Core Competencies

- Discovery Technologies
  - Drug Design and Synthesis
  - Molecular Recognition
  - Membrane Biophysics
  - Membrane Protein Purification and Characterization
  - Nuclear Magnetic Resonance Spectroscopy
  - Mass Spectrometry
  - High Throughput Screening Technologies
  - High Field EPR
  - Molecular Modeling

- Drug Formulations and Delivery
  - Polymeric biomaterials
  - Drug delivery systems
  - Nanomedical technologies
  - Physiologically active compounds
  - Experimental pharmacology
  - Animal models (cancer, inflammation, CNS diseases)
  - ADME/PK *in vitro* and *in vivo* studies

- Biological Screening
  - Biomarker Discovery
  - Proteomics of Cell Lines
  - Pathway Analysis
  - *in vivo* Analysis
  - Tissue Analysis
  - Antimicrobials
  - Immunologic pathways

- Protein Analysis
  - Mass Spectrometry
  - Chromatography / Electrophoresis
  - Ultratrace Analysis
  - Toxicological Analysis
  - Carbohydrate Analysis

- Imaging
  - Proprietary technology for identifying new atypical antipsychotics
Proprietary technology for assessing toxicity and risk to chronic CNS drug exposure
Proprietary technology for imaging fully conscious animals for use in MR imaging
Custom chemical synthesis and radiolabeling for both the development of biomarkers for disease diagnosis and prospective studies on drug efficacy
Translational imaging using transgenic mice, inbred strains of rats and marmoset monkeys
Expertise in assessing pharmaco-kinetics and pharmaco-dynamics of novel therapies in vivo using nuclear imaging techniques
Established protocols in cardiac, oncology and CNS applications. Significant experience in performing large-scale imaging studies on xenograft models evaluating interaction of therapeutics across a variety of imaging agents. In vivo and ex vivo correlation of biomarkers such as cellular/molecular assays for proliferation, apoptosis, or histopathology.
Imaging animal models for drug discovery
Quick freeze deep etch electron microscopy w/immunogold labeling
Live cell imaging capacity with focal plane stabilized microscopes - NIKON TE2000E
Live toxicity screening
Custom bioreactors for live cell imaging
Phase imaging of transparent biological specimens such as embryos and stem cells
Multimodal imaging of preimplantation embryos to evaluate viability
Multimodal imaging to characterize non-melanoma skin cancers

- Cell Separation & Analysis
  - Microfluidic cell manipulation
  - BioMEMS device fabrication

- Physical Chemistry Capacity
  - Protein osmometry
  - Custom mechanochemical assay systems

Facilities and Resources

- AAALAC-Accredited Vivarium
  - Small animal facility (mice, rats, & rabbits)
  - IACUC approval
  - Availability of animal procedure suites and resources
  - Availability of a consulting veterinarian
  - Short course offerings

- Barnett Institute
  - LTQ-FT MS
  - LTQ-ETD MS
  - Synapt Ion Mobility MS
- MALDI TOF and TOF-TOF MS
- Q-TOF Atmospheric Pressure ESI MS
- ESI orthogonal extraction TOF-MS
- GC-MS
- Capillary Electrophoresis, and CE-MS
- 2D LC, UPLC, nanoLC
- HPLC, cap-HPLC, MDLC, FPLC
- 2D SDS-PAGE
- Automation Systems
- Computer Cluster
- 500MHz LC NMR with nanocoil

- Center for Drug Discovery
  - 700 MHz 4-channel NMR
  - 400MHz 4-channel wide-bore spectrometer
  - nano-LC- 4000 QTrap
  - TSQ quantum ultra triple quad MS
  - Electrothermal and autochem parallel synthesizers
  - 4800 MALDI TOF/TOF mass spectrometer.

- Center for High-rate Nano-Manufacturing
  - Microfluidics
  - Biosensor fabrication
  - Bio-electrical interface

- Center for Pharmaceutical Biotechnology and Nanomedicine
  - Beckman Optima TLX-100 bench top ultracentrifuge
  - Coulter Model N4+ submicron particle analyzer (Beckman Coulter)
  - Zeta potentiometer (Brookhaven Instruments)
  - 2 Hitachi HPLC systems with flow cell and auto sampler
  - Hitachi F-2000 fluorescence spectrophotometer
  - Beckman Gamma 5500B two-channel gamma-counter
  - Nikon Epifluorescence microscope
  - Flow cytometer calibur (Biosciences Inc.)

- Center for Translational Imaging
  - MollyQ SPECT camera
  - 7.0Tesla Brucker MRI
  - I-CIT DA transporter
  - HPLC
  - LC-MS
  - Accuscan Instruments Locomotor activity chambers and Versamax software (Columbus OH) - Febo lab NIH R01
  - Accuscan Instruments Active/Passive avoidance chamber with software (Columbus OH) - Febo lab Northeastern Startup
  - Plexon 16 channel Multiunit Acquisition Processor (MAP) for simultaneous single unit and field potential recordings in awake rats - Febo lab Northeastern startup
  - Sort client, Offline sorter, neuroexplorer software suite for neuronal recordings analysis - Febo lab startup
- Avisoft Bioacoustics Instrumentation and software suite for ultrasonic vocalization recordings, processing and analysis

- New England Inflammation and Tissue Protection Institute
  - Flow cytometry analyzer
  - ELISA luminoscan reader
  - Real time PCR machine
  - Mouse telemetry system
  - 18" x 24" hyperbaric chamber capable of administering oxygen and mixed gases under pressure

- Nanomaterials Instrumentation Facility
  - Hitachi S-4800 field emission scanning electron microscope with EDX
  - Amray AMR-100 scanning electron microscope
  - JEOL JEM-1000 transmission electron microscope
  - Agilent PicoPlus AFM/MFM/STM with liquid cell and electrochemical options
  - RHK Model UHV 350 AFM/STM
  - Nanonics NSOM/SPM-100 near-field, scanning optical microscope
  - Quantum Design MPMS XL-5 SQUID magnetometer
  - Olympus fluorescence microscopes

- Keck 3D Microscope Laboratory
  - Optical Quadrature Microscopy for full-field quantitative phase imaging
  - Two-Photon Fluorescence microscopy
  - Second-Harmonic Microscopy
  - Confocal Reflectance Microscopy
  - Confocal Fluorescence Microscopy
  - Differential Interference Contrast
  - Epi-Fluorescence Microscopy
  - Line Scanning FRAP

- 140 The Fenway Core Facilities
  - CompuCyte iCyte Laser Scanning Cytometer for Quantitative Analysis of cellular and tissue samples
  - Zeiss LSM700 confocal microscope
  - Roche LightCycler 480 for real time PCR
  - BioTek Synergy/HI microtiter plate reader for fluorescence/luminescence/polarization measurements
  - Thermo Nanodrop 2000C spectrophotometer
  - Expert knowledge in high content cellular analysis, molecular pathology based tissue analysis, Stereoscopic imaging and display