom and 1 cage/rack washer and houses conventional rodents and pigeons.

There are two off campus facilities that houses vertebrate species. The Marine Science Division has a 7,244 square foot facility at Flax Pond that maintains large aquaria housing wild caught fish native to the Long Island Sound. Stony Brook University has also recently purchased the Southampton college campus and they have a Marine Sciences facility which is under the oversight of the Stony Brook University IACUC.

### **DNA Sequencing Facility**

#### **DNA Sequencing**

We offer DNA Sequencing service utilizing the Applied Biosystems 3730 DNA Analyzer using BigDye chemistry. Customer data is downloadable directly from our secure server. We have three sample drop off sites on campus for the convenience of our customers. Trouble shooting

#### **Custom Oligos**

Custom Oligos can be ordered from Eurofins Genomics through our portal and delivered to your lab. Benefits include lower per base cost and no shipping charges.

#### **Real-Time PCR Service**

The UDSF is currently equipped with an MJ Research DNA Engine Opticon 2, and Applied Biosystems 7300 Real-Time PCR System.

These systems combine the high sensitivity SyBr green based real-time PCR with the advantages of a 96-well format.

- Experimental design and data analysis help is available.
- Data analysis software available from the DNA Sequencing Core.
- Results are downloaded from our server.
- One-step or two-step RT-PCR
- A wide variety of technologies requiring dual-dye detection, like TaqMan, Molecular Beacons, Scorpion Probes and others can be run.

### **PCR Product Purification**

The DNA sequencing Core can now save you time and purify your PCR products and setup the sequencing reaction. Once you complete your PCR reactions you can run a gel to determine which clones to purify or you can submit the entire PCR reaction and we can run your reactions on the [QIAxcel System](#) and email you the results and you select the clones for purification. We will purify the PCR and assemble the sequencing reaction with your provided primer

### **Facility for Experimental Radiopharmaceutical Manufacturing (FERM)**

FERM is a comprehensive core for the synthesis and characterization of PET radiopharmaceuticals. We have fully trained staff and validated equipment for the synthesis of cGMP  $^{18}\text{F}$  radiolabeled pharmaceuticals.

Over 500  $^{18}\text{F}$  radiopharmaceuticals have been characterized in vivo and over 200 of these used in humans as probes of biological systems and have applications in oncology, cardiology, neurology, psychiatry and drug development (see NIH MICAD database at <http://www.ncbi.nlm.nih.gov/books/NBK5330/>).

PET radiopharmaceuticals are generally administered in pharmacologically inactive amounts and are non-toxic. PET tracers are designed to be specific for a defined transport or receptor system and hence enable the probing of basic biochemical processes in real time.



## Services provided

- Full cGMP manufacturing of clinical grade radiopharmaceutical in compliance with FDA and USP guidelines
- Assistance in obtaining local (RDRC) or federal (IND) approval
- Supports both preclinical and clinical PET imaging studies

## Instrumentation

At the center of the FERM laboratory is an ISO Class 7 clean room, which houses three ISO Class 5 hot cells. These hot cells provide a safe working environment to both protect the radiopharmaceutical from biological contamination and protect the operator from radiation.

Inside the hot cells are automated radiochemistry modules that perform the chemical synthesis and the final purification of the radiopharmaceutical. These radiochemistry modules are part of the triple containment system which retains all radioactivity in the facility during radiosynthesis. The units are under computer control for rapid and efficient manufacturing of consistent radiopharmaceutical products.

The FERM cGMP laboratory is equipped with two MIP 1100 hot cells and a Manuela dispensing hot cell with 3" of lead shielding, two TracerLab FXN pro synthesis modules for multistep nucleophilic fluorination reactions. These modules can accommodate two pot reactions and perform the final reformulation of the radiopharmaceutical in an isotonic form for human administration.

## Freezer Farm

The Freezer Farm is the newest core facility under the Office of Scientific affairs at the Renaissance School of Medicine. The Freezer Farm aims to provide safe and reliable dry storage at ultra-low temperatures for research samples. The Freezer Farm has eight -80°C permanent storage chambers for a total combined storage capacity of over 1.8 million samples.

Our Services:

The Freezer Farm is a great option for investigators with large sample collections that are not currently being used as part of an active project. The Freezer Farm ensures that Investigators will no longer have to worry about faulty freezers or power outages destroying their irreplaceable samples. There are numerous safety measures in place, which will ensure that no loss of temperature ever

affects the Freezer Farm. Storing samples in the Freezer Farm is also a great way to increase the available space in an investigator's own lab. Some investigators have large collections of samples which they are not currently using for research but which are valuable and may be needed in the future. Usually this would pose a problem for their future projects by limiting the amount of new samples, which could be collected. By transferring the samples into the Freezer Farm, investigators can free up space while knowing their samples are safe. The Freezer Farm offers peace of mind, increased space and opportunity for future research along with the storage of samples. All samples stored within the Freezer Farm are barcoded and their location in the Freezer is documented to make finding the samples in the future quick and easy.

#### Facilities and Safety Measures:

The permanent storage  $-80^{\circ}\text{C}$  chambers are situated within a  $-20^{\circ}\text{C}$  walk-in chamber. Manufactured by Bahnsen Environmental Systems, this set up allows for greater storage space at a much lower energy expenditure than traditional upright and chest freezers commonly used for sample storage.

There are extensive safety measures in place to ensure that no loss of temperature will affect the samples stored within the Freezer Farm. The measures in place are designed to account for equipment failure, power outages, and natural disasters. The temperature of the  $-20^{\circ}\text{C}$  walk-in environment and each of the  $-80^{\circ}\text{C}$  chambers are monitored on an Alerton system which will alarm in the event of a loss in temperature or door being left open for an excessive amount of time. In the event of an alarm, there are a number of individuals who will be contacted to assess the situation and ensure all samples are safe while the issue is being resolved.

The  $-80^{\circ}\text{C}$  chambers are powered from one of two  $-80^{\circ}\text{C}$  compressors. These compressors operate on a lead-lag system. Each compressor runs for twenty-four hours before switching over to the other one, this keeps the compressors exercised which will prolong the life of the equipment and ensure that both are in working order in the event that one compressor becomes unusable. In the event one of the compressors malfunctions, the other will take over and operate continuously until the damaged compressor can be repaired. In the event of a power outage, the Freezer Farm is hooked up to the hospital's emergency generator with the highest level of priority. In the extremely unlikely event, that both the hospital power and generator are non-functional there is a back-up liquid nitrogen infusion system, which can keep the  $-80^{\circ}\text{C}$  chambers at temperature for about 6 hours per tank. In the event that the liquid nitrogen will

be needed for an extended period, there is a system in place where a micro bulk truck with liquid nitrogen can be parked in the loading dock and hooked up to our Liquid Nitrogen infusion system to cool the Freezer Farm. In addition, due to the way the chambers are situated within the -20°C walk-in environment, as long as the doors are not opened the chambers will remain at temperature for 8 hours without power.

In addition to the safety measures against temperature fluctuations, the Freezer Farm is also strictly access controlled. A limited amount of people have access to the area and the doors are monitored by video to record anyone who enters the -20°C walk-in environment to access the -80°C chambers. We know that the samples being stored within the Freezer Farm are extremely valuable and irreplaceable so we have taken extensive measures in protecting them

### **Research Flow Cytometry**

The Research Flow Cytometry laboratory is a nonprofit joint venture between the School of Medicine and University Hospital. The Laboratory is part of the Clinical Immunology and is housed in University Hospital. The laboratory is equipped with a 2-laser Becton Dickinson FACSCalibur analyzer, a 4-laser Becton Dickinson LSRFortessa analyzer, and a 5-laser Becton Dickinson FACS Aria III cell sorter

### **Genomics Core Facility**

The Stony Brook University Genomics Core Facility, founded in 2000, aims to provide scientists with the tools required to maximize their research related to genetics/genomics. The Genomics Core serves researchers at Stony Brook as well as researchers at other institutions, with a number of genomic technologies and expertise. We offer Sanger DNA sequencing; genotyping; quantitative PCR analysis (including digital PCR); Microarray Analysis (Affymetrix and Agilent platforms) and Luminex X MAP technology for transcript detection/quantification and multiplex ELISA. The Genomics Core Facility is equipped with various systems for sample quality control (RNA integrity evaluation using capillary electrophoresis); DNA and RNA concentration measurement (using fluorescent and spectroscopic methods) and PCR optimization (gradient PCR, capillary electrophoresis to detect/quantify PCR products).

In addition to these traditional technologies, we offer pyrosequencing services. Pyrosequencing is a highly quantitative sequencing method that relies on the detection of light. It is used in a variety of applications including genotyping analysis, DNA methylation studies (measurement of methylation of individual CpG islands) and detection and accurate quantification of rare/mosaic mutations.

Using an individual approach to every customer, we consult on experiment design and controls, run the experiment and help with data analysis to meet client's needs.

#### Services Offered:

- Sanger DNA Sequencing  
Microarray Services (Gene Expression, miRNA using Affymetrix and Agilent platforms)
- Genotyping
- Quantitative real-time RT-PCR (TaqMan and SYBR green platforms)  
Digital PCR (QuantStudio 3D)  
Luminex bead technology (Bio-Plex 200 instrument)  
Pyrosequencing (PyroMark MD Pyrosequencer)  
QIAXcel System (Formerly known as eGene) automated capillary electrophoresis  
BioAnalyzer (capillary electrophoresis)
- NanoDrop spectrophotometer
- Qubit Fluorometer

#### **Molecular Cloning Services**

We design and create a molecules of DNA (plasmids) which have desired characteristics and can be used in different experiments. For instance: protein expression, gene knock out, protein localization, protein interaction and others.

#### **PET ex vivo Radiometabolite Laboratory (PERL)**

The PET ex vivo Radiometabolite Laboratory (PERL) is a facility of the Stony Brook University PET Research Core. It is dedicated to the ex vivo analysis of blood and other tissue samples to support preclinical and clinical PET imaging at Stony Brook University. The laboratory has comprehensive facilities for radioanalytical chemistry.

PERL is a fully equipped laboratory adjacent to the PET/MRI imaging facility which is able to:

- Perform basic blood chemistry on baseline blood samples
- Perform basic blood chemistry on radioactive blood samples
- Assay radioactivity in whole blood, serum or plasma
- Analyze whole blood samples for free radiopharmaceutical fraction
- Analyze serum samples for intact radiopharmaceutical and radiometabolites
- Analyze other tissue samples for radiopharmaceutical and radiometabolites

These analyses are essential for the correct modeling of radiopharmaceutical uptake and retention.

#### Instrumentation

- iSTAT blood analyzer for the determination of simple blood chemistry such as glucose hematocrit levels in whole blood.
- Two clinical centrifuges for the isolation of plasma or serum samples. Additional centrifuges are available for ultrafiltration and for the determination of free and bound radiopharmaceutical in whole blood samples.
- Perkin Elmer Wizard 2480 fully automatic gamma counter for the counting of radioactive samples. This detector has a 3" NaI(Tl) crystal and 1 ½" of lead shielding and is optimal for counting PET radioisotopes with minimal background and crosstalk.
- The laboratory is equipped with two Agilent HPLC systems with LabLogic PosiRam coincidence flow gamma counters. These systems offer high sensitivity detection of intact radiopharmaceuticals and radio metabolites in serums samples

#### **Research Histology Core Laboratory**

The Stony Brook Research Histology Core Lab (RHCL) provides clinical and basic science investigators with access to a wide range of histological procedures. The facility is managed by the Department of Pathology and offers gross processing of research tissue and cellular specimens, including fixation, paraffin embedding, sectioning and staining. Both routine hematoxylin and eosin (H&E) and advanced immunohistochemical (IHC) staining methods are offered. The Core staff and scientific director are available to assist in the development of research protocols that depend on the processing of tissue or other cellular specimens.

The laboratory is equipped with an embedding station, microtomes, and automated immunostainers. Additional specialized stains may be available upon request. Additional advanced services, including preparation of research tissue microarrays, laser capture microdissection, and other methods to support tissue-based research may be arranged following consultation with the Core Lab Director. Please contact the Core Lab in advance of submitting specimens to discuss methods for sample collection and tissue fixation.

### **Small-Animal PET Facility (Inveon/microPET)**

Stony Brook's small-animal PET imaging facility features the Siemens Inveon trimodality PET/SPECT/CT. The Inveon is a top-tier small-animal imaging platform located in a spacious lab in the main animal facility in the Health Sciences Center. All 3 modalities can be accessed in a sequential manner, without removing the animal from the bed, thus providing a high degree of image registration. The PET component features a large field of view (9.9 cm transaxial x 12.7 cm axial), high spatial resolution (1.5 mm FWHM), and high sensitivity (6.8% coincidence). The CT component provides anatomical information as well as attenuation correction for the PET. It also has fully developed data processing software with all necessary quantitative corrections and multiple image reconstruction options (FBP, OSEM, and MAP) as well as gating functions. Animal handling equipment includes isoflurane anesthesia machine, rectal temperature probe with closed-loop heating pad, MouseOX physiological monitoring (real-time display and recording of arterial oxygenation, heart and respiratory rates from a single clip-on probe). For quantitative radioactivity measurements of radiotracers/blood/plasma, the lab includes a Biodex Atomlab 500 dose calibrator integrated with a calibrated well counter as well as standard equipment for handling blood samples (pipettes, centrifuge ...). The facility is fully approved for radioactive animal research, and the tracer F-18 labeled fluorodeoxyglucose is regularly delivered from regional vendors