Beth Israel Deaconess Medical Center (BIDMC) maintains 18 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.

### Clinical Research Coordinator Core
Director: Janet Mullington, PhD, (617) 667-4269; jmulling@bidmc.harvard.edu
Manager: Michelle Beck, (617) 667-4269; mbeck1@bidmc.harvard.edu

BIDMC’s Clinical Research Coordinator Core provides investigators with access to administrative support for clinical trials, and can be of particular value for smaller trials that do not require a full-time coordinator. Specific services include assistance with IRB application materials and other IRB documentation; research participant recruitment and retention; assistance at study visits; case report form completion; research sample processing; and maintenance of source documentation.

### REDCap eData Collection Core
Director: Stephen Berry, (617) 754-8820; sberry@bidmc.harvard.edu
REDCap Specialist: Chris Botte, (617) 667-3758; edc@bidmc.harvard.edu

REDCap is a web based electronic data collection system that enables basic and clinical researchers, quality control staff, and administrators to create electronic data capture forms for simple to complex multi-arm studies or to utilize the web survey functionality to create quick simple surveys or multi-variable, repeated surveys that are compliant with relevant HIPAA and IS security guidelines. This service is provided at no cost to the user and is supported by the Harvard Catalyst grant. Please contact Chris Botte or visit the REDCap web site at: https://redcap.bidmc.harvard.edu/redcap/ to learn more.

### Flow Cytometry Core
Director: Peter Weller, MD, (617) 735-4110
Managers: John Tigges, (617) 735-4193; jttigges@bidmc.harvard.edu
Vasilis Toxavidis, (617) 735-4191; vtoxavid@bidmc.harvard.edu

Providing scientists with the ability to rapidly analyze, enumerate and physically separate cells suspended in fluid, the Flow Cytometry Core offers investigators the newest available software and machinery with both

### Biomedical Research Informatics
Director: Griffin Weber, MD, PhD, gweber@bidmc.harvard.edu

The Biomedical Research Informatics Core (BRIC) builds and manages web-based tools that enable query, analysis, and visualization of clinical data. These include Clinical Query 2 (CQ2), which provides access to BIDMC’s clinical data warehouse, and the Shared Research Information Network (SHRINE), which queries databases at other institutions. Many investigators use CQ2 or SHRINE for preliminary or exploratory research before working with the InSIGHT Core for more complex data analyses.

### Biostatistics

### Bioinformatics & Systems Biology Core
Director: Manoj K. Bhasin, PhD, (617) 667-0009; mbhasin@bidmc.harvard.edu

The mission of Bioinformatics and Systems Biology core is to provide expertise and infrastructure in designing and analyses of high-throughput OMICS data to answer underlying biological questions. The core supports state-of-the-art next-generation sequencing assays and analysis of data including, Whole Genome or Exome sequencing data, RNA-Seq, protein-nucleic acid interactions (ChIP-Seq) and global methylation. The core also supports analysis of proteomics, metabolomics and lipidomics data generated using Mass Spec, SomaScan, Luminex and Protein arrays. A special emphasis is made on implementing/developing systems biology frameworks and models for integrative analysis of genomic, epigenomics proteomic, metabolomic, imaging and clinical data to identifying key molecules driving pathophysiology. The core also provides analysis of single cell genomics data as well as proteomics data. Core specializes in providing analysis of cancer mutational panels to identify clinically important and druggable mutations.

### Clinical Research Core

### Flow Cytometry Core
Genomics and Proteomics Core
Center Director: Towia Libermann, PhD, (617) 667-0760; tliberma@bidmc.harvard.edu
Genomics: Towia Libermann, PhD
Proteomics: Simon Dillon, PhD, (617) 667-0884; sdillon1@bidmc.harvard.edu
The Genomics and Proteomics Core provides investigators with the instrumentation, expertise and services required to study all kinds of genomics and proteomics applications. The core is equipped with state-of-the-art technologies for transcription profiling, genotyping, real-time PCR, proteomics and bioinformatics. Affymetrix GeneChip high-throughput and whole genome arrays are available for human and most animal models. Next generation sequencing service is provided for RNA and DNA sequencing, methylation analysis, ChIP sequencing, metagenomics and targeted sequencing. Protein biomarkers in biological samples can be comparatively and quantitatively measured using SOMAscan aptamer arrays, the iTRAQ isobaric tags for relative and absolute quantification (iTRAQ), tandem mass spectrometry and mass spectrometry, as well as by ELISA and other protein-based technologies. To directly guide investigators in the implementation of more complex bioinformatics services, Bioinformatics and Statistical Analysis (BSA) is available. The core is capable of lipidomics profiling using new technology. The core also has capabilities for mass spectrometry using 13C and 15N sources.

Mass Spectrometry Core (phosphoproteomics, metabolomics and lipidomics)
Director: John Asara, PhD, (617) 735-2651; jasara@bidmc.harvard.edu
Research Associate: Min Yuan, (617) 735-2652; myuan@bidmc.harvard.edu
Sr. Research Associate: Susanne Breitkopf, PhD, (617) 735-2653; sbreitko@bidmc.harvard.edu
The Mass Spectrometry Core specializes in a targeted and non-targeted mass spectrometry based proteomics approach and metabolomics profiling by liquid chromatography/tandem mass spectrometry (LC-MS/MS). The Core’s specialty is analysis of immunopurified peptides, proteins, protein complexes, in particular mapping and quantifying phosphorylation and other post-translational modifications involved in cellular signaling. This information is then used to assemble functional protein networks. Using leading-edge mass spectrometry instrumentation including orbitraps, ion traps, and triple quadrupoles, the Core provides investigators with protein complex identification and quantification, identification and quantification of post-translational modifications, and quantitative profiling of endogenous cellular metabolites. The core is also capable of lipidomics profiling using new technology. The core also has capabilities for enzymatic full ion flux analysis with 13C and 15N sources.

Preclinical MRI, Hyperpolarizer & Seahorse Core
Director: Aaron Grant, (617) 667-3265; akggrant@bidmc.harvard.edu
Seahorse Scientific Advisor: Pankaj Seth, PhD, pseth@bidmc.harvard.edu
The Preclinical MRI Core facility at the Beth Israel Deaconess Medical Center offers instrumentation and expertise for a broad range of magnetic resonance imaging and spectroscopy applications for small animals, excised tissue and cell culture studies. We provide fee for service within BIDMC and to outside investigators. The hyperpolarized MRI core provides imaging of tissue function at the molecular level, principally directed toward studies of metabolism and perfusion. Through the use of carbon-13 labeled substrate molecules, hyperpolarized NMR can interrogate specific metabolic pathways non-invasively and in real time. Molecular substrate molecules including pyruvate, glutamine, succinate, fumarate and choline can be imaged with hyperpolarization. In addition, tracer molecules for studying tissue perfusion are available. The Seahorse facility within the Preclinical MRI Core is available to assess mitochondrial respiration and glycolysis through in vitro measurement of oxygen consumption rates and extracellular acidification rates. Staff will perform runs, provide training, offer initial advice for XF24 analyzer run and supply plates and cartridges on a fee for service basis.

Preclinical Murine Pharmacogenetics Core
Scientific Advisor: Pier Paolo Pandolfi, MD, PhD, (617) 735-2121; ppandolfi@bidmc.harvard.edu
Director: John (Seán) Clohessy, PhD, (617) 735-2147; jclohess@bidmc.harvard.edu
One of BIDMC’s newest Research Cores, the Preclinical Murine Pharmacogenetics Core (or Mouse Hospital as it is known) provides investigators with access to expertise in the design and implementation of preclinical trials to test new drugs, drug combinations and therapeutic modalities in a variety of models including standard xenograft, PDX and genetically engineered mouse models (GEMS) of human diseases. The Core offers the following services: Design and implementation of in vivo and in vitro assays to validate target specificity; collection of preclinical toxicity data for new agents or combinations of agents in GEMS; acquisition of preclinical efficacy evidence for novel drugs or drug combinations allowing for evaluation and documentation of therapeutic potential in GEMS; and facilitation in reaching the appropriate in vivo imaging facility when the efficacy of a treatment can be monitored by imaging analysis (such as micro-MRI, micro-PET, etc.).

Research Glassware Core
Manager: Tanya Santos, (617)975-8532; msantos3@bidmc.harvard.edu
The Glassware Core is primarily responsible for the cleaning and sterilization of reusable laboratory glassware, reagents, and equipment. This centralized service eliminates the need for individual investigators to maintain space, equipment and personnel in their own laboratories to handle the washing and sterilization.
The Longwood Small Animal Imaging Facility (LSAIF) provides investigators with a streamlined system for the transport, testing and imaging of small animals used in research studies. High-quality technologies, including computed tomography (CT), positron emission technology (PET), single-photon emission computed tomography (SPECT), bioluminescence imaging, fluorescence light imaging and magnetic resonance imaging (MRI) are available to scientists. The Core’s services extend to experimental design, advanced data analysis, image fusion resources and a satellite animal facility for longitudinal studies. In 2011, the Longwood SAIF expanded with the addition of the Animal Blood Testing Facility. Blood testing is a valuable tool that can reveal a wealth of data to investigators. Testing results measured against reference standards can show abnormalities, presence of disease, health of organs, and trends in experimental groups. The Blood Lab gives investigators access to a wide range of experimental tools, including: Blood Gas, Complete Blood Count (CBC), and Lactate for virtually any small or large animal. For more information visit www.LongwoodSAIF.org.

**Blood Chemistry Core**

**Department:** Surgery

**Director:** Leo Otterbein, PhD, lotterbe@bidmc.harvard.edu

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

Hematologic analyses specifically designed to help laboratory animal and human researchers generate accurate, reliable, quality results using a small sample volume. Wide spectrum of organ specific panels. Capable of measuring blood, plasma, serum, culture media, cerebrospinal fluid, and urine. Contact David Gallo for more information and pricing.

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

**Department:** Orthopaedic Surgery

**Manager:** Daniel Brooks, dbrooks@bidmc.harvard.edu

The CAOS µCT core provides high resolution 3D imaging of ex vivo specimens. Our main service is imaging of rodent bones for measuring bone microarchitecture and morphology. Additionally, we can image other types of specimens up to 36 mm in diameter and 80mm in length with voxel sizes as small as 6 µm. We are available for consultation both before and after the completion or your project.

**Center for Virology and Vaccine Research Flow Cytometry Core**

**Department:** Medicine, CVVR

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

**Cell Sort Contact:** Mary Laughridge, (617)735-4515; mlaughri@bidmc.harvard.edu

Flow Cytometry Tech: George Tweet, (617) 735-4612; gttweet@bidmc.harvard.edu

The Center for Virology and Vaccine Research Flow Cytometry Core offers sterile cell sorting and acquisition specifically for sorting live, unfixed and infectious human cells as well as dedicated staff for assistance with instrument operation, data analysis, and panel development.

**Glycomics Core Summary**

**Department:** Surgery

**Scientific Advisor:** Richard Cummings, PhD, rcummin1@bidmc.harvard.edu

**Manager:** Sylvain Lehoux, PhD, slehoux@bidmc.harvard.edu

The Glycomics Core is the most recent addition to the BIDMC Core facilities. The Glycomics Core provides services, instrumentation, and expertise in glycomics to BIDMC research groups, affiliated and non-affiliated institutions, and corporate companies. Currently, the Glycomics Core offers glycan microarray analysis on 9 different Defined and Shotgun glycan arrays; N- and O-glycan Mass Spectrometry profiling and analysis for individual glycoproteins, sera, cells, or tissues; training; distribution of specific reagents. More services including glycoproteomics approaches, detailed glycan sequencing, and customized production of glycan microarrays will also be available in the near future.

**InSIGHT (Integration of Standard Information Gathered using Healthcare Technology) Core**

**Department:** Healthcare Quality

**Manager:** Karla Pollick, (617) 667-7157; kpollick@bidmc.harvard.edu

Technical Director: Larry Markson, MD, (617) 754-8031; lmarkson@bidmc.harvard.edu

The InSIGHT Core helps researchers and quality improvement teams use the vast array of data available in BIDMC’s clinical data repositories. We help you leverage these data to answer important questions, using tools of traditional clinical epidemiology and health services research. Services range from supplementing data in traditional clinical research (e.g. pulling admission laboratory test results for every patient in a cohort you have already collected) to building complete, high-complexity, large electronic cohorts for complex analyses.

**Islet Isolation Core**

**Department:** Medicine, Transplant Immunology

**Director:** Maria Koulimanda, PhD; mkoulim@bidmc.harvard.edu

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

The Islet Isolation Core provides Islets of Langerhans to investigators in the Boston area and beyond. This leaves the investigator to concentrate on experiments rather than the complexity of islet isolation.

- The islet isolation from mice, rats, porcine and non-human primates.
- Most commercially available animals can be used.
- Can also perform islet isolations on healthy external animals.
- Isolated islets can be picked up at our facility, sent via courier, or shipped overnight via FedEx.
PERFUSE Core

Department: Cardiovascular Medicine
Chairman: Michael Gibson, MD, (617) 975-9950
sjaminet@bidmc.harvard.edu
Program Director: Meghan Leitao, mleitao@bidmc.harvard.edu

Imaging Core Laboratory: PERFUSE functions as an angiographic, ECG/EGM, coronary MRI core laboratory for many clinical trials. We perform quantitative and qualitative analysis on defined physiologic variables derived from the specified patient population of each trial.

Global Principal Investigator/Study Chairman of Trial: Dr. Gibson serves as the overall trial Principal Investigator for multi-center, international clinical trials. He leads the trial interacting with the sponsor, lead country investigators, local site investigators, DSMB and other trial personnel.

Clinical Event Adjudication Committee (CEC): PERFUSE serves as the CEC adjudicating protocol specified, clinical site reported клиническая база

generated, adverse clinical events or presenting diagnoses in a clinical trial.

Data Safety Monitoring Board (DSMB): Dr. Gibson serves as both an organizer and or a member to assemble an independent DSMB for specific clinical trials. A DSMB reviews safety and tolerability data through the period of the primary endpoint for all patients receiving any amount of study drug.

Steering/Executive Committee Member: Dr. Gibson provides academic and scientific leadership via expert opinion on study planning and conduct, including protocol design and development, research strategy, development of statistical analysis plan, reviewing trial process and clinical data, oversee the writing of the final trial results for publication.

Statistical Support: PERFUSE provides statistical support for clinical trials including programming and analysis

Translational MRI Research Core

Department: Radiology
Director: David Alsop, PhD, dalsop@bidmc.harvard.edu
Manager: Meaghan Fox, (617) 667-2508; mfox2@bidmc.harvard.edu
MRI Technologist: Fotini Kourtelidis, fkourtel@bidmc.harvard.edu

The Translational MRI Core of the BIDMC Department of Radiology provides state-of-the-art MRI capabilities for imaging human subjects and potentially large animals as part of research studies. The facility operates a research dedicated 3 Tesla system and can provide access to a 1.5 Tesla system. In addition to commercial tools for clinical imaging, customized software and protocols for applications including functional and structural brain imaging, abdominal perfusion and diffusion, muscle functional imaging and spectroscopy are available to users. Additional customization of applications either by the Core staff or in collaboration with the Division of MRI Research is encouraged.