Beth Israel Deaconess Medical Center

HARVARD MEDICAL SCHOOL TEACHING HOSPITAL

NCI Designated Comprehensive Cancer Center

Dana-Farber/Harvard Cancer Center

# RESEARCH CORE EQUIPMENT

Beth Israel Deaconess Medical Center (BIDMC) maintains 18 institutional core research facilities, available to BIDMC investigators as well as to scientists from the Longwood Medical Area and beyond. The shared scientific services provided through the BIDMC Cores enable researchers to advance their work in an efficient and cost-effective manner, while at the same time encouraging and promoting cross-departmental collaborations among investigators.

For general information about the BIDMC Research Program, visit our site, **bidmc.org/research.**

## INSTITUTIONAL CORES

### Berenson-Allen Center for Noninvasive Brain Stimulation

For equipment inquiries contact: **Andrea Vatulas,** (617) 667-0203; **avatulas@bidmc.harvard.edu**

### Bioinformatics & Systems Biology Core

Contact: **Manoj K. Bhasin, PhD,** (617) 667-0009; **mbhasin@bidmc.harvard.edu**

**Equipment and Softwares:**

- Computational Resources: Main compute cluster provides access to ~900 CPU cores, 12TB of total RAM and the 600TB of storage space. For memory intensive tasks, two separate dedicated high-memory clusters (additional 156 CPU cores total) are available with 2x 128GB of usable RAM.
- Softwares: SEQUEST, GEXPAS, Ingenuity IPA, Mascot, MATLAB, ProteinPilot, R/Bioconductor, GeneGo, Cytoscape and >200 open source bioinformatics software packages for NGS, Proteomics and systems biology analysis.

**Workflows:**

- RNA-Seq analysis (mRNA expression/alternate splicing/isoforms/novel transcripts or gene/ Gene fusion/ detection of RNA editing)
- Non-coding- and Linc- RNA sequencing analysis and annotation
- Variant discovery/allele analysis (CNV/SNP)
- Analysis of epigenomics, ChIP-Seq and DNA Methylation data
- Comprehensive analysis of Microbiome sequencing data
- Single cell mRNA-Seq data analysis
- Integrated analysis of transcriptome, miRNA, epigenome and proteomics data
- Functional Genomics analysis of data including pathway and functional enrichment analysis
- Predictor development and biomarkers discovery
- Immunogenicity, epitopes and subcellular localization prediction

### Clinical Research Center

For equipment inquiries contact: **Michelle Beck,** (617) 667-4269; **mbeck1@bidmc.harvard.edu**

### Flow Cytometry Core

Contact: **Vasilis Toxavidis,** (617) 735-4191; **vtoxavid@bidmc.harvard.edu**

- BD FACSAria II 5 Laser
- BD FACScan
- BD LSR II 4 Laser
- BD LSR II 5 Laser
- Beckman Coulter MoFlo XDP
- Propel Avalon
- High Throughput Sampler/plate reader (BD HTS)
- Beckman Coulter Gallios
- Nexcelomt Celigo
- Miltenyi AutoMACS Magnetic Separator
- Luminex Magpix
- Beckman Coulter Astrios EQ

### Genomics and Proteomics Core

Contact: **Simon Dillon** (Proteomics), (617) 667-0884; **sdillon1@bidmc.harvard.edu**

**Towia Libermann** (Genomics), (617) 667-0760

- SOMAscan aptamer arrays for 1310 protein biomarker measurement
- Agilent SureScan Micraarray Scanner (model D)
- Affymetrix GeneChip Fluidics, ArrayStation and Scanner
- Affymetrix GeneTitan
- Dionex Ulitmate Plus nanoflow LC system with Probot
- Agilent 1100/1200 HPLC
- AB Sciex MALDI-TOF/TOF 4800Plus mass spectrometer
- BioTEK Synergy MX multimode microplate reader
- Biomek FX Robot
- StepOne Plus 96 well Real Time PCR System

### Glycomics Core

Contact: **Sylvain Lehoux, slehoux@bidmc.harvard.edu**

The Glycomics Core houses the following instrumentation:Anesthesia System

- Perkin Elmer contact Spot Array Printer
- Scienion non-contact Microarray Printer
- Molecular Devices ScanArray Pro microarray scanner
- Three Shimadzu HPLC systems with autosampler, fluorescence and UV detectors, and fraction collector
- Bruker UltraFlex II MADLI-TOF mass spectrometer
- Thermo Fusion Lumos LC-MS mass spectrometer
- Dionex ICS-3000 Ion Chromatography system

### Histology and Microscopy (Morphology) Core

Contact: **Susan J. Hagen,** (617) 667-5308; **shagen@bidmc.harvard.edu**

**Histology** (not available for independent usage)

- Leica TP1020 Tissue Processor
- Leica EG1160 Embedding Center Dispenser and Hot Plate
- Leica XL Autostainer
- Leica IP S Automated Slide Printer
- Leica CM 1850 Cryostat
- Leica RT2125 Rotary Microtomes (3)

**Electron Microscopy**

- Leica Ultracut E Ultramicrotomes (2)
- Leica Ultracut UCT Ultramicrotome with FC-S and Cryo Attachment
- JEM-1400 Transmission Electron Microscope with EM tomography capability
- Bal-Tec MED 020 Vacuum Evaporator
- Wohlwend High Pressure Freezer

**Confocal Microscopy**

- Zeiss 880 Upright Confocal System
- Zeiss LSM510 Meta Live-Cell Confocal System with a Life Imaging Services environmental enclosure and Brick and Cube environmental control devices
- Eppendorf FemtoJet Microinjector
- Zeiss Axioimager M1 microscope with color and B/W CCD cameras

**Instrumentation available via collaboration with the Harvard Center for Biological Imaging, Harvard Cambridge Campus**

- Zeiss Lightsheet Z1Microscope
- Zeiss ELYRA Super-resolution Microscope System (SIM and PALM)
- Zeiss 880 (inverted platform) System with Fast Airyscan
- Zeiss LSM 780 Confocal System
- Zeiss LSM 510 Confocal System
- Zeiss AxioScan Z1
- Zeiss PALM LSM System

**Image Processing**

- Dell T7500 High Capacity computers (2)

- Volocity Image Analysis software
- Image J software
- Serial EM software
- IMOD software
- Chimera Software

## Mass Spectrometry (phosphoproteomics, metabolomics and lipidomics) Core

Contact: **John Asara,** (617) 735-2651; **jasara@bidmc.harvard.edu**

- Thermo QExactive Plus Orbitrap with 2D-HPLC
- AB/SCIEX 5500 QTRAP triple quadrupole with 2D-UFLC
- Peak Nitrogen Generators
- Offline HPLC for fractionation
- Thermo Orbitrap Elite with EASY-nLC II
- Thermo QExactive HF Orbitrap with Agilent 1200 LC

## Molecular Medicine Core

Contact: **Victoria Petkova,** (617) 667-0603; **vpetkova@bidmc.harvard.edu**

- Illumina MiSeq Next Generation Sequencer
- Arcturus XT Laser Capture Microdissection System
- Covaris E220 Ultra-Sonicator
- Agilent 4200 TapeStation System
- 7000 Real-Time PCR System
- 7500 Fast Real-Time PCR System
- Li-Cor Odyssey System Infrared Imager

## Preclinical MRI, Hyperpolarizer & Seahorse Core

Contact: **Aaron Grant, PhD,** (617) 667-3265; **akgrant@bidmc.harvard.edu**

for Seahorse: **Pankaj Seth, PhD, pseth@bidmc.harvard.edu**

- Bruker Biospec 9.4 Tesla horizontal bore MRI scanner for imaging and spectroscopy in tissue samples, mice, rats, and other small animals
- Carbon-13 Hyperpolarizer for in vivo metabolic and functional imaging
- Gas anesthesia and animal monitoring facilities
- Seahorse XF24

## Preclinical Murine Pharmacogenetics Core

Contact: **John (Seán) Clohessy, PhD,** (617) 735-2147; **jclohess@bidmc.harvard.edu**

- QIAxcel: multicapillary electrophoresis system
- Vevo 2100 Ultrasound system

## SAIF - Small Animal Imaging Facility Core

Contact: **Meaghan Fox,** (617) 667-2508, **mfox2@bidmc.harvard.edu**

- PPET/CT
- SPECT/CT
- MRI
- Radioactive Chemistry HPLC Detection System
- Xenogen IVIS Bioluminescence
- Maestro Multispectral Fluorescence
- PAM Complete Portable Anesthesia Machines
- Tec 3 style Isoflurane Vaporizers
- Animal Blood lab instruments: TruPoint and Hemavet
- Cyclone Plus Autoradiography Phosphoimager
- Imaging Software: VivoQuant; Living Image; Maestro; Nucline

## Transgenic Core

For equipment inquiries contact: **Joel Lawitts, PhD,** (617) 632-0264; **jlawitts@bidmc.harvard.edu**

## X-ray Crystallography Core

Contact: **Gabriel Birrane,** (617) 667-0025; **crystallography@bidmc.harvard.edu**

The laboratory houses instrumentation consisting of:

- Micromax 007 X-ray generator
- R-Axis HTC detector
- Osmic VariMax HF confocal optics
- X-Stream 2000 cryogenic device for data collection at 100K
- Two Olympus microscopes are available for inspecting and photographing crystal trays
- Two incubators (4ºC - 25ºC) are available for crystallization experiments
- An Art Robbins Instruments CrysCam for plate imaging
- A TTP Labtech Mosquito Crystallization robot
- Malvern VP-ITC

## Zebrafish Core Facility

Contact: **Nadine Budrow,** (617) 667-8943; **nbudrow@bidmc.harvard.edu**

- 3000 tank Aquatic Habitats recirculating water system (1, 5, 10L tanks), including nursery area
- Stand-alone isolation/quarantine units
- Labconco steam scrubber dishwashers
- Narishige microinjectors
- Leica steromicroscopes
- Vevo800 high-frequency ultrasound machine
- Variable temperature incubators
- Vibration-stabilized microinjection stations
- YSI 5200 water quality monitors
- PT4 TGP monitors

# BIDMC DEPARTMENTAL CORES

## Blood Chemistry Core

Contact: **David Gallo, dgallo@bidmc.harvard.edu**

- IDEXX Catalyst Dx Chemistry Analyzer

## Center for Advanced Orthopaedic Studies (CAOS) µCT Core

Contact: **Daniel Brooks, djbrooks@bidmc.harvard.edu**

- Two Scanco µCT 40 scanners

## Center for Virology and Vaccine Research Flow Cytometry Core

Contact: **Michelle Lifton, MT(ASCP),** (617) 735-4512, **mlifton@bidmc.harvard.edu**

- BD FACSAria, 4 laser system capable of detecting up to 18 fluorescent markers. The instrument is housed in a biosafety cabinet in a BSL2+ laboratory allowing for sterile sorting of live cells into a variety of tubes and plates. A dedicated Aria operator assists with all sort designs and runs all samples.
- 2 BD LSRII, 4 laser systems capable of detecting up to 18 fluorescent markers. Dedicated staff train users and are available to run samples upon request.
- FACSCalibur, 2 laser system capable of detecting up to 4 fluorescent markers.
- ADVIA120 automated hematology instrument providing CBC with 5 part differential.

## Islet Isolation Core

Contact: **Vaja Chipashvili, MD,** (617) 735-2883; **vchipash@bidmc.harvard.edu**

**Microscopes:**

- LeicaStereo Zoom 7
- Olympus CK2

**Centrifuges:**

- SORVALL RC 3C Plus
- IEC Centra CL2

## Metabolism and Mitochondrial Research Core

Contact: **Xiaowen Liu, PhD,** (617) 667-0706; **xliu4@bidmc.harvard.edu**

Functional Metabolic Analysis in Live Cells

- XFe96 Extracellular Flux Analyzer: Simultaneously measure the two major energy pathways of the cell - mitochondrial respiration and glycolysis - in live cells, in real time.

Multiplexing biomarker and cytokine assays

- MESO QuickPlex SQ 120: a high performance, multiplexing imager for electrochemiluminescence immunoassays.

## Translational MRI Research Core

Contact: **Meaghan Fox,** (617) 667-2508; **mfox2@bidmc.harvard.edu**

- GE Discovery 3T MR750
- Visual and Auditory stimulus systems and response pads for fmri
- Medrad (Bayer) power injector for contrast administration
- Medrad (Bayer) physiologic monitors