Beth Israel Deaconess Medical Center

HARVARD MEDICAL SCHOOL TEACHING HOSPITAL

Clinical and Research Fellowship Training Programs in Cardiovascular Medicine

CardioVascular Institute

2021–2022

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

Cardiovascular Institute at BIDMC

Clinical and Research Fellowship Training Programs in Cardiovascular Medicine

Inside

Letters from Leadership

Looking back at recent advances in the field of cardiovascular medicine, the developments of the past two decades are nothing short of miraculous. Driven by sophisticated new technologies and physiological breakthroughs, cardiovascular care has developed and has been refined at an unprecedented pace. Furthermore, emerging investigations at the molecular level – from the sequencing of the human genome to the widespread use of proteomics – are helping to illuminate the roots of heart disease, pointing us in new directions as we continue to develop improved treatments and diagnostics.

As a major teaching hospital of Harvard Medical School, Beth Israel Deaconess Medical Center (BIDMC) offers cardiovascular fellows a unique set of resources and an ideal environment in which to take advantage of this exciting era in cardiac medicine. Known for its exemplary patient care, safety and quality initiatives, BIDMC is also a national and international leader in biomedical research and in medical education.

The carefully structured clinical curriculum of our fellowship program is strengthened by a highly accomplished faculty, committed to helping trainees achieve their maximum potential. Our program's strong investment in multidisciplinary training and research provides fellows with a solid foundation on which to build their futures and it is our objective to continue this tradition of excellence by attracting promising men and women to careers in academic cardiology.

Robert E. Gerszten, MD
Chief, Division of Cardiovascular Medicine,
Beth Israel Deaconess Medical Center

Letters from Leadership

On behalf of the faculty of BIDMC Cardiovascular Medicine Division, I welcome your interest in our Clinical and Research Fellowship Training Program in Cardiovascular Disease.

Long ranked among the nation's premier programs in graduate medical education, BIDMC's Cardiovascular Disease Fellowship Program has produced leaders in both clinical and research arenas. Our breadth of training opportunities extends from advanced ACGME fellowships in cardiac electrophysiology and interventional cardiology to in-depth experience in basic and translational research and advanced noninvasive cardiac imaging.

Combining clinical and research experience over three years, the Cardiovascular Disease Medicine Fellowship includes intensive training in patient care. Our commitment to academic and scholarly activity is equally as strong; fellows are paired with research and clinical mentors early in their training experience so that they may be aided in developing productive and satisfying careers.

BIDMC's leading-edge resources and facilities provide trainees with a rich patient care experience. Our teaching affiliation with Harvard Medical School and commitment to medical student, house staff, and fellow education affords numerous opportunities for personal and intellectual growth.

We look forward to introducing you to the BIDMC Cardiovascular Division family.

Joseph P. Kannam, MD, FAHA
Director, Cardiovascular Fellowship Program,
Beth Israel Deaconess Medical Center

Assistant Professor of Medicine,
Harvard Medical School

Division of Cardiovascular Medicine Directors
Beth Israel Deaconess Medical Center

2021-2022

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Associate Chief and Director of Clinical Cardiology
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Cardiac Electrophysiology Fellowship

Training Program, Director
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Critical Care

Director, Cardiac Care Unit
Dhruv Kazi, MD

Electrophysiology

Director, ECG and Arrhythmia Monitoring Labs
Jonathan Waks, MD

Director, Clinical Electrophysiology Laboratory
Andre D'Avila, MD

Director, Pacemaker and Device Services and Lead Management
Peter Zimetbaum, MD

Heart Failure

Interim Directors, LVAD Program
E. Wilson Grandin, MD, MPH, MEd
Marwa Sabe, MD

Advanced Heart Failure and Mechanical Circulatory Support

Director
A. Reshad Garan, MD, MS

Director, Ventricular Assist Device Program and Associate Section Director
Marwa Sabe, MD, MPH

Director, ECMO and MCS
E. Wilson Grandin, MD, MPH, MEd

Director, Transplant Services
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Cardio-Oncology

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Sports Cardiology/CPET

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Training Program, Director
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Division of Cardiovascular Medicine Directors
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Cardiovascular Genetics

Director
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Director, Structural Heart Disease Program
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Section Chief, Noninvasive Cardiac Imaging & Testing
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Director, Nuclear Cardiology and Medical Director, Cardiac CT Program
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Outpatient Cardiology

Director, Ambulatory Cardiology and
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Director, Core Laboratory at Perfuse
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Director, Cardiology Physiology Core
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Scientific Director, Cardiac MR Center
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Director, Cardiac Critical Care Unit
Dhruv Kazi, MD, MSc, MS

About Beth Israel Deaconess Medical Center

The Division of Cardiovascular Medicine at Beth Israel Deaconess Medical Center (BIDMC) has a long and distinguished history as a leader in the development of cardiovascular treatments, in research and scientific discovery, and in training future generations of cardiologists.

Created in 1996 through the merger of the former Beth Israel Hospital and the former New England Deaconess Hospital, BIDMC maintains a long-standing reputation for compassionate patient care coupled with the most advanced patient therapies. With innovations dating back to Beth Israel's founding in 1916 and Deaconess's creation in 1896, BIDMC has truly been at the forefront of cardiovascular medicine. Among the historical medical milestones:

- The first implantable cardiac pacemaker was developed by Dr. Paul Zoll at Beth Israel Hospital in 1952.
- Beth Israel's Dr. Herrman Blumgart was the first investigator to use radioisotopes in studying human cardiac physiology, paving the way for modern day nuclear cardiology.

Dr. Paul Zoll

- Beth Israel cardiologist Dr. Louis Wolff was a member of the team that first described the clinical manifestations of what has become known as Wolff-Parkinson-White Syndrome.
- In our more recent history, the Deaconess Hospital established a record of excellence in developing its two catheterization laboratories in 1965, as well as creating one of Boston's first coronary intensive care units.
- Carrying on in this tradition, Dr. Mark E. Josephson established the first Arrhythmia Institute in Boston in 1992.
- In 1995, the nation's 2nd dedicated Cardiac Magnetic Resonance (CMR) Center was established at Beth Israel Hospital.

Today, the 649-bed medical center is a tertiary/quaternary teaching hospital of Harvard Medical School, serving more than half a million patients each year. BIDMC's biomedical research program consistently ranks among the top three in National Institutes of Health funding nationwide. Furthermore, the nation's oldest clinical research laboratory, the Harvard-Thorndike Laboratory, has been located at BIDMC since 1973.

Fellowship Overview

Two 30 bed floors comprise the inpatient cardiology space with 2 housestaff teams and one fellow covering the advanced heart failure service and 2 housestaff teams and one fellow covering the general cardiology service. Michael Gavin, MD, MPH and Marwa Sabe, MD, MPH share the medical director responsibilities for the two units.

The two-year clinical core rotation, divided into 1/2 month rotations, breaks down as follows:

- 8-9 months in non-laboratory clinical practice activities (cardiac consultation, inpatient cardiac care, coronary care unit, advanced heart failure management, congenital heart disease)
- 4 months in the cardiac catheterization laboratory
- 4-5 months of noninvasive cardiac imaging (transthoracic echocardiography (TTE), nuclear cardiology techniques, with exposure to cardiovascular magnetic resonance (CMR) and cardiac computed tomography (CCT))
- 1 month of electrocardiography, stress testing, ambulatory electrocardiographic (ECG) monitoring
- 2 months of arrhythmia and permanent pacemaker management and electrophysiology
- 1 month of adult congenital heart disease (BACH, Children's Hospital)
- 2 weeks of advanced congestive heart failure management (Tufts Medical Center)
- 16 weeks of elective time
- 2 months vacation
- A 3-year ambulatory care experience that includes a half day per week during the training program

Clinical Services Training

Clinical Services training includes comprehensive experience in the Cardiac Intermediate Care Unit (CICU), Coronary Care Unit (CCU), the Consult Service, the Emergency Ward, and Outpatient Cardiology.

Cardiac Intermediate Care Unit (Zoll)

Two 30 bed floors comprise the inpatient cardiology space with 2 housestaff teams and one fellow covering the advanced heart failure service and 2 housestaff teams and one fellow covering the general cardiology service. **Michael Gavin, MD, MPH** and **Marwa Sabe, MD, MPH** share the medical director responsibilities for the two units. The cardiac fellow admits and follows all service patients of the attending cardiologist during a one-month period. He/she supervises and advises the interns and general medicine residents. The fellow makes rounds with the attending cardiologist and is present during clinical conferences when he/she may present relevant literature reviews. During this rotation, the fellow obtains experience in the management of a variety of cardiac patients including infarct patients, and those with valvular heart disease, pericardial disease, congestive heart failure and electrophysiologic disorders.

Cardiac Care Unit

The CCU specializes in the management of patients with acute cardiovascular disorders. Under the leadership of our medical director **Dr. Dhruv Kazi** and our nursing director Pamela Browall, the CCU admits more than 1500 patients a year. CCU rooms are equipped with bedside hemodynamic and arrhythmia monitoring, portable fluoroscopy, capacity for mechanical circulatory support including balloon pumps, the full range of Impella devices, and left ventricular assist devices, therapeutic hypothermia, and emergent bedside procedures. Our CCU is comprised of three interns, three second-or third-year internal medicine residents, a cardiology fellow, a dedicated critical care pharmacist, respiratory therapists, highly experienced CCU nurses, and the CCU attending. The teams are responsible for management decisions, as well as any required diagnostic and therapeutic procedures. A structured cardiac critical care curriculum for the house staff was launched in 2019; this includes case-based lectures jointly delivered by the CCU fellow and attending. Fellows have 4 to 6 weeks of the CCU rotation in the first year, and 0 to 2 weeks in the second year.

In addition to providing intensive care for the cardiac patient, the CCU is also an active center of clinical cardiovascular research. Ongoing investigations include the evaluation of novel drugs and devices for critically ill patients as well as medical care delivery strategies.

The CCU will eventually expand to a 15-bed unit alongside a similarly sized cardiothoracic surgical ICU in BIDMC's new inpatient building.

Inpatient Cardiology Consult Service

In this experience, requests for inpatient cardiac consultation come from all departments and divisions of the medical center. The consultations are evaluated by the fellow who later presents them to the attending physician; he/she then reviews the patient history and physical exam results and joins in a consultative opinion. Cases are then followed by the fellow and attending until specialized cardiac opinion is no longer necessary.

Carl Shapiro Ambulatory Clinical Center

The trainee meets for one session every week in the clinic of his/her mentor. The trainee interviews and examines patients, arrives at a diagnosis, and proposes appropriate studies and therapeutic programs. The case is then reviewed with the senior clinician, who checks the salient features of the history and physical exam and the suggested treatment. The mentor then reviews the general knowledge of the issues involved and suggests appropriate reading and management. The fellow dictates a letter/note to the referring physician. This rotation continues throughout the entire duration of the training program.

Emergency Department

The fellows on the clinical cardiology rotation provide consultation to the ED staff for problems in general cardiology and for evaluation of patients with acute illness including acute myocardial infarction, cardiac tamponade and ventricular tachycardia.

During each of the clinical rotations, the cardiology fellow supervises Harvard Medical School and other national and international medical students as well as BIDMC interns and residents who are taking electives or assigned rotations. The fellow reviews relevant clinical observations and also provides appropriate reviews of the literature and didactic instruction. Fellows spend approximately six months of their first year and two-three months of their second year on these services.

Advanced Heart Failure

Under the direction of **Dr. Reshad Garan,** advanced heart failure encompasses the rapidly growing subspecialty involved with managing patients with refractory (AHA/ACC Stage D) heart failure. In their second year, fellows rotate two blocks on the heart failure service. The rotation fellow is responsible for rounding on and managing the inpatient heart failure service, supervising and teaching residents. Focus is directed toward high quality care, evidence-based management, and developing effective care transitions at discharge. Patients on the inpatient service include decompensated chronic heart failure patients, de novo cardiomyopathies, refractory heart failure patients undergoing evaluation for transplant and/or ventricular assist device support, post-transplant patients with rejection or other complications, and patients on extracorporeal life support (veno-arterial, veno-venous ECMO). Fellows will actively participate in the management of straight-forward heart failure admissions as well as advanced cases and those patients on mechanical support, durable and percutaneous. Fellows will be expected to round on post-operative durable LVAD and ECMO patients in the cardiac surgical ICU. Weekly conferences include (1) an academic conference that will either be a lecture, case discussion, heart failure M&M, or research discussion; (2) clinical conference where we discuss all inpatient and outpatient LVAD, pre-transplant and post-transplant patients. Fellows may optionally attend LVAD implant surgeries, LVAD outpatient clinic, post-transplant clinic and regular heart failure outpatient clinic.

Cardiac Electrophysiology and Arrhythmia Service

The Harvard-Thorndike Electrophysiology Institute and Arrhythmia Service at BIDMC, founded by Mark. E. Josephson is internationally recognized as a leader in the diagnosis and treatment of cardiac arrhythmias. The electrophysiology section has authored multiple textbooks in this field, that form an integral part of the curriculum for general clinical fellows, as well as the advanced program in clinical EP.

During the general clinical cardiology training all fellows rotate through the EP service for at least 2 months. They participate as integral members of the inpatient arrhythmia/EP consult team, and are encouraged to come to the EP lab to view and participate in procedures.

The Cardiac Electrophysiology Fellowship program is designed to prepare the trainee for a career in clinical cardiac electrophysiology

at either an academic institution or a tertiary care medical center. Our program places a primary emphasis on a thorough understanding of the mechanisms of arrhythmias and an evidenced based approach to clinical management. Training includes a focus on ablation techniques for complex atrial and ventricular tachyarrhythmias, lead management procedures including lead extraction and the care of patients with advanced heart failure who require device therapy. Advanced electrophysiology training requires a minimum of 2 years of training to achieve proficiency. This expertise can only be obtained via additional training in an academic training program that has a high volume of patients and faculty who have expertise and commitment to teaching. Trainees are exposed to a wide variety of patient populations with a multitude of cardiac diseases. In order to further enhance the training of fellows wishing to pursue an academic career, a 4-year combined clinical/research EP fellowship is offered. This program, fully funded, incorporates 2 years of research in the experimental EP lab plus 2 years of standard clinical EP training.

The BIDMC EP curriculum spans the entire range of electrophysiology topics, ranging from molecular and cellular electrophysiology, clinical laboratory-based EP, to population-based arrhythmia work, including genetics topics. The fundamentals underlying our program are to develop an understanding of mechanisms responsible for arrhythmias, to enable a rational physiologic approach to management of patients. The material is taught by world-recognized experts and leaders. It includes instruction in anatomy, using autopsy specimens, to provide the trainees with a unique perspective to improve their understanding of cardiac structure, as it relates to ablation and device implantation. Fellows learn how to evaluate and manage patients with cardiac arrhythmias, appropriate use and performance of diagnostic tests for arrhythmias, (noninvasive and invasive electrophysiologic studies), all types of catheter ablation and mapping. The curriculum addresses appropriate choice of implantable pacemakers, defibrillators, and recording devices, implantation techniques, and long-term management of implanted cardiac electrical devices. We conduct didactic teaching sessions Monday through Friday throughout the year. All fellows are required to participate actively in research, that ranges from fundamental (molecular and cellular) research to clinical research projects. Fellows actively participate in teaching of medical students, medical residents and clinical cardiology fellows. Specific training goals of the advanced EP fellowship include:

- Proficiency in catheter ablation of SVT, AFIB, atrial flutter and VT (endocardial and epicardial approaches), left atrial occlusion devices
- Proficiency in implantable cardioverter-defibrillator (including subcutaneous system), permanent pacemaker (including leadless technology) and CRT insertion
- Proficiency in lead management including lead extraction techniques
- Proficiency in consultative electrophysiology with in-depth understanding of AFIB management including anti-arrhythmic therapy and anticoagulation options.
- Proficiency in non-invasive electrophysiology including advanced ECG analysis techniques, cardioversion and clinical electrocardiography.
- Proficiency in the out-patient management of arrhythmias with a focus on diagnosis of dysrhythmias using mobile out-patient cardiac telemetry, Holter monitoring, implantable loop recorders.
- Proficiency in remote device monitoring using cloud-based platforms (CareLink, Latitude, Merlin).

The Electrophysiology fellowship program is directed by **Dr. Patricia Tung** and the electrophysiology arrhythmia service is directed by **Dr. Andre D'Avila.**

Interventional Cardiology Laboratories

The Cardiac Catheterization Laboratories of Beth Israel Deaconess Medical Center are among the busiest in the world, performing more than 3,500 procedures annually. Interventional faculty are active in a number of clinical trials in new stent and valve technology and pharmacologic therapies. **Dr. Duane Pinto,** Chief of the Interventional Cardiology Section coordinates the operation of the laboratories, which include five all-digital laboratories for cardiac and peripheral vascular procedures.

Training in Cardiac Catheterization

During the first and second year of fellowship training each cardiac fellow generally spends about four months in the Cardiac Catheterization Laboratory. Emphasizing their pivotal role, a first or second year fellow is scrubbed in on all catheterization cases including emergency and "off-hour" cases. Each fellow performs between 300 and 400 procedures during that time, under the direct supervision of a senior attending. Both radial and femoral access approaches are commonly employed.

The fellow is responsible for pre- and post-procedure evaluation of the patient, and for preparation of the catheterization report. Fellows also participate in specialized procedures such as intra-aortic balloon pump placement, pericardiocentesis, ethanol septal ablation, percutaneous PFO/ASD closure and hemodynamic assessment with inhaled nitric oxide for patients with pulmonary hypertension and/or congenital heart disease. For those interested in advanced training in Interventional Cardiology, participation in research projects during the second year of fellowship is encouraged. A subgroup of fellows (chosen at the end of their second fellowship year for invasive skills and research potential) will have the opportunity to acquire advanced training in interventional cardiology during a third and fourth year of training.

Advanced Training in Interventional Cardiology

The Interventional Cardiology Fellowship is an ACGME-certified program directed by **Dr. Eric Osborn** that offers comprehensive training in interventional cardiology techniques and patient care. This intensive combined clinical and research program focuses on all aspects related to percutaneous coronary intervention (PCI) procedures. In addition, it provides fellows with early exposure to "leading edge" technologies including novel stent technology, complex high-risk (CHIP) and chronic total occlusion (CTO) procedures, mechanical circulatory support devices (e.g. IABP, Impella, ECMO), and structural heart interventions including percutaneous valve technology. A substantial involvement in clinical trials also introduces fellows to the principles and practices of clinical trial research and management. At completion, each fellow will have performed approximately 300 interventional procedures, and will be eligible for the certification examination in interventional cardiology given by the American Board of Internal Medicine.

Select advanced interventional fellows may also pursue training in vascular intervention under the direction of **Dr. Eric Secemsky,** as part of a joint collaboration with vascular surgery. This program provides dedicated training in the evaluation and treatment of peripheral vascular disease, predominately arterial intervention but also including caval interruption, venography, mesenteric intervention, acute limb management, and catheter-based pulmonary artery embolectomy. Fellows completing vascular intervention training will be eligible for the certification examination in endovascular intervention given by the American Board of Vascular Medicine.

Hybrid Operating Room

Beth Israel Deaconess Medical Center's advanced hybrid OR combines cardiac catheterization, surgery and electrophysiology (EP) capabilities in a single space, allowing maximum flexibility and speed in the treatment of patients with complex heart conditions. The hybrid OR brings together highly advanced equipment, skilled surgeons, cardiologists and anesthesiologists and specialized nursing and technologist staff to perform complex cases that involve two or more major services. TAVR procedures and laser lead extractions are performed in this suite. The obvious advantage is a matter of time and space, eliminating the need to move a patient to a different room, for example, to accommodate surgery after the placement of a stent or the treatment of an arrhythmia.

Structural Heart Disease Fellowship Training Program

The Structural Heart Disease Fellowship Training Program started at BIDMC on July 1, 2014. The program is adapted from the model developed by the ACC/SCAI/AHA Task Force. Over the last decade, structural heart disease (SHD) interventions have become an integral part of the interventional cardiology cognitive and procedural skill sets, particularly with the emergency of transcatheter aortic valve replacement (TAVR), pulmonic valve implantation (TPVI), mitral valve repair (MitraClip), and shunt closure procedures. Accordingly, there is an increasing need for specialized interventional cardiologists who are skilled in structural heart disease.

Listed are a few necessary skills to acquire proficiency in structural heart disease interventions, including research.

- To understand the effectiveness and limitations of non-coronary cardiovascular interventional procedures to select patients and procedure types appropriately.
- Define the cognitive knowledge base required for the field that includes a Core Curriculum in structural cardiac interventions.
- To achieve the appropriate cognitive knowledge and technical skills needed to perform interventional cardiovascular procedures with emphasis on procedural performance, patient selection, pre- and post-adjunctive strategies, and complication management.
- To foster an attitude of life-long learning and critical thinking skills needed to gain from experience and incorporate new developments.
- To understand and commit to quality assessment and improvement in procedure performance.

Noninvasive Cardiac Imaging and Testing Laboratories

Dr. Warren Manning is the section chief of the Noninvasive Cardiac Imaging and Testing Laboratories which provide diagnostic services for both inpatients and outpatients. Assignment to the non-invasive imaging block includes assigned time in the echocardiography laboratory with exposure to nuclear cardiology, cardiac computed tomography (CT), and cardiovascular magnetic resonance (CMR). Fellows take an active role in the performance, analysis, and interpretation of a wide variety of cardiac tests, including two-dimensional (2D) and three-dimensional (3D) echocardiography and Doppler echocardiography, exercise and pharmacologic stress testing, radionuclide imaging and CMR studies. Rotations are designed for fellows to develop a comprehensive understanding of the indications for effective and cost-efficient use of diagnostic non-invasive cardiac imaging, the methodology of noninvasive cardiac techniques and their application to the solution of clinical problems. Fellows participate in the ongoing teaching and research activities of the noninvasive section. Three non-invasive conferences are held weekly, including a multidisciplinary imaging conference at noon on Mondays, an echocardiographic focused conference on Wednesday morning, and a bimonthly Friday lunch case-based clinical conference.

Echocardiography Laboratory

The Echocardiography Laboratory is an active service, performing over 20,000 studies per year (including over 15,000 transthoracic, 1,000 transesophageal [including 3D], and 2,000 stress echocardiograms).

The echocardiographic clinical experience is designed to enable each fellow to attain Level 2 training as defined by the American Society of Echocardiography. Among other responsibilities, fellows learn the basics of transthoracic echocardiography, perform examinations under the supervision of a cardiac sonographer, and assist in saline contrast studies, dobutamine stress monitoring and portable/emergency studies. When on night-call, the fellow independently performs the transthoracic echocardiographic study and provides a preliminary interpretation.

A third year focused year in non-invasive cardiac imaging is offered to interested fellows. The purpose of this year is to develop skills in advanced echocardiographic-based research and undergo focused training in stress echocardiography and transesophageal echocardiography (TEE). Third-year fellows are also responsible for teaching more junior fellows, as well as preparing case review and journal club conferences. The majority of those completing this year of additional training have gone on to academic positions throughout the country. Successful completion of this dedicated year fulfills eligibility for the American Board of Echocardiography Special Competency Examination in transthoracic, stress, and transesophageal echocardiography.

Cardiac MR Center

The BIDMC Cardiac MR Center is a dedicated/independent CMR Center and a joint effort with the Department of Radiology. It is co-directed by Dr. Warren Manning (Cardiology) and Dr. Koenraad Mortele (Radiology). **Dr. Reza Nezafat** is the Center's Scientific Director. Since its inception in 1995, the BIDMC CMR Center has gained both a national and an international reputation for CMR innovation and expertise, specifically with regards to coronary artery and vein imaging, imaging of atherosclerosis/subclinical disease and imaging of patients with atrial fibrillation and technology development and translation. Utilizing a state-of-the art dedicated cardiac 3.0 Tesla MR system, clinical studies are referred from across the U.S. for the investigation of ventricular function, pericardial disease, myocardial viability, valvular disease, cardiomyopathy assessment, and coronary anomalies/coronary integrity.

Attendance is required by all cardiology fellows assigned to the noninvasive imaging rotation at the daily clinical reading sessions. A broad range of research opportunities exists for fellows at all levels of training and interest. While all fellows receive training to fulfill Level I training in CMR, with opportunities to achieve Level II and Level III CMR training available for fellows during their 3rd year of training.

Cardiac CT

Under the direction of **Dr. Thomas Hauser,** the BIDMC Cardiac CT is in collaboration with the Department of Radiology. Three 64-slice and a 320-slice MDCT unit are installed, including a 64-slice MDCT unit in the Emergency Department. Fellows are encouraged to collaborate with Cardiac CT physicians and attend the weekly clinical review while on the non- invasive rotation. All fellows fulfill Level I training in Cardiac CT. All fellows receive training to fulfill Level I training in Cardiac CT. Opportunities to achieve Level II training in CCT is offered to interested 3rd year fellows.

Exercise Testing/Clinical Physiology

The Exercise/Clinical Physiology Laboratories are under the direction of **Dr. Ernest Gervino** and include exercise treadmill, cycle ergometry, pharmacologic tests and cardiopulmonary stress tests used in approximately 5,000 patients each year. During their 2 week annual rotation, fellows are exposed to the principles of exercise physiology and actively participate in clinical exercise testing for purposes of diagnosis, therapy evaluation, and prognostic assessment, as well as for understanding hemodynamic observations in patients with known coronary artery disease, heart failure with preserved and reduced ejection fraction, arrhythmia/conduction abnormalities and evaluation of possible cardiac symptoms. Jeremy Robbins is developing a cardiopulmonary exercise test program.

Electrocardiography Laboratory

The Electrocardiographic Laboratory, under Director **Dr. Jonathan Waks,** processes nearly 100,000 ECGs per year. This laboratory also serves as an important divisional teaching and training resource for the development of expertise in ECG interpretation by cardiology trainees as well as Harvard Medical students on the cardiology elective rotations. The resources of the laboratory, in collaboration with Dr. Ary L. Goldberger, also support clinical investigations in surface ECG and the development of computer-based instruction ("ECG Wave-Maven" program).

Nuclear Cardiology

Under the direction of **Dr. Thomas Hauser,** Nuclear Cardiology is a collaborative effort with the Nuclear Medicine Division of BIDMC's Department of Radiology, providing fellows with the experience necessary to appropriately utilize and interpret a wide spectrum of cardiac radionuclide exams. During joint reading sessions with members of both the Cardiovascular Division and the Nuclear Medicine Division (twice weekly) fellows interpret exercise and pharmacologic stress perfusion studies with thallium-201 and technetium-99m agents, radionuclide ventriculograms (RVGs), and first-pass examinations. All fellows receive training to fulfill Level I requirements for training in nuclear cardiology, necessary for admittance to the cardiovascular board examination. During the third year, arrangements may be made to gain further experience necessary for Level II or III training, required for nuclear cardiology certification examinations and Nuclear Regulatory Commission "licensure." The program fund selected fellows to take an online "Physics" course fulfilling the requirements for Nuclear Certification. The program also affords ample opportunity to participate in clinical research and other educational events such as the New England Nuclear Cardiology Working Group meetings.

Ambulatory Cardiology Center

Directed by **Dr. Eli Gelfand,** the BIDMC Ambulatory Cardiovascular Center provides routine and urgent consultative cardiovascular patient care for more than 30,000 outpatient visits per year, making it one of the busiest cardiovascular practices in Boston. Services within the Center include routine office visits, pacemaker and ICD clinic, Arrhythmia Clinic, Cardio-oncology Clinic, Women's Cardiovascular Health Clinic, Lipid and Preventive Cardiology Clinic, Advanced Heart Failure and LVAD Clinic, Russian and Latino Cardiovascular Clinics, Nutrition services, ECG and phlebotomy services and insurance and prescription counseling. Besides the Cardiovascular Division faculty, the Center also employs several full-time nurses and nurse practitioners. Dedicated outpatient echocardiography, stress testing and laboratory services are housed in the same location, providing for convenient same-day testing for many patients.

The Ambulatory Cardiology Center is a site of many local and multicenter clinical trials every year, including those in valvular heart disease, preventive cardiology, diabetes and atrial fibrillation. Innovative work with cardiology pharmacists allows for collaborative titration of guideline-directed therapy for heart failure, dyslipidemia, hypertension and diabetes. The outpatient cardiovascular experience is anchored by BIDMC's pioneering, award-winning electronic medical records system (WebOMR). All outpatient orders and requisitions are fully electronic, radiologic (echocardiograms, catheterizations, CMR, nuclear) images and reports are readily accessible online, and test results are automatically forwarded to the ordering provider's mailbox, ensuring rapid patient follow-up.

During the first year, each fellow is paired with a faculty mentor and attends their mentor's clinic for one half day in the first two fellowship years. During the third year and beyond fellows can choose to continue with their mentor or switch to a new clinic to broaden their experience and perspective. Fellows pursuing additional training in Heart Failure, Electrophysiology or Interventional Cardiology are paired with a subspecialist preceptor in their third and fourth year. The fellow is expected to see the patients independently, present their findings to the faculty preceptor, and formulate a diagnosis/treatment plan. The preceptor who then also sees the patient, confirms the fellow's impression and approves the plan. Continuity in patient care is emphasized, and the fellow will typically follow the patient for the entirety of their cardiovascular diseases fellowship.

The Ambulatory Cardiology Center hosts focused continuity clinic for Internal Medicine residents interested in exploring a career in Cardiovascular Diseases, where fellows are exposed to one-on-one and group teaching of medical housestaff. We are also a site for training of nurse practitioner students from the Massachusetts General Hospital Institute of Health Professions, University of Massachusetts and Regis College of Nursing.

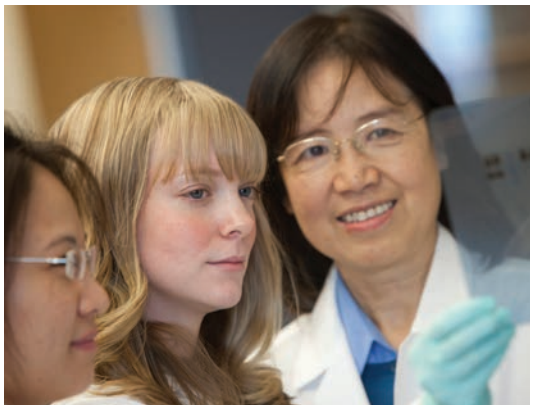
Cardiovascular Health and Lipid Center

The Cardiovascular Health and Lipid Center directed by **Mark Benson, MD,** is a multidisciplinary outpatient program that holds five clinic sessions per week. The Center has expertise in advanced lipid disorders, genetic testing for lipid disorders, cardiometabolic health, advanced blood pressure monitoring and management, and primary cardiovascular disease prevention. In addition to faculty, fellows and senior medical residents, a registered dietitian and a lipid nurse specialist staff the Lipid Center, which oversees over 1,000 patients. The Lipid Center is also a forum for clinical research. All clinical information and laboratory results are incorporated into a longitudinal database that tracks patient responses to dietary and pharmacologic strategies. In addition, the Lipid Center's patient population serves as a resource for basic and clinical metabolic and genetic studies and provides fellows an opportunity to become familiar with the diagnosis and management of cardiometabolic disease as it pertains to cardiovascular risk.

Research Training

A central mission of the BIDMC Cardiovascular Division is providing our fellows with opportunities to train in the full spectrum of research – from basic mechanistic studies to clinical trials.

During the first year, fellows are assigned faculty mentors who help them to identify areas of interest and potential research preceptors. In addition to the programs outlined below, fellows have access to an almost limitless array of research opportunities in the broader BIDMC community, as well as through Harvard Medical School, Harvard University and other Boston-area biomedical institutions.



Basic and Translational Research

Collectively, BIDMC's Research enterprise consistently ranks in the top three in National Institutes of Health (NIH) funding nationwide and, in total, research at BIDMC is a $200 million enterprise.

The recent recruitment of new faculty, together with the research program's recent move to the new Center for Life Science (CLS) building (a 350,000-square foot state-of-the-art facility that is the largest research building in Boston's Longwood Medical Area) herald an exciting period for biomedical research at BIDMC.

Research in BIDMC's Division of Cardiovascular Medicine includes a wide range of investigations, from basic mechanistic studies to translational research and clinical trials. Innovative new programs are examining cardiometabolomics, precision and personalized medicine and hospital-based outcomes research, providing clinicians and patients with key information ranging from predictive biomarkers to "big data" analyses used to evaluate and transform health care delivery for cardiovascular conditions.

For more information visit **bidmc.org/research/research-by-department/medicine/cardiovascular-medicine**

Baim Institute for Clinical Research

Collaboration with biostatisticians, epidemiologists, decision and cost effectiveness analysts, and clinical trialists is available at the Baim Institute for Clinical Research (formerly the Harvard Clinical Research Institute—HCRI and previously the Cardiovascular Data Analysis Center), an academic contract research organization specializing in the design and coordination of multicenter clinical trials as well as analysis of clinical research data from a wide variety of clinical disciplines (with special emphasis and expertise in cardiovascular diseases). Over the past 28 years, this organization has conducted over 100 national and international medical device, pharmaceutical and biological trials, many leading to FDA approval for novel therapies (including intravascular brachytherapy, drug-eluting stents, and distal-embolic protection devices). Members of the Division who have worked at the Institute include **Drs. Donald Cutlip, Kalon Ho, C. Michael Gibson, Robert Yeh, Jeffrey Popma, Ernest Gervino** and **Peter Zimetbaum.**

The Richard A. and Susan F. Smith Center for Outcomes Research in Cardiology

The Smith Center, established in 2015, brings together a multidisciplinary group dedicated to addressing the most pressing challenges in cardiovascular care. Under the leadership of Director **Dr. Robert W. Yeh,** along with Assistant Director **Dr. Dhruv S. Kazi** and Senior Administrative Manager **Joanne Laffan,** the Center is comprised of six Sections, each headed by faculty physician investigators: Health Economics; Epidemiology and Data Science; Electrophysiology and Digital Health; Interventional Cardiology and Vascular Research; Cardiovascular Imaging Research; and Health Policy and Equity Research. Academic and industry partners include Medtronic, Boston Scientific, Abiomed, Amgen, the Baim Institute for Clinical Research, and many others.

For more information, please visit
bidmc.org/smithcenter

Leveraging the unique strengths of the partnership of BIDMC and the Harvard T.H. Chan School of Public Health, the Center currently hosts 15 faculty physician investigators, 6 statisticians, 6 staff members covering administration and operations and research coordination, and 9 current students, residents, and fellows. Over the course of five years, the Smith Center has taught over 40 students, residents, and fellows, sponsored through many fellowships including the Smith Center Fellowship. The Cardiology Division also offers the Zimetbaum fellowship, established in 2021 and aims to support the training of students who are from backgrounds traditionally underrepresented in medicine, the inaugural award going to a Smith Center mentee. Many of those who learn in the Smith Center continue to work collaboratively with faculty investigators post-fellowship. Some have joined the Smith Center as faculty themselves.

Smith Center trainees develop skills in health outcomes research, and receive training in biostatistical, epidemiological, and econometric methods, as well as the use of large, real-world datasets. As a result, early career trainees have the opportunity to explore and pursue novel, impactful research ideas with the areas of clinical medicine, epidemiology, health economics and policy, and social policy.

Section Descriptions:

The Health Economics Section, headed by **Dhruv Kazi MD, MSc, MS,** focuses on using real-world data and mathematical modeling to examine the clinical and economic effects of diagnostic tests, new therapies, and public health measures on the cardiovascular health of the population.

The Electrophysiology and Digital Health Section, headed by **Daniel Kramer, MD, MPH,** focuses on electrophysiology effectiveness, clinical policy and ethics questions arising from the use of medical devices.

The Cardiovascular Imaging Research Section, headed by **Jordan Strom, MD, MSc,** focuses on the evaluation of the impact of imaging on cardiovascular health outcomes, as well as the development of novel tools for pre-procedural risk stratification, especially for valvular heart disease.

The Interventional Cardiology and Vascular Research Section, headed by **Eric Secemsky, MD, MSc,** focuses on the comparative effectiveness of coronary and vascular therapies, with an emphasis on the use of novel statistical methods.

The Health Policy and Equity Research Section, headed by **Rishi Wadhera, MD, MPP, MPhil,** focuses on understanding the impact of state and federal health policies on access, quality of care, and health outcomes, as well the underlying determinants of health inequities, with a specific focus on racial/ethnic disparities, income inequality, and neighborhood disadvantage.

The Epidemiology and Data Science Section, headed by **Issa Dahabreh, MD, MS, ScD,** focuses on the development of novel methods of extending causal inferences from one or more trials to target populations and transporting clinical prediction models.

Framingham Heart Study

This NHLBI (National Heart Lung Blood Institute) sponsored project is the world's largest and longest running prospective cardiovascular disease epidemiology study. New technologies have been introduced in recent years including echocardiography, Holter monitoring for arrhythmia and ST segments, computerized 12-lead ECGs, ambulatory blood pressure measurements, cardiac MR, cardiac CT, and carotid ultrasonography. Data from these are part of a correlated database that includes up to 50 years of cross-sectional and longitudinal data.

Current research includes: incidence, prevalence and prognosis of atrial fibrillation; exercise treadmill results as predictive of coronary disease; blood pressure response to exercise as predictive of left ventricular hypertrophy; arrhythmias on ambulatory ECG monitoring (impact of age and sex); left ventricular mass and risk for sudden death; left ventricular mass and risk for stroke; determinants of diastolic left ventricular function; characterization of echo patterns in subjects with congestive heart failure; prevalence of ultrasound documented carotid disease in subjects with MI; differences in early and late death from coronary disease in men vs. women, and subclinical disease assessment by both cardiac MR and cardiac CT.

Harvard School of Public Health

Over a dozen Cardiovascular Division fellows have participated in the Program for Training in Clinical Effectiveness at the Harvard School of Public Health during the last decade. This seven-week, intensive session designed for physicians is offered in July and August with introductory and advanced courses in epidemiology, biostatistics, decision analysis, clinical trials, measurement techniques, outcomes analyses, quality improvement, and health services research. Fellows who wish to receive a master's degree (MSc or MPH) can do so by attending classes full-time during two summers and/or part-time during the academic year. A parallel, non-degree granting summer program is also available through the Summer Institute at the School of Public Health. **Dr. Murray Mittleman,** Co-director of Cardiac Epidemiology and Clinical Trials at BIDMC, has an appointment at the Harvard School of Public Health and directs the MPH program there.

The Harvard-Thorndike Electrophysiology Institute and Arrhythmia Service

Research studies include the basic science and clinical investigation of risk stratification for sudden cardiac death. Novel ECG analysis strategies such as T-wave alternans and R- and T-wave heterogeneity tests were developed by **Dr. Richard Verrier.** Recent applications of these markers have ranged from identification of candidates for CRT devices, gauging efficacy of vagus nerve stimulation in patients with advanced heart failure, and tracking recovery of risk following myocardial infarction and acute coronary syndrome. Dr. Alfred Buxton is studying the porcine model of infarction using epicardial and endocardial mapping to assess arrhythmogenic substrate. **Dr. Buxton** and **Dr. Jonathan Waks** are evaluating characteristics in arrhythmogenic substrates responsible for VT at the molecular and whole organ level. Collaboration occurs with **Drs. Reza Nezafat** and **Warren Manning** in cardiac MR to develop cutting-edge imaging methods to define the electrophysiologic substrate of ventricular arrhythmia.

Clinical Investigator Training Program

The Clinical Investigator Training Program (CITP), administered jointly by the Clinical Research Center at Beth Israel Deaconess Medical Center and the Health Sciences and Technology Division (HST) of Harvard Medical School and the Massachusetts Institute of Technology (MIT), funds clinical research projects conducted by senior fellows from medical and surgical specialties. Fellows who successfully compete for these two year grants are expected to devote the majority of their third and fourth year fellowships to the proposed project as well as attend daily didactic sessions in the summer and weekly didactic sessions during the remainder of the year. Topics covered vary from basic science subjects (e.g., genetic engineering techniques, pharmacokinetics of insulin) to regulatory issues (e.g., FDA drug approval, ethics of human experimentation) to analytical techniques (e.g., study design, biostatistics). A master's degree from MIT in medical sciences may be obtained upon completion of the CITP Fellowship. Numerous fellows from the Cardiovascular Division have been recipients of the CITP Fellowships.

Off-Site Rotations

Adult Congenital Heart Disease Rotation, Children's Hospital Boston Under the direction of Dr. Michael Landzberg at Children's Hospital in Boston, the rotation is devoted to care of both children and adults with congenital disorders. Fellows round with the floor team, participate in didactic sessions, and are exposed to the evaluation of congenital heart disease during rotations in electrocardiography, echocardiography, nuclear cardiology, and the cardiac catheterization laboratory, and when being trained in other imaging techniques (magnetic resonance imaging, computed tomography).

Tufts Medical Center Advanced Heart Failure Rotation In collaboration with Dr. David D'ONofrio at the Cardiac Transplantation and Mechanical Circulatory Support Services at Tufts Medical Center, this rotation is dedicated to training in all aspects of Advanced Heart Failure management, including device therapies (CRT, ICD, etc), as well as in the selection and ongoing management of patients receiving cardiac transplantation and mechanical circulatory support.

Work Environment

Interaction with Other Disciplines

The Cardiovascular Division works closely with the Cardiothoracic and Vascular Surgery Divisions as well as the Departments of Internal Medicine, Emergency Medicine, Nuclear Medicine, and Radiology. Joint conferences are often held and fellows and attendings from the division are often invited to participate as cardiology experts. Interventional fellows are encouraged to participate in procedures with Vascular Surgery. Some cardiology fellows pursue additional training or collaborate on research projects with faculty members from other departments. In addition, several other subspecialty training programs and a residency in internal medicine allow trainees to interact with other disciplines through the availability of collaborating consultants and suitable patients.

Teaching and Educational Experience

Acknowledging the important role that cardiology fellows play in the education of medical students and housestaff, each fellow is appointed to the rank of Clinical Instructor in Medicine at Harvard Medical School. The cardiology teaching experience is directed by Dr. Eli Gelfand, and begins with a daily Core Curriculum lecture series in July and August. The lectures then continue weekly for the remainder of the year, and cover all key aspects of clinical and consultative cardiology, electrophysiology, imaging and interventional cardiology. The educational experience also includes weekly conferences in clinical cardiology, nuclear cardiology, echocardiography, electrocardiography, electrophysiology, angiography, advanced noninvasive imaging (cardiovascular magnetic resonance, cardiac CT, nuclear cardiology) and interventional cardiology. Attempts are made to incorporate basic biomedical information with the clinical aspects of cardiology, including integration of clinical management principles. Fellows have regularly scheduled experiences in teaching and are encouraged to attend and participate in national cardiology meetings. Funds are available for each fellow to attend one national conference per year.

Evaluation and Documentation of Competence

Fellows are evaluated monthly throughout their training, consistent with criteria set forth by the American Board of Internal Medicine. Fellows review their evaluations and in turn, evaluate the faculty members who oversee their rotations. The program co-directors and representative section heads review these evaluations biannually. Upon discovery of a problem, the directors take immediate action to rectify as appropriate. Records are maintained of all evaluations and of the number and type of all laboratory procedures performed by each trainee. Fellows are also expected to evaluate the attending staff on a regular basis.

Calls and Schedules

The call schedule for first year fellows is created by the upcoming second year class and approved by the program directors. The first year fellows who are on the three clinical rotations (CCU, Intermediate Care Unit, Consult) take most night and weekend coverage. In an approximately "every fourth night rotation" during their clinical service months, fellows take night and weekend coverage. (Fellows take minimal call while on the exercise, catheterization laboratory, and echocardiography rotations.) Fellows generally spend four to six months during their first year and one to two months during their second year on this "every-fourth" call rotation. Staff attendings are kept informed of all changes in the status of patients under their care and expect to be called at any hour.

- Four weeks of vacation may be taken each academic year of fellowship training.
- There are regularly scheduled cardiology conferences and participation of trainees in the planning and production of these conferences is required.

Conferences & Seminars

Mondays

7:30 Electrophysiology Didactic Session
11:00 CMR Readout
12:00 Advanced Non-invasive Conference (CMR, CCT, Nuclear Medicine)

Tuesdays

7:00 Core Curriculum Lecture Series
8:00 Clinical Conference
11:00 CMR Readout
12:00 CMR Journal Club
12:15 Angiography Conference

Wednesdays

7:00 Interventional Cardiology Conference
8:00 Echocardiography Conference
8:00 EP Teaching Conference
9:30 Nuclear Medicine Lecture
11:00 CMR Readout

Thursdays

7:00 Elio Fine ECG Conference with Drs. Buxton and Waks
7:30 EP Fellows Work Conference
8:00 Medical Grand Rounds
8:00 Heart Failure Conference
11:00 CMR Readout
12:00 CVI Lecture Series

Fridays

7:00 Meeting with the Chief (monthly for F1s and F2s)
8:00 Cardiovascular Grand Rounds
11:00 CMR Readout
12:00 Fellow Research Conference/ Combined Imaging Conference/ Vascular Conference (alternating)

Other Clinical Conferences

1. Summer Lecture Series (Daily at 7 am for July and August)
2. CMR Physics directed by Dr. Reza Nezafat (4 pm, Monday through Friday)

Faculty

Robert E. Gerszten, MD, is Chief of Cardiovascular Medicine at the Cardiovascular Institute, Professor of Medicine at Harvard Medical School and a Senior Associate Member of the Broad Institute. His research focuses on the nexus of cardiac and metabolic diseases. This translational research program is a national leader in the use of metabolomics and proteomic technologies – and the integration of this information with human genetics – for the discovery of new biomarkers and pathways contributing to atherogenesis and its complications. The Gerszten team has identified novel biomarkers that single out individuals destined to develop diabetes and heart disease more than a decade before disease onset, with the goal of determining which of these patients might benefit from clinical interventions. Dr. Gerszten's research is funded by the National Institutes of Health and the American Heart Association. He is an active clinician in the Coronary Care Unit. He is the recipient of the William Silen Lifetime Achievement in Mentoring Award from Harvard Medical School.

Peter J. Zimetbaum, MD, is the Richard and Susan Smith Professor of Cardiovascular Medicine at Harvard Medical School; Associate Chief and Clinical Director of Cardiology at BIDMC. He is a clinical electrophysiologist with a particular interest in lead management. Dr. Zimetbaum directs the ECG and Arrhythmia Core Laboratory at the Baim Institute for Clinical Research and is the co-editor of Cardiology in Review. He authored the well-received textbook, *Practical Clinical Electrophysiology*.

Anne-Marie Anagnostopoulos, MD, FACC, is the Director of Recruitment and Advancement of Women Fellows in Cardiology Training at BIDMC. She also serves as a member of the BIDMC Department of Medicine Advancement of Women committee. Dr. Anagnostopoulos is a general cardiologist whose interests include cardiovascular risk assessment of kidney and liver transplant candidates, cardiovascular disease in women, as well as echo interpretation.

Aarti H. Asnani, MD, is the Director of the BIDMC Cardio-Oncology program and a basic/translational researcher in this field. She joined BIDMC in 2017. Her lab seeks to define the molecular mechanisms that contribute to heart toxicity associated with cancer therapies, with the goal of targeting these pathways therapeutically in patients.

Mark Benson, MD, is Director of Preventive Cardiology at BIDMC and an Assistant Professor of Medicine at Harvard Medical School. His main clinical and research focus is on the application of emerging metabolomics, proteomics, and clinical phenotypic methods to identify new targets for metabolic and preventive atherosclerotic cardiovascular disease therapy. He works with a diverse group of collaborators and fellows to develop new ways to further study these methods in both laboratory and clinical settings.

Alfred E. Buxton, MD, is Ben-Haim Josephson Professor of Medicine at Harvard Medical School. He serves as Director of the Clinical Electrophysiology Laboratory, the ECG Laboratory and the former Clinical Cardiac Electrophysiology Fellowship Training Program. He has authored or co-authored over 300 publications. He was Principal Investigator of the NIH-funded Milticenter Study of Non-Sustained Ventricular Tachycardia (MUSTT). His current research is focused on methods to predict risk of sudden cardiac death, appropriate role of implantable defibrillators for prevention of sudden cardiac death and mechanisms of ventricular tachycardia.

Brett Carroll, MD, is Director of Vascular Medicine at BIDMC and Instructor in Medicine at Harvard Medical School. He staffs the inpatient vascular medicine consult service and directs the Massive and Submassive Clot On-Call Team, BIDMC's PE response team. His outpatient clinic focuses on aortic disease, peripheral vascular disease, venous thromboembolism, and lymphatic medicine, in addition to general cardiology. He also interprets vascular laboratory studies. His research interests include pulmonary embolism, lymphedema and management of aortic disease.

James D. Chang, MD, is Assistant Professor of Medicine at Harvard Medical School and a member of the CardioVascular Institute's Advanced Heart Failure Center program. He is involved in research activities pertaining to early detection and prevention of cancer therapeutics-associated cardiotoxicity and to the role of implantable hemodynamic monitoring devices in the management of advanced heart failure. In addition to his work in advanced heart failure, he is an active member of the echocardiography laboratory..

Donald Cutlip, MD, is Professor of Medicine at Harvard Medical School. He served as Director of the Cardiac Catheterization Laboratory at BIDMC from 2007-2017 and is currently a Vice Chair in the Department of Medicine, responsible for clinical care in the community. He is Chief Medical Officer at the Baim Institute for Clinical Research. Over the past 20 years, he has been a leader in the design and management of clinical trials in percutaneous coronary intervention and other cardiac devices and has been responsible for standardization of clinical endpoint definitions for these trials.

Faculty

Andre d'Avila, MD, is the Director of the Cardiac Arrhythmia Service and The Harvard Thorndike Electrophysiology Institute. Dr. d'Avila also maintains a part time appointment as a consulting electrophysiologist at the Hospital Cardiologico Florianopolis, Brazil. Dr. d'Avila is an internationally renowned clinician, teacher and researcher. He is a highly sought after lecturer and is committed to the advanced training of fellows in electrophysiology. His primary research focus is the mapping and ablation of complex atrial and ventricular arrhythmias. He and his colleagues in Brazil have pioneered the field of epicardial ablation and Dr. d'Avila was instrumental in bringing this technique to the United States. He has authored over 200 original scientific articles and 20 book chapters.

Loryn S. Feinberg, MD, is the director of the Women's Cardiovascular Health Program at Beth Israel Deaconess Medical Center. She specializes in interpreting advanced imaging modalities of the heart, including echocardiograms, stress tests, and cardiac MRIs. She evaluates outpatients and attends on the inpatient cardiac intensive care unit. She received her medical degree and residency/chief residency training from the University of Miami School of Medicine. She completed cardiology and cardiovascular imaging fellowship at BIDMC and joined the faculty in 2006. She is board-certified in cardiovascular disease and echocardiography, is a Fellow of the American College of Cardiology, and holds a faculty appointment at Harvard Medical School. Her clinical areas of interest include the evaluation and treatment of women with unique conditions such as SCAD, stress cardiomyopathies, and microvascular disease and pre-conception counseling/ management of pregnant women with cardiovascular disease.

Airley E. Fish, MD, MPH, is an Instructor of Medicine at Harvard Medical school and joined the Cardiovascular Division at the BIDMC in 2010. She holds a Master's in Public Health from John Hopkins University School of Public Health. Her clinical interests include coronary artery disease, valvular heart disease, preventive cardiology and cardiovascular diseases in women.

Ariane "CoCo" Fraiche, MD, is Instructor of Medicine at Harvard Medical School and a clinical and non-invasive cardiologist. Dr. Fraiche specializes in non-invasive testing with echocardiography as well as inpatient and outpatient consultative cardiology services in the community. Her clinical interests include preventive cardiology, valvular heart disease, coronary artery disease, and heart failure. She was the 2020-2021 Rabkin Fellow in Medical Education. Her research interests include medical education in cardiovascular disease as well as special topics in echocardiography and communication in cardiology.

A. Reshad Garan, MD, joined the faculty in 2019 as the Section Chief for Advanced Heart Failure and Mechanical Circulatory Support. Having served as the Director of Acute Circulatory Support and Associate Director of the Cardiac Intensive Care Unit at Columbia University prior to his recruitment, he has brought extensive experience in the management of cardiogenic shock. He is the site PI for multiple trials studying device-based therapies in Heart Failure. He is an Associate Professor of Medicine at Harvard Medical School and his research interests include durable and short-term circulatory support for patients with advanced heart failure and cardiogenic shock.

Michael C. Gavin, MD, MPH, is Director of the CVI's Cardiac Direct Access Unit, Director of Inpatient Cardiology at BIDMC and an Assistant Professor of Medicine at Harvard Medical School. Dr. Gavin's clinical practice focuses on valvular heart disease, coronary artery disease and preventive cardiology.

Eli Gelfand, MD, is an Assistant Professor of Medicine at Harvard Medical School and Chief, Section of General Cardiology. He also founded the Russian Cardiovascular Clinic and co-founded the Latino Cardiovascular Clinic at BIDMC. Within the Division he is responsible for cardiovascular outpatient operations. He is also active in developing the clinical applications of new and rapidly evolving diagnostic imaging modalities, such as three-dimensional (3D) and intracardiac echocardiography (ICE) and cardiovascular magnetic resonance (CMR) imaging with particular focus on imaging support of minimally-invasive therapies for valvular and congenital cardiac disease. With a non-profit organization Hearts Around The World, Dr. Gelfand is actively involved in several Global Cardiovascular Health initiatives and has led training missions to Kenya, China and Cuba.

Ernest Gervino, ScD, is an Associate Professor of Medicine at Harvard Medical School and has been a member of the Cardiovascular Division since 1981. He is the Director of Clinical Physiology Laboratory at BIDMC and serves as the Director of Exercise Testing Core Lab at the Baim Institute of Clinical Research for both national and international research trials. His research interests include the stress testing as a primary endpoint, effects of exercise training on management of patients, diet and behavior modification on the reduction of risk for a second cardiac event.

Faculty

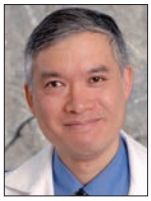
C. Michael Gibson, MD, is a Professor of Medicine at Harvard Medical School, an interventional cardiologist, cardiovascular researcher & educator. He pioneered our understanding of the "open artery hypothesis" as well as our understanding of the importance of restoring flow downstream in the capillary bed in the "open microvasculature hypothesis." He is the CEO of the combined non-profit Baim and PERFUSE research institutes at Harvard Medical School. The institutes have led over 1,000 studies, published 5,500 manuscripts in the peer review literature, and have led 60 FDA submissions from their network of 7,000 sites worldwide. He is the Founder and Chairman of the Board of the non-profit WikiDoc Foundation, the world's largest open source textbook of medicine. In 2014, 2018-2020 he was recognized as one of the most highly cited scientists in the world.

Ary Goldberger, MD, Professor of Medicine at Harvard Medical School, is Director of the Margret and H.A. Rey Institute for Nonlinear Dynamics in Physiology and Medicine and Program Director of the NIH-sponsored Research Resource for Complex Physiologic Signals. He is also Chief of the Division of Interdisciplinary Medicine and Biotechnology (IMBIO). Dr. Goldberger and his colleagues have pioneered the biomedical application of fractals to physiology and nonlinear dynamics, including the development of widely-used methods to quantify the breakdown of complexity with aging and heart disease. His team has introduced new ways of analyzing cardiopulmonary coupling during sleep, with translational applications to monitoring sleep stability and obstructive/central apnea syndromes. Recent work focuses on the discovery of heart rate fragmentation, a form of electrodynamical cardiac remodeling, which serves as a novel biomarker of adverse cardiovascular events, superseding conventional heart rate variability measures. He and colleagues also created and direct ECG Wave-Maven, the largest, open-access website for self-instruction in electrocardiography.

E. Wilson Grandin, MD, MPH, MEd, specializes in Advanced Heart Failure and Transplant Cardiology (AHFTC). He is the Director of the ECMO and Temporary Mechanical Circulatory Support (MCS) Program and the Site Director of the joint BIDMC-Tufts fellowship in AHFTC. He is engaged in clinical outcomes research focused on optimizing therapies for patients receiving durable or temporary MCS and heart transplant. He directs a simulation-based course on shock and MCS for trainees aimed at improving the management of patients with cardiogenic shock requiring circulatory support.

Charles Haffajee, MB, BChir, FRCP, is an Associate Professor of Medicine at Harvard Medical School and Director of Device Trials and Cardiac Electrophysiology Network Development. His primary interests are in pacing, defibrillation, congestive heart failure, cardiac arrhythmias, atrial fibrillation, syncope and ablation for cardiac arrhythmias.

Thomas Hauser, MD, is an Assistant Professor of Medicine at Harvard Medical School and Director of Nuclear Cardiology Medicine in the CardioVascular Institute. His primary research interest is in the clinical application of advanced methods of cardiovascular imaging with particular focus on nuclear cardiology and cardiac MR.



Kalon Ho, MD, MSc, is an Assistant Professor of Medicine and the Director of Quality Assurance for BIDMC's Division of Cardiovascular Medicine. He helps to coordinate BIDMC's efforts to monitor the outcomes and improve the quality of cardiovascular care. His research interests include methodological issues in the design, management and analyses of clinical trials; assessment of outcomes of cardiovascular procedures, including use of large-scale, multicenter databases; and effective integration of decision support tools into clinical care. In addition to a clinical emphasis on invasive hemodynamics, he has been teaching clinical epidemiology at Harvard Medical School for more than two decades.

Peter M. Kang, MD, is an Associate Professor of Medicine at Harvard Medical School and Director of the Cardiac Physiology Core in BIDMC's Cardiovascular Research Program. His laboratory is developing novel nanoparticle-based systems that are activated by hydrogen peroxide, for use in cardiovascular therapeutics and bio-imaging applications, and is currently investigating the molecular mechanism of cardiac dysfunction associated with vitamin D deficiency and examining the potential role of vitamin D therapy in the treatment of heart failure.

Joseph P. Kannam, MD, is an Assistant Professor of Medicine at Harvard Medical School and program director for the Cardiovascular Fellowship Program at Beth Israel Deaconess Medical Center. He is Chief of the Division of Cardiology at Beth Israel Deaconess Hospital–Needham (BID–Needham) and oversees the hospital's comprehensive community-based cardiology program.

Vladimir Kaplinskiy, MD, is an Instructor of Medicine at BIDMC. He practices general clinical cardiology with an interest in care of the elderly population, use of multimodality imaging and cardiology consultation. He is also interested in operations management of clinical trials at the Baim Institute for Clinical Research.

Faculty

Dhruv Kazi, MD, MSc, MS, serves as the Director of the Cardiac Critical Care Unit and the Associate Director of the Richard A. and Susan F. Smith Center for Outcomes Research in Cardiology. He is a general cardiologist whose clinical focus is facilitating the delivery of high-quality, high-value cardiovascular care to critically ill patients. His research uses real-world data and mathematical modeling to examine the clinical and economic effects of new drugs, devices, and policies on population cardiovascular health. His work advances analytic methods in the fields of outcomes research and cost-effectiveness analysis, and facilitates their application to vulnerable populations in the US and overseas, with the overarching goal of increasing societal returns on healthcare expenditures. Dr. Kazi serves as a research or career mentor to fellows and residents, particularly those with an interest in cardiac critical care, health economics, or global health.

Daniel Kramer, MD, MPH, is an Assistant Professor of Medicine at Harvard Medical School, Section Head of Electrophysiology and Digital Health at the Richard A. and Susan F. Smith Center for Outcomes Research in Cardiology, and a faculty member of the Harvard Medical School Center for Bioethics. Dr. Kramer joined the electrophysiology section in 2012, and is the Director of Pacemaker and ICD Service. Dr. Kramer's conducts focuses on ethics, health policy, and outcomes research related to cardiac devices.

Roger J. Laham, MD, is an Associate Professor of Medicine at Harvard Medical School and Co-Director of the Peripheral Vascular Disease Program. Dr. Laham is investigating novel Angiogenesis and Myogenesis strategies including stem cell and myotissue transplantations, Novel imaging modalities including Multidetector CT (320) for coronary artery disease detection and PET/CT for vulnerable plaque imaging. In addition, he is developing and studying several Cardiovascular Devices including percutaneous valves, left atrial exclusion for atrial fibrillation, and myocardial restraint for congestive heart failure.

Warren J. Manning, MD, is Professor of Medicine and Professor of Radiology at Harvard Medical School and the Section Chief of Noninvasive Cardiac Imaging and Testing at the BIDMC where he also serves as Co-director of the Cardiac MR Center and Director of the Echocardiography Laboratory. A former president of the Society for Cardiovascular Magnetic Resonance, his ongoing research interests include cardiovascular applications of magnetic resonance (coronary MRI, valvular heart disease, subclinical atherosclerosis, atrial fibrosis in atrial fibrillation and pericarditis), utilization of echocardiography for prognosis in valvular heart disease and appropriate use of echocardiography.

Jason Matos, MD, is a non-invasive Cardiologist with a clinical focus in General Cardiology and Cardiac Imaging. His research interests include management of post-operative atrial fibrillation and imaging metrics associated with cardiovascular outcomes. He completed his residency and fellowship training at Beth Israel Deaconess Medical Center, and also served as Chief Medical Resident and Chief Cardiology Fellow. He also has a strong passion for medical education, serving as a Rabkin Fellow for Medical Education 2019-2020 and has re-designed the inpatient Cardiology and CCU curricula for medical residents.

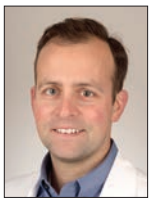
Ian McCormick, MD, is an Instructor in Medicine at Harvard Medical School and enjoys working as a general cardiologist at Beth Israel Deaconess Hospital–Needham, Beth Israel Deaconess HealthCare–Chestnut Hill Square, and the Cardiac Direct Access Center at BIDMC. He also attends on the inpatient cardiology service and consult service at BIDMC.

Murray A. Mittleman, MD, DrPH, DEc, is Program Director of the NIH-Funded T32 training program in Cardiovascular Research at BIDMC. He is Professor of Epidemiology and Chair of the Master of Public Health Program at the Harvard T.H. Chan School of Public Health. He directs an active research program in Cardiovascular Epidemiology and Patient-Centered Outcomes Research based jointly at the Cardiovascular Division at BIDMC and the Department of Epidemiology at the Harvard School of Public Health. His clinical practice in Preventive Cardiology is based at the Cardiovascular Health and Lipid Center at BIDMC.

Shweta Motiwala, MD, MPH, is an Instructor of Medicine at Harvard Medical School and a member of the CVI's Advanced Heart Failure section. Her clinical practice focuses on the care of patients with heart failure, including those who require mechanical circulatory support devices and heart transplants. Her clinical and research interests include the development of chronic disease management programs, such as the use of implantable hemodynamic monitoring devices and other remote monitoring systems in heart failure, as well as studies focusing on serum biomarkers, quality of life, and patient-reported outcomes in heart failure.

Reza Nezafat, PhD, is a Professor of Medicine at Harvard Medical School and serves as the Scientific Director of the Cardiac MR Center. Dr. Nezafat completed his training at Johns Hopkins School of Medicine and National Institute of Health in Biomedical Engineering prior to joining Harvard Medical School. Dr. Nezafat's research is to develop and apply new non-invasive methods in magnetic resonance imaging to guide therapy in cardiovascular disease.

Faculty



Eric A. Osborn, MD, PhD, is the Director of the Interventional Cardiology Fellowship Program and an Assistant Professor in Medicine at Harvard Medical School. He is also the Director of Intravascular Imaging at the Harvard Medical Faculty Physicians Cardiovascular Imaging Core Laboratory. His clinical and research interests include complex percutaneous coronary intervention, intravascular imaging, and coronary physiology.

Panos Papageorgiou, MD, PhD, is an Assistant Professor of Medicine at Harvard Medical School. He is also a staff electrophysiologist. His clinical research has focused on atrial anisotropy and atrial pacing for atrial fibrillation prevention.

Duane S. Pinto, MD, is Associate Professor of Medicine, Director of Underrepresented in Medicine Trainee Affairs of the Cardiac Care Unit (CCU) and Chief of the Interventional Cardiology section. He performs complex coronary and peripheral vascular and structural intervention. He maintains a general cardiology outpatient practice and his research interests include cost effectiveness evaluation of anticoagulation strategies for acute coronary syndromes as well as the development of approaches improving outcomes after myocardial infarction. He was a resident, chief resident, cardiology fellow and interventional cardiology fellow at BIDMC.

Jeffrey Popma, MD, is a Professor of Medicine at Harvard Medical School and the Director of Interventional Clinical Services at the BIDMC. Dr. Popma was a former President of the Society for Cardiovascular Angiography and Intervention and former Co-Chair of the American College of Cardiology Interventional Council. Dr. Popma also directs the BIDMC Angiographic Core Laboratory for numerous multicenter device studies for coronary and peripheral applications. Dr. Popma's clinical interest include aortic and mitral transcatheter valve replacement and intervention, drug eluting coronary stents, and radial artery access procedures. Dr. Popma has published over 400 peer-reviewed manuscripts in the field of interventional and structural cardiology. Dr. Popma has recently moved to a senior position at Medtronic but will continue to see patients at BIDMC.

Marie–France Poulin, MD, is an interventional and Structural Cardiologist who serves as the Associate Director of the Structural Heart Clinical Services. She is also the Associate Program Director for the Interventional Cardiology Fellowship. Dr. Poulin spends her time between structural heart interventions, inpatient and outpatient structural consults, coronary interventions, cardiac intensive care unit, as well as maintaining a continuity clinic. Dr. Poulin was previously an interventional fellow here at BIDMC, after which she completed an advanced fellowship in Structural and Congenital Heart Disease Interventions at Rush University Medical Center in Chicago. She stayed on as faculty for a few years prior to coming back to BIDMC. Her clinical and research interests include percutaneous mitral therapies, TAVR, percutaneous PFO and ASD closure, intracardiac echocardiography, as well as LAA exclusion procedures.

Pablo Quintero Pinzon, MD, is an Instructor of Medicine at Harvard Medical School and an advanced heart failure cardiologist. He is originally from Colombia. He is the Director of the Latin Cardiovascular Clinic, which delivers culturally sensitive cardiovascular care for Spanish speaking patients. He also serves as the Director of Underrepresented in Medicine Trainee Affairs for the Department of Medicine. After joining BIDMC as faculty, he established a Heart Failure bio-repository in order to facilitate translational research efforts within the division. He also created a multidisciplinary amyloid clinic.

Carl Rasmussen, MD, PhD, is a staff cardiologist at BIDMC and an Instructor of Medicine at Harvard Medical School. His clinical expertise is in the diagnosis and management of rhythm disturbances, utilizing both invasive and noninvasive methods.

Anne Riley, MD, is an Instructor of Medicine at Harvard Medical School and joined the Cardiovascular Division at BIDMC and BID–Needham in 2011. She is a clinical cardiologist who sees general cardiology patients and performs non-invasive cardiac testing at BID–Needham. She attends on the inpatient cardiology service and the cardiology consult service at BIDMC.

Jeremy Robbins, MD, is Associate Director of the Clinical Physiology Laboratory. His research interests are in the application of biochemical profiling to understand how exercise improves cardio metabolic health. His clinical interests include sports medicine, HFpEF, and applying advanced cardiopulmonary stress testing in the evaluation of patients with undifferentiated dyspnea. He attends in the Coronary Care Unit.

Faculty

Marwa Sabe, MD, MPH, is Associate Director of Advanced Heart Failure and Director of the Left Ventricular Assist Device (LVAD) program. She works with patients with temporary and permanent mechanical support devices and heart transplantations at BIDMC and she spends part of each year working at Tufts Medical Center with advanced heart failure patients who have had placement of LVADs and transplants.

Jeffrey E. Saffitz, MD, PhD, is the Mallinckrodt Professor of Pathology at Harvard Medical School and Chair of the Department of Pathology at BIDMC. He is an experimental cardiac pathologist who studies mechanisms of myocardial injury in the arrhythmogenic non-ischemic cardiomyopathies.

Eric Secemsky, MD, MSc, is the Director of Vascular Intervention and an interventional cardiologist at Beth Israel Deaconess Medical Center. He is also Section Head of Interventional Cardiology and Vascular Research at the Richard A. and Susan F. Smith Center for Outcomes Research in Cardiology and an Assistant Professor of Medicine at Harvard Medical School. He received his medical degree from Northwestern University and a Master's of Science in Epidemiology from the Harvard School of Public Health. Dr. Secemsky completed his internal medicine training at the University of California, San Francisco, and Cardiovascular Medicine, Interventional Cardiology, and Vascular Diagnostics and Intervention training all at Massachusetts General Hospital. Clinically, Dr. Secemsky splits his time attending in the cardiac catheterization lab, and the inpatient and outpatient vascular medicine services. Dr. Secemsky's research program focuses on optimizing outcomes for patients with peripheral vascular disorders, and includes comparative effectiveness research and clinical trials.

Keri Shafer, MD, a cardiologist focusing on adult congenital heart disease and pulmonary hypertension, who will strengthen our ties with Boston Children's Hospital. Dr. Shafer completed an internal medicine residency at Beth Israel Deaconess Medical Center in 2009 and subsequently completed an adult cardiovascular medicine fellowship in 2012 at UT Southwestern in Dallas. She returned to Boston in 2014 for an adult congenital heart disease and pulmonary hypertension fellowship at Boston Children's Hospital and Brigham and Women's Hospital before joining the Boston Adult Congenital Heart Group (BACH). Her clinical/research interests within ACHD include exercise physiology, echocardiography and medical education.

Samuel Shubrooks, MD, is Associate Professor of Medicine at Harvard Medical School and a member of the interventional cardiology section. Dr. Shubrooks clinical and research interests include interventional cardiology and aortic and mitral valvuloplasty.

Alexei Shvilkin, MD, is a clinical Assistant Professor of Medicine at Harvard Medical School. He completed residencies at Jacobi Medical Center in Medicine and at BIDMC in Cardiology and a fellowship at BIDMC in Cardiac Electrophysiology. Dr. Shvilkin is an electrophysiologist at both BIDMC and South Shore Hospital.

Jordan Strom, MD, MSc, is Assistant Professor of Medicine at Harvard Medical School, Director of Echocardiographic Research at Beth Israel Deaconess Medical Center in Boston, Massachusetts, and Section Head for Cardiovascular Imaging Research at the Richard A. and Susan F. Smith Center for Outcomes Research in Cardiology. His research which has been funded by the NIH and American Heart Association involves evaluation of the relationship of cardiac structure and function to health outcomes and the optimal use and timing of cardiac imaging in practice. He is the inaugural leadership academy member elected to the Board of Directors of the American Society of Echocardiography. He is additionally a member of the Editorial Board of the *Journal of the American Society of Echocardiography*, the leadership committee for the ACC Imaging Council, and is the current ACC representative to the Board of Directors of the Joint Review Committee on Education in Diagnostic Medical Sonography, which accredits sonography training programs in the United States.

Usman Tahir, MD, MBI, is the Director of Cardiovascular Genetics at Beth Israel Deaconess Medical Center and an Instructor of Medicine at Harvard Medical School. Dr. Tahir's clinical expertise is in the evaluation and management of inherited arrythmia, cardiomyopathy and systemic disease. His research interests include the integration of bioinformatic approaches with detailed molecular phenotyping and application of novel omic technologies, in efforts to better understand cardiovascular disease processes. Dr. Tahir aims to translate these findings to clinical practice to provide patients with individualized medical care.

Hector Tamez, MD, MPH, is an Instructor in Medicine at Harvard Medical School and an interventional cardiologist specializing in complex coronary interventions. He is an investigator in the Smith Center for Outcomes Research in Cardiology. His current research interests focus on outcomes after complex percutaneous coronary interventions (chronic total occlusions and in-stent restenosis) and on bleeding and thrombotic outcomes after percutaneous coronary intervention.

Faculty

Connie Tsao, MD, MPH, is Director of Clinical Cardiac MRI Research and specializes in clinical echocardiocardiography and cardiovascular magnetic resonance in the Non-invasive Cardiac Imaging and Testing Section of the Division. She is an Assistant Professor of Medicine at Harvard Medical School. Cross-trained in epidemiology, she is also an investigator at the Framingham Heart Study and works with several NHLBI cohort studies. Her NIH funded research is in the non-invasive assessment of cardiovascular remodeling and imaging in the pathophysiology and prognosis of subclinical and clinical disease. Active among several committees within the American Heart Association, she is past-Chair of the Council on Epidemiology and Prevention Early Career Committee and current Chair of the Statistics Committee.

Patricia Tung, MD, MPH, completed her fellowship in Cardiology and Cardiac Electrophysiology at Beth Israel Deaconess Medical Center in Boston, MA. She is the Program Director of the Clinical Cardiac electrophysiology fellowship program. Her research interests involve the interaction between sleep apnea and arrhythmia. Dr. Tung is also committed to the advancement of women in EP. Dr. Tung performs ablation procedures for atrial fibrillation, atrial flutter and SVT, and implantation procedures for cardiac pacemakers and defibrillators.

Richard L. Verrier, PhD, FHRS, is Associate Professor of Medicine at Harvard Medical School. His research focuses on neural control of heart rhythm with particular reference to atrial fibrillation and sudden cardiac death. A recent topic of emphasis has been tracking vulnerability to cardiac arrhythmias in individuals recovering from STEMI, NSTEMI, and acute coronary syndrome. These studies have been made possible by novel ECG analysis strategies such as T-wave alternans and R- and T-wave heterogeneity, which can be employed in diverse clinical platforms including 12-lead ECGs, EP study systems, and exercise tolerance and pharmacologic stress testing.

Rishi K. Wadhera, MD, MPP, MPhil, is a cardiologist and the Associate Program Director of the Cardiovascular Medicine Fellowship. Dr. Wadhera received his MD from the Mayo Clinic School of Medicine and an MPhil in Public Health as a Gates Cambridge Scholar from the University of Cambridge. He competed his Internal Medicine Residency and Cardiovascular Medicine Fellowship at Brigham and Women's Hospital. He also received an MPP at the Harvard Kennedy School of Government. Dr. Wadhera is a researcher at the Smith Center for Outcomes Research in Cardiology. His research focuses on health care access, quality and disparities, and understanding how health policy initiatives impact care and outcomes.

Jonathan W. Waks, MD, is a staff electrophysiologist. He directs the arrhythmia monitoring and ECG laboratories. Dr. Waks' main research interests involve use of novel electrocardiographic and vectorcadiographic methods of assessing risk for ventricular arrhythmias and sudden cardiac death. He sees patients in the electrophysiology clinic on Shapiro 7, implants pacemakers and defibrillators, and performs ablations as well as electrophysiology studies.

Francine K. Welty, MD, PhD The AHA awarded the 2021 Special Recognition Award in Arteriosclerosis to Dr. Welty for her research on resolution of inflammation in atherosclerosis and clinical work in cardiovascular prevention. Research findings include: 1) EPA and DHA supplementation leading to a high ratio of the downstream products, 18-HEPE + RvE1, to the proinflammatory mediator, leukotriene B4, was associated with regression of coronary plaque, and plaque regression was associated with fewer cardiovascular events over 30 months; 2) EPA and DHA improved physical and cognitive function over 30 months with DHA more effective than EPA; 3) pre-operative levels of 14-HDHA predicted remission of diabetes after bariatric surgery and 4) higher cardiorespiratory fitness in both women and men was associated with lower coronary artery calcium scores, which predict cardiovascular events and mortality.

Robert W. Yeh, MD, MSc, MBA, is Director of the Richard A. and Susan F. Smith Center for Outcomes Research in Cardiology at BIDMC, and Associate Professor of Medicine at Harvard Medical School. He holds the Katz-Silver Family Endowed Chair in Cardiovascular Outcomes Research. He also serves as the Associate Chief of Interventional Cardiology at BIDMC.

Meghan York, MD, is an Instructor of Medicine at Harvard Medical School and joined the Cardiovascular Institute in 2011. She attends on the general cardiology inpatient and consult services at BIDMC and maintains an active general cardiology practice at Beth Israel Deaconess Hospital–Needham.

Attending and Fellow Awards

George E. Altman, MD and Harriet Altman Annual Cardiology Fellow Award

2021 Timothy Maher, MD
2020 Vladimir Kaplinskiy, MD
2019 Mark Tuttle, MD
2018 Jakub Sroubek, MD, PhD
2017 Brett Carroll, MD
2016 Shweta Motiwala, MD
2015 Fernando Contreras Valdes, MD
2014 Jonathan W. Waks, MD
2013 Michael Gavin, MD
2012 Yuri B. Pride, MD
2011 Connie Tsao, MD
2010 Amit J. Thosani, MD
2009 Joyce Meng, MD
2008 Gregory Piazza, MD
2007 Christopher C. Pickett, MD
2006 Eli V. Gelfand, MD
2005 Ajay Kirtane, MD
2004 Alexei V. Shvilkin, MD
2003 Thomas Hauser, MD
2002 Duane S. Pinto, MD
2001 Allison W. C. Richardson, MD
2000 Lisa Thomas, MD
1999 Todd B. Seto, MD, MPH
1998 Orlando Rodriguez, MD, MMS
1997 Peter J. Zimetbaum, MD
1996 Roger J. Laham, MD

The First Year Fellows' Outstanding Teaching Award

2021 E. Wilson Grandin, MD
2020 Jason Matos, MD
2019 Brett Carroll, MD
2018 Peter J. Zimetbaum, MD
2017 Alfred E. Buxton, MD
2016 Alfred E. Buxton, MD
2015 Mark E. Josephson, MD
2014 Mark E. Josephson, MD
2013 Eli V. Gelfand, MD
2012 Alfred Buxton, MD
2011 James Chang, MD
2010 James Chang, MD
2009 Mark E. Josephson, MD
2008 David O'Halloran, MD
2007 Eli V. Gelfand, MD & Duane S. Pinto, MD, MPH
2006 Kalon Ho, MD
2005 Allison Richardson, MD
2004 Marilyn Riley, RDCS & Candace Silversides, MD

Franz Aepfelbacher, MD Second Year Fellows Award

2021 Serge Korjian, MD
2020 Timothy Maher, MD
2019 Vladimir Kaplinskiy, MD
2018 Jason Matos, MD
2017 Jeremy Robbins, MD
2016 Colin Phillips, MD
2015 Sudip Saha, MD
2014 Fernando Conturas Valdes, MD
2013 Jason D. Roh, MD
2012 Ethan Ellis, MD
2011 Natalie Bello, MD
2010 Andre Dejam, MD
2009 Airley E. Fish, MD

The First Year Fellows' Outstanding Mentor Award

2021 Aarti Asnani, MD

Diversity, Equity and Inclusion

Medical Education at BIDMC: A Welcoming, Respectful and Inclusive Environment

We are deeply proud of our long legacy of providing extraordinary care for all, regardless of race, ethnicity, socioeconomic level, sexual identity, sexual orientation, gender or age. Our staff, nurses, physicians, researchers and trainees personify this legacy by bringing unique expertise, perspectives, experiences, beliefs and values. This is what makes BIDMC the world-class academic medical center it is today.

BIDMC is committed to recruiting and nurturing a diverse community of interns, residents and fellows. As a trainee, you can expect:

- A vibrant environment with some of the world's most accomplished physicians and researchers
- Diverse faculty from countries around the world who are passionate about teaching
- Innovative educational tools and the most up-to-date medical technologies
- A workplace that welcomes all cultures, languages and lifestyles

Center for Diversity, Equity and Inclusion

BIDMC's Center for Diversity, Equity and Inclusion (CDEI) provides all of our physician trainees with personalized support for career development to ensure they get everything they need as they begin to shape the future of medicine. This includes one-on-one support and other programs that are designed to increase the satisfaction of faculty and trainees underrepresented in medicine (UiM).

CDEI programs and initiatives include:

- The Data Science Research Program for Underrepresented Minorities in Medicine
- Sponsorship of Boston-based leadership development opportunities for multicultural professionals
- Competitive research grants that support junior, multicultural physicians
- Online and in-person trainings for topics such as unconscious bias and healthcare equity
- Annual distinguished lectures on topics such as diversity and inclusion
- Networking and social events
- LGBTQ+ health education sessions and citywide PRIDE events
- Collaboration with Harvard Medical School's Office for Diversity Inclusion and Community Partnership

Boston Pride Parade

YMCA Black Achievers Awards

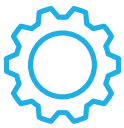
Latinx/Hispanic Heritage Month

Taking Care of You

Wellness Resources

- **On-Call Rooms:** Physicians and staff who need to stay overnight or sleep during the day because of fatigue from call duty may use an on-call room. Rooms are available on both East and West Campuses and contain one or two single beds, a night stand, desk and telephone. Shower and restroom facilities are located nearby, along with a linen cart with additional sheets and towels.
- **Program for House Staff Well-Being:** This program provides a confidential assessment, evaluation, and referral for psychiatric service, if necessary.
- **Recognizing Signs of Fatigue:** Fatigue can cause issue for physicians-in-training, compromise patient safety and increase potential for medical error. Now included in ACGME program requirements is a limit on resident duty hours; trainees cannot work more than 80 hours in a week and must have time off between shifts.
- **Physician Health Services:** Provided by the Massachusetts Medical Society, confidential consultations and support are available to physicians, residents and medical students facing health concerns.

Family Resources



- **BIDMC Families:** This social network is available for the spouses and partners of medical interns, residents and fellows.
- **Care.com:** This program offers employees backup childcare or adult care services for those times when regular childcare or adult care arrangements are unavailable.
- **Lactation Pump Rooms:** Staff returning to work after maternity leave have access to private pump rooms on the East and West Campuses.
- **The Parent Connection:** This free service is for first-time parents who deliver here at BIDMC.
- **Harvard Office of Work/Life:** This office serves the faculty, staff, post docs and students of Harvard Medical and Dental Schools, Harvard School of Public Health and participating affiliated institutions. Whether you're looking for child care centers, after school programs, summer camps, in-home child care providers or information about public or private schools, the Harvard Office of Work/Life can provide you with the resources you need to find the situation that works best for your family.

Commuting Resources

- **MBTA Pass Program:** BIDMC offers a subsidized MBTA pass for eligible employees. Cash sales are subsidized at 45 percent, and passes purchased through payroll deduction are subsidized at 50 percent, up to $120.
- **Taxi Vouchers:** BIDMC residents and fellows are eligible to receive a taxi voucher for Boston Cab Company if they have worked an extended shift and feels it is unsafe to drive home, or a shift has required the trainee to leave the hospital during off hours or when it is unsafe to walk home.

Graduate Medical Education Resources

The **Graduate Medical Resources** page on BIDMC's website will help you learn more about the policies, programs and responsibilities associated with being a graduate trainee in BIDMC Fellowship Training Program. We are required by NRMP to provide you this information. Please browse the policies and resources pages using that link to learn more about the resources listed below.

- Medical Education by Department
- Graduate Medical Education
- Our Team
- Commitment and Values
- GME Calendar
- House Staff Resources
- Lease Guaranty Program
- Incoming Housestaff – Applicants
- Rotators at BIDMC
- Policies
- GME Committee
- Diversity Committee
- Resource for Program Directors
- Orientation Schedule

Harvard Medical School

I hereby acknowledge receipt of Beth Israel Deaconess Medical Center's Resident Eligibility & Selection Policy (GME-17), process for Visa Sponsorship and sample GME Training Agreement.

I recognize that these documents do not constitute an expressed or implied contract of employment.

Use this link to complete the **BIDMC/HMS Acknowledgment Waiver Form.**

Beth Israel Deaconess Medical Center is a patient care, teaching and research affiliate of Harvard Medical School and consistently ranks as a national leader among independent hospitals in National Institutes of Health funding.

BIDMC is in the community with Beth Israel Deaconess Hospital–Milton, Beth Israel Deaconess Hospital–Needham, Beth Israel Deaconess Hospital–Plymouth, Anna Jaques Hospital, Cambridge Health Alliance, Lawrence General Hospital, Signature Healthcare, Beth Israel Deaconess HealthCare, Community Care Alliance and Atrius Health. BIDMC is also clinically affiliated with the Joslin Diabetes Center and Hebrew Rehabilitation Center and is a research partner of Dana-Farber/Harvard Cancer Center and the Jackson Laboratory. BIDMC is the official hospital of the Boston Red Sox. For more information, visit **bidmc.org**.

BIDMC is part of Beth Israel Lahey Health, a new health care system that brings together academic medical centers and teaching hospitals, community and specialty hospitals, more than 4,000 physicians and 35,000 employees in a shared mission to expand access to great care and advance the science and practice of medicine through groundbreaking research and education.

For more information, contact:

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