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: **Peter Fried, pfried@bidmc.harvard.edu** or **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:

- NextSeq 550 System
- 10 Genomics Chromium Controller
- BioRad Single cell Counter
- 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 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: **John Tigges,** (617) 735-4191 **jtigges@bidmc.harvard.edu**

- BD FACSAria II 5 Laser
- CytoFLEX LX
- BD LSR II 5 Laser
- Beckman Coulter MoFlo XDP
- Propel Avalon
- High Throughput Sampler/plate reader (BD HTS)
- Beckman Coulter Gallios
- Nexcelom Celigo
- Miltenyi AutoMACS Magnetic Separator
- Beckman Coulter Astrios EQ

Glycomics Core

Contact: **Sylvain Lehoux,** (617) 667-6133 **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 EG1150H-C 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 Compact HPFO2 High Pressure Freezer

Confocal Microscopy

- Zeiss 880 Upright Confocal System
- Zeiss LSM 880 Live-Cell Confocal System with CO2, humidity and temperature control chamber
- 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 Z1 Microscope System
- Zeiss ELYRA Super-resolution Microscope System (SIM and PALM)
- Zeiss 880 (inverted platform) System with -Fast Airyscan
- Zeiss LSM 880 Confocal System with FLIM
- Zeiss LSM 880 NLO Multiphoton System
- Zeiss CellDiscoverer7 Live/High Content System
- Zeiss AxioScan Z1
- Zeiss PALM Laser Dissection 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 HF Orbitrap with EASY-nLCII nano-HPLC and Agilent 1200 HPLC
- Thermo QExactive Plus Orbitrap with Agilent 2D-HPLC
- AB/SCIEX 6500 QTRAP hybrid triple quadrupole with Shimadzu 2D-HPLC
- AB/SCIEX 5500 QTRAP triple quadrupole with 2D-UFLC
- Two Peak Nitrogen Generators
- Offline UV-HPLC for offline fractionation
- Thermo Orbitrap Elite with EASY-nLC II nano-LC
- Denator tissue heat stabilizer
- Andrew Alliance robot liquid handler
- Laminar and clean hoods for sample preparation

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 Core

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

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 Strob (Fox),** (617) 667-2508, **mfox2@bidmc.harvard.edu**

- PET/CT
- MRI
- Xenogen IVIS Bioluminescence
- Isoflurane Vaporizers
- Animal Blood lab instruments: TruPoint (blood gas), Hemavet (CBCs), and Ortho Vitros 350 (Chemistries)
- Imaging Software: VivoQuant; Living Image; Nucline

Seahorse Core

Contact: **Pankaj Seth, PhD**

pseth@bidmc.harvard.edu

- Seahorse XF24

Transgenic Core

Contact: **Joel Lawitts, PhD,** (617) 667-0391 **jlawitts@bidmc.harvard.edu**

- 3 micromanipulation stations consisting of: Nikon inverted microscope, Narishige micromanipulators, Narishige picoinjector, TMC anti-vibration table
- Nikon stereo microscopes
- Sutter pipet puller
- Narishige pipet grinder
- Narishige microforge
- BioCool controlled rate freezer

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

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BIDMC DEPARTMENTAL CORES

Animal Metabolic Physiology Core

Contact**: Kerry Wellenstein,** (617) 735-3330
kwellens@bidmc.harvard.edu

http://www.baderc.org/cores/metabolicCore.html

- DEXA scanner
- Coulter Counter
- Stereotaxic table
- CODA 8
- "wheel cage system"
- telemetry system
- Thermalert TH-5 thermometer
- CMA 401 Infusion pumps (from Harvard Apparatus)

Blood Chemistry Core

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

- IDEXX Catalyst Dx Chemistry Analyzer

Boston Nutrition Obesity Research Center (BNORC) Bioinformatics Core

Contact**: fungen.core@gmail.com**

- Qubit
- NextSeq500 sequencer
- Agilent Bioanalyzer

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.

Genomics and Proteomics Core

Contact: **Towia Libermann** (Director), (617) 667-0760
Xuesong Gu (Genomics)**,** (617) 667-0761
xgu@bidmc.harvard.edu
Simon Dillon (Proteomics)**,** (617) 667-0884
sdillon1@bidmc.harvard.edu

- SOMAscan aptamer arrays for 1305 protein biomarker measurement
- Comprehensive data analysis for SOMAscan and Affymetrix data
- SOMAscan biomarker validation by ELISA
- Agilent SureScan Micraarray Scanner (model D)
- Affymetrix GeneChip Fluidics, ArrayStation and Scanner
- Affymetrix GeneTitan
- Agilent 1100/1200 HPLC
- BioTEK Synergy MX multimode microplate reader
- StepOne Plus 96 well Real Time PCR System

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.

Non-Coding RNA Core Facility

Contact**: Jihoon Lim, jlim5@bidmc.harvard.edu**

- The NanoAssemblr Spark
- The NanoAssemblr Benchtop
- The NanoAssemblr Blaze
- DLS

Translational MRI Research Core

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

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

Beth Israel Deaconess Medical Center is home to a preeminent academic research program where scientific discoveries are helping to transform medical care. Key research areas include vascular biology, molecular imaging, transplantation, signal transduction, cancer biology, metabolic disease and obesity, neurobiology, AIDS, inflammation and cardiology/cardiac surgery. BIDMC consistently ranks in the top four in National Institutes of Health (NIH) funding among independent hospitals nationwide.