Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

Cardiology Faculty 2025 Research Spotlights

Introduction to Cardiovascular Medicine
Research Spotlights

May 2025

Dear Colleagues,

Reading through these faculty spotlights and the sheer breadth of work that you are leading has been nothing but amazing – a testament of how vibrant, creative, and deeply committed to the academic mission our BIDMC cardiology community is. We are incredibly grateful to work with all of you every day.

We hope that you, too, enjoy browsing through some of the research and academic pursuits that your colleagues are passionate about!

All our best,

Jennifer E. Ho, MD
Director of Research
BIDMC Cardiovascular Medicine

Robert E. Gerszten, MD
Chief of Cardiology
BIDMC Cardiovascular Medicine

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How do cancer therapies cause cardiovascular toxicity?

Aarti Asnani, MD

What have you found so far?

Using zebrafish, mouse, and human translational studies, we identified two molecular pathways that contribute to the pathogenesis of anthracycline cardiotoxicity - Cytochrome P450 family 1-mediated metabolism and hemopexin signaling. We are working to develop new biomarkers and cardioprotective therapies based on these findings. The goal of our research is to minimize heart toxicity in patients treated with anthracyclines.

Leadership Roles

Section Head, Cardio-Oncology;
Chair-Elect, American Heart Association Cardio-Oncology Committee

What else are you trying to figure out?

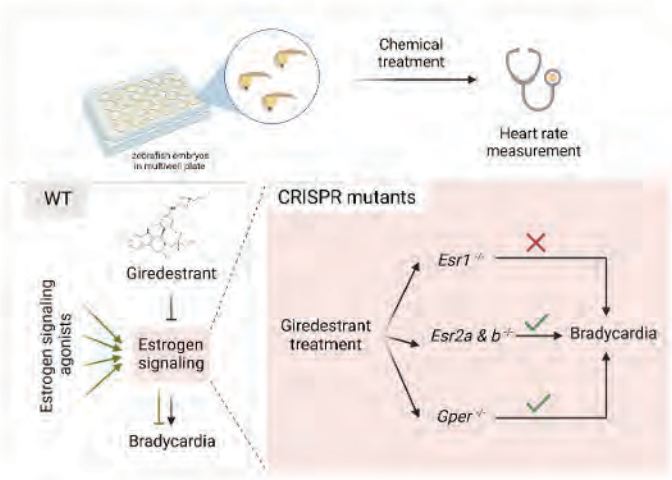
We are using chemical and genetic approaches in zebrafish models to understand how estrogen receptor degraders (a new treatment modality for breast cancer) cause bradycardia in patients.

What active grants, projects, or trials are you leading?

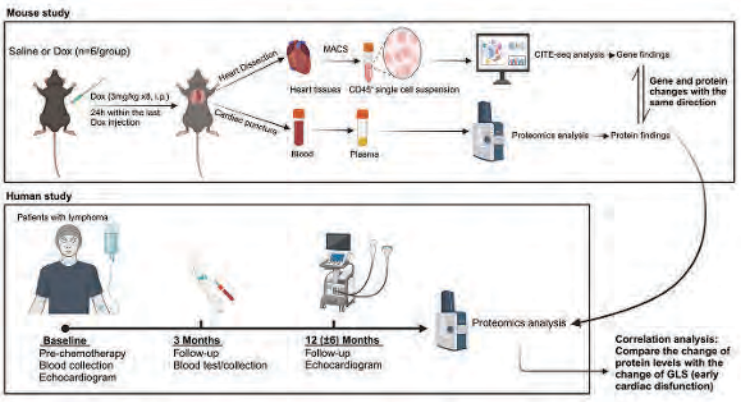
- NIH R01 HL163172
- ATRIUM trial (site PI)
- HESI THRIVE award

Work in Progress

Selective Estrogen Receptor Degraders Induce Bradycardia by Modulating Nuclear Estrogen Signaling



An Integrated Approach Using CITE-Sequencing and Plasma Proteomics Reveals Immune Signatures of Doxorubicin Cardiotoxicity



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How can we best apply emerging proteomics and metabolomics approaches to identify novel therapeutic targets in preventive cardiology?

Mark Benson, MD, PhD

What have you found so far?

The integration of plasma proteomics, metabolomics, and genomics profiling data from population studies can be used to identify novel biological pathways that can be experimentally tested at the bench. Using this approach, we have identified new roles for human plasma proteins and metabolites in the regulation of glucose, insulin, and lipid metabolism.

What else are you trying to figure out?

How can we leverage emerging large-scale functional genomic screening methods to "retro-translate" observations made in humans back to the bench more systematically? How can we use human proteomics and metabolomics findings to find new drug targets in preventive cardiology more efficiently?

Leadership Role

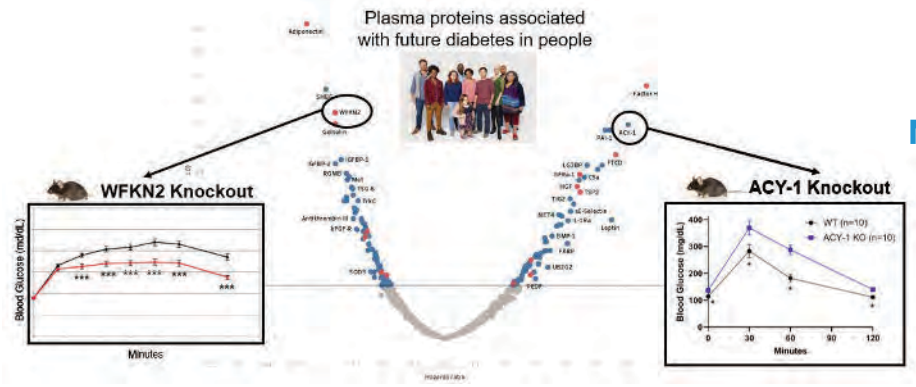
Director, Preventive Cardiology, BIDMC

What active grants, projects, or trials are you leading?

- NIDDK R01 (CYP4F Enzymes Regulate N-Acyl Amino Acid Signaling in Humans)
- Boehringer-Ingelheim investigator initiated grant (Real world barriers to the use of SGLT2i/GLP-1RA for cardiovascular disease prevention)
- Amgen investigator initiated grant (Proteomic and metabolomic characterization of PCSK9)

Publication Highlight

Proteomic profiling reveals biomarkers and pathways in type 2 diabetes risk.
Ngo, D, et. al. (2021). JCI insight, 6(5), e144392.



Two top plasma proteins associated with future diabetes risk in humans demonstrate novel functional roles in regulating glucose metabolism when knockout mouse models were tested using intraperitoneal glucose tolerance tests.

Main Mentor / Collaborator

Robert Gerszten, MD

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What causes AV conduction abnormalities during TAVR?

Alfred Buxton, MD

What have you found so far?

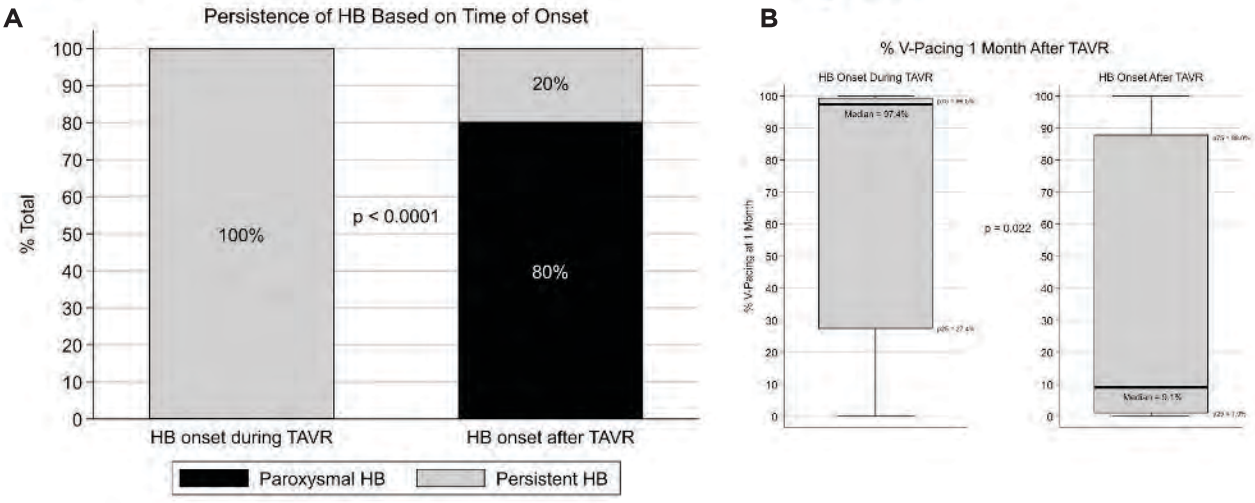
1. Sites of conduction block vary more than was previously documented
2. Mechanisms causing conduction block during TAVR differ from those causing delayed conduction block
3. Risk of delayed heart block can be predicted by His bundle recordings

What else are you trying to figure out?

What is the interaction between ventricular geometric remodeling and occurrence of ventricular tachy-arrhythmias in patients with healed MI and nonischemic cardiomyopathy?

Collaborators

Roger Laham, MD; Marie-France Poulin, MD; Jonathan Waks, MD; Andre D'Avila, MD; Patricia Tung, MD; John-Ross Clarke, MD; Katherine Kiernan, MD; Alexandra Medline, MD; Duane Pinto, MD, MPH; and Beatie Ultimo, DNP



A. Graph comparing time of onset of heart block (during TAVR implant procedure or after implant) versus pattern of block (paroxysmal or persistent). Percent refers to proportion of patients in each category. B. Graph comparing time of onset of heart block (during TAVR implant procedure or after implant) versus percent RV pacing at 30 days after TAVR. Boundaries of box plot refer to 25th and 75th percentile values.

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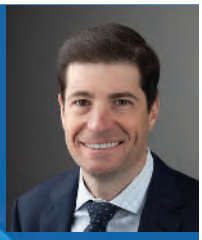
What is the role of vascular medicine in a multidisciplinary lymphedema clinic?



Brett Carroll, MD

What have you found so far?

Less than 10% referred to the lymphatic center ultimately underwent surgery. Vascular medicine is a vital aspect for clinical evaluation, imaging assessment, and optimization of conservative therapy for patients with lymphedema.

What else are you trying to figure out?

Does augmentation of lymphatic flow with a peripheral external pump or internal central lymphatic pump accelerate decongestion in decompensated heart failure.

What active grants, projects, or trials are you leading?

- Site PI: TITAN SvS
- Site PI: PE-TRACT

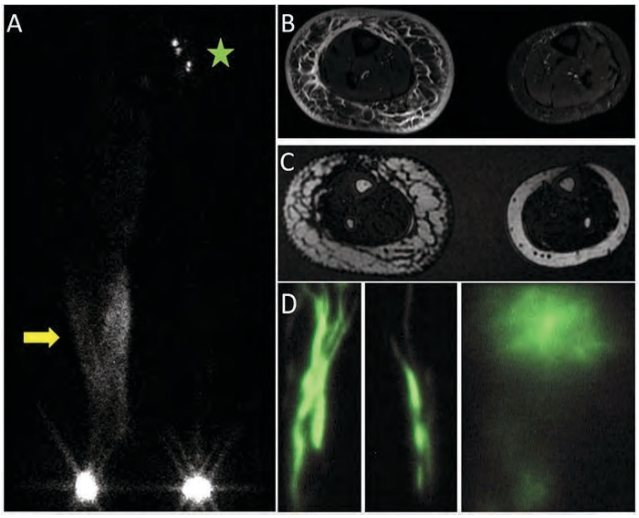
Collaborators

- Eric Secemsky, MD
- Dhruv Singhal, MD

Publication Highlight

Advances in lymphedema: An under-recognized disease with a hopeful future for patients. *Carroll BJ, Singhal D. Vasc Med 2024;29:70-84. PMID 38166534*

Figure Highlight



A) Nuclear lymphoscintigraphy; (B) MRI with edema in right lower extremity and (C) excessive adipose in left extremity (D) Indocyanine green with normal linear channels in foot and distal lower leg (two left panels), while stardust in proximal lower leg and thigh (right panel) with decreased brightness and more scattered pattern.

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Which circulating metabolites and proteins are associated with incident coronary heart disease in African Americans?

Daniel E. Cruz, MD

What have you found so far?

Some metabolites may be differentially associated with incident coronary heart disease based on self-identified race.

What else are you trying to figure out?

How does genetic ancestry influence health and disease through its influence on circulating proteins and metabolites?

Publication Highlight

Metabolomic Analysis of Coronary Heart Disease in an African American Cohort From the Jackson Heart Study. *Cruz DE et al. JAMA Cardiol. 2022;7(2):184-194.*

What active grants, projects, or trials are you leading?

- BIDMC URiM Faculty Career Development Award
- K01 "Admixture Mapping of Coronary Heart Disease and Associated Metabolomic Markers in African Americans"

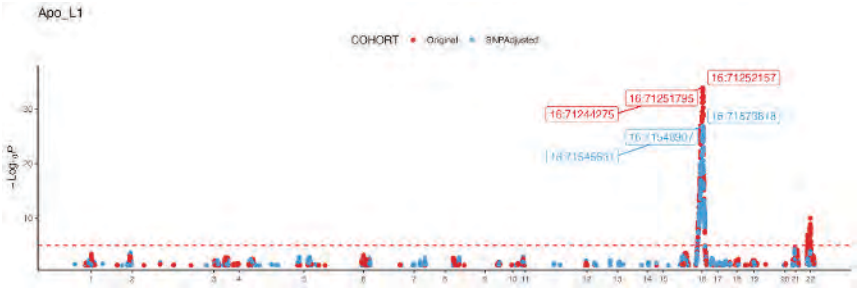
Leadership Roles

- Health Disparities Research Scholar; Health Disparities Research Institute; NIH, NIMHD

Main Mentors / Collaborators

- Robert Gerszten, MD
- James Wilson, MD
- Laura Raffield, PhD

Figure Highlight



Local admixture mapping (red) reveals genomic regions of African origin associated with levels of circulating Apolipoprotein L1. Conditional analysis (blue) reveals traditional GWAS may not fully explain levels of circulating proteins in non-European populations.

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Will angioplasty balloons coated with sirolimus reduce restenosis and ischemic PCI complications compared with drug-eluting stents?

Donald Cutlip, MD

What have you found so far?

We will complete the one-year follow-up of the first randomized clinical trial to address this question in patients with in-stent restenosis later this year. This trial will study outcomes for patients with previous restenosis of a coronary stent. Another study has just started enrollment and will test the drug-coated balloon compared with drug-eluting stents for de novo lesions in small vessels, where avoidance of an initial stent may be beneficial.

What else are you trying to figure out?

What is the optimal biomarker and threshold for defining peri-procedural myocardial infarction after PCI? Using a central laboratory and sampling multiple biomarkers at time of PCI we hope to demonstrate the best biomarker and threshold for defining this comp-lication of PCI.

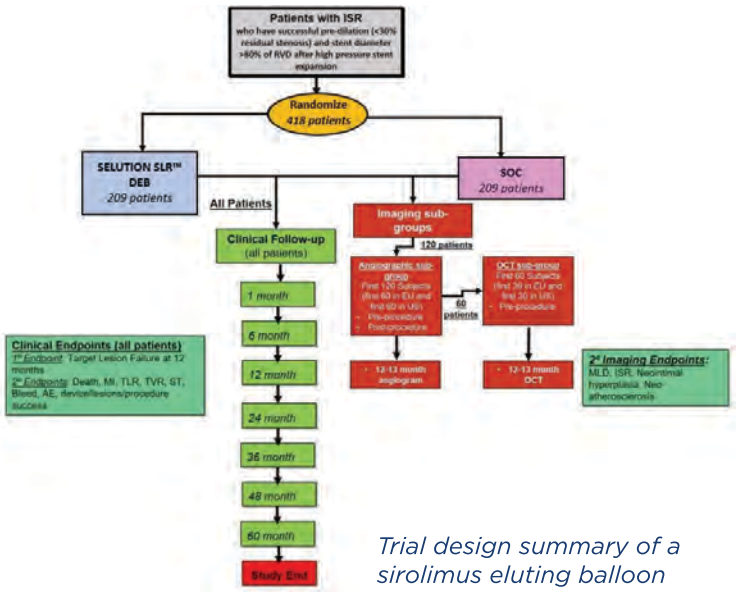
Leadership Roles

- Chief Medical Officer, Baim Institute for Clinical Research
- Academic Research Consortium, Steering Committee

Publication Highlight

Atrial shunt device for heart failure with preserved and mildly reduced ejection fraction (REDUCE LAP-HF II): a randomised, multicentre, blinded, sham-controlled trial. *Shah SJ, Borlaug BA, Chung ES, Cutlip DE, et al. Lancet. 2022;399:1130-1140.*

Figure Highlight



Trial design summary of a sirolimus eluting balloon versus drug eluting stent for treatment of intracoronary stent restenosis (ISR).

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Are there innovative approaches to treat and ablate ventricular tachycardia?

Andre d'Avila, MD, PhD

What have you found so far?

There is a new way to map and ablate ventricular tachycardia without VT induction.

What else are you trying to figure out?

Long-term outcome of patients who had a VT ablation without VT induction.

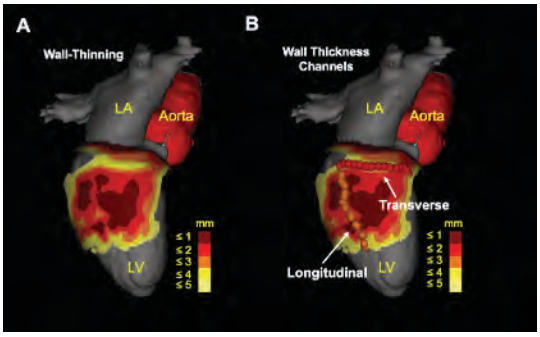
Leadership Roles

- Director, Electrophysiology Research

Publication Highlight

Patient Selection, Techniques, and Complication Mitigation for Epicardial Ventricular Tachycardia Ablation.
Card Electrophysiol Clin. 2022 Dec;14(4):657-677.

Figure Highlight



CTA-derived wall thickness features of an example ICM patient showing the inferior wall of the LV. A) Wall thickness segmentation shows an area of thinned myocardium ranging from 1-5 mm. B) Two example WTCs depicted in orange and red. Abbreviations: ICM: infarct-related cardiomyopathy; WTC: wall thickness channels.

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How frequently is radial access used for PCI in the United States and how does use of transradial versus transfemoral access for PCI impact clinical outcomes?

Reza Fazel, MD, MSc

What have you found so far?

Transradial PCI in the US increased from 20.3% in 2013 to 57.5% in 2022 and was associated with lower mortality, major access site bleeding, and other vascular complications but a higher risk of stroke.

What else are you trying to figure out?

What is the impact of radial versus femoral arterial access for PCI in subgroups such as patients with prior CABG? What are the sources of operator variation in transradial PCI, and how can further adoption be achieved?

Leadership Roles

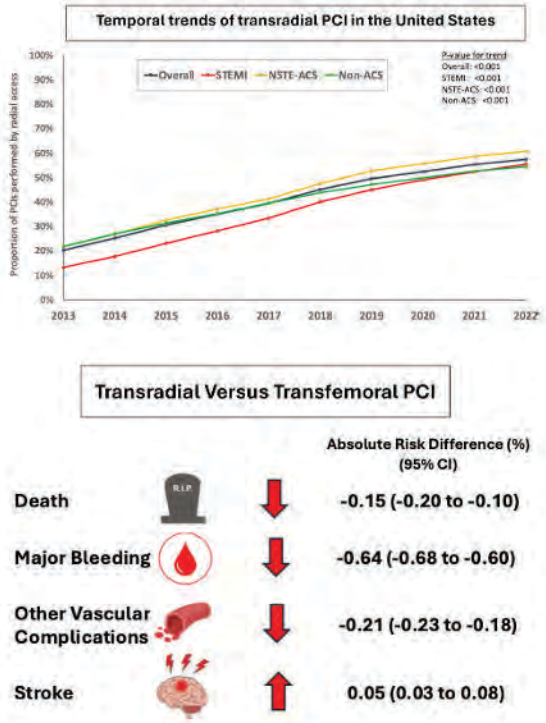
Member, Publications Committee, Society for Cardiovascular Angiography and Intervention

Mentors / Collaborators

- Robert Yeh, MD
- Eric Secemsky, MD
- David Cohen, MD

Publication Highlight

Temporal Trends and Clinical Outcomes with Radial Versus Femoral Arterial Access for Percutaneous Coronary Intervention in the United States. *Fazel R, Rao SV, Cohen DJ, Secemsky EA, Swaminathan RV, Manandhar P, Rymer JA, Wojdyla DM, Yeh RW. European Heart Journal 2025 (in press).*



Transradial PCI has become the dominant access for PCI in the US but opportunity for further adoption remains. Transradial PCI provided net clinical benefit including lower mortality, major bleeding and other vascular complications but a slightly higher stroke risk.

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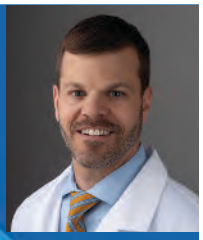
What is the impact on regional transplant volume, wait time to transplant, waitlist mortality, and post transplant survival following the opening of a new heart transplant center?



A. Reshad Garan, MD

What have you found so far?

Using the Scientific Registry of Transplant Recipients (SRTR) database, we have observed that the absolute numbers of heart transplants in a region increases following the addition of a new transplant center, highlighting the fact that the total number of transplants for that region's population may not be a fixed sum, but instead may increase with additional competition and improved access to transplant for patients.

What else are you trying to figure out?

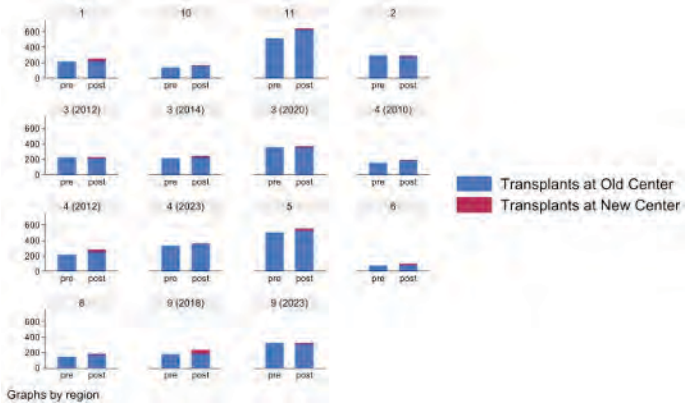
We are trying to understand whether the overall national trends in transplant practice account for this observation, or whether the addition of a new center truly improves access to transplant for patients in that region. We are also trying to understand if the addition of a new center impacts 1 year survival following transplant in that region.

What active grants, projects, or trials are you leading?

Executive steering committee member for the Cardiogenic Shock Working Group (Industry Funding From Abiomed, Boston Scientific, LivaNova, Teleflex, and Getinge)

Publication Highlight

Outcomes of Patients Transferred to Tertiary Care Centers for Treatment of Cardiogenic Shock: A Cardiogenic Shock Working Group Analysis. *Garan AR, et. al. J Card Fail. 2024 Apr;30(4):564-575. doi: 10.1016/j.cardfail. 2023.09.003. PMID: 37820897*



Impact of a new heart transplant center opening on the annual regional volume of heart transplants has varied in the 15 instances this has occurred since 2010. Openings are depicted according to region (1-11) and, in regions where there were multiple openings, by year.

Leadership Roles

Section Chief, Advanced Heart Failure, Cardiac Transplant, and Mechanical Circulatory Support; Executive steering committee member for the Cardiogenic Shock Working Group

Collaborators

Navin Kapur; Dan Burkhoff; Manreet Kanwar; Shashank Sinha; Jaime Hernandez-Montfort

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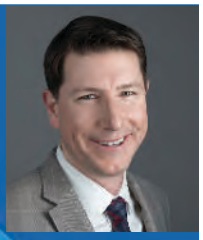
What is the cost effectiveness and operational impact of Cardiac Direct Access Unit (CDAc)?



Michael Gavin, MD, MPH

What have you found so far?

Our data suggests that a cardiology-directed observation unit serves as a high-value alternative to the ED for appropriately selected patients. We've seen reduced admissions and use of observation compared to historical ED based numbers.

What else are you trying to figure out?

We have updated our data out to six years post implementation of the CDAc and trends are very similar to our observations in 2019 seen below. We are looking to publish that data now and next hope to look more deeply at cost savings using the CDAc model.

Publication Highlight

Impact of an Outpatient Cardiology-managed Urgent Access and Observation Unit on Hospital Admissions. *Wallins JS, Cajiao KM, McCarthy KJ, Estrada-Roman A, Gavin MC. Crit Pathw Cardiol. 2019 09; 18(3):113-120.*

Leadership Roles

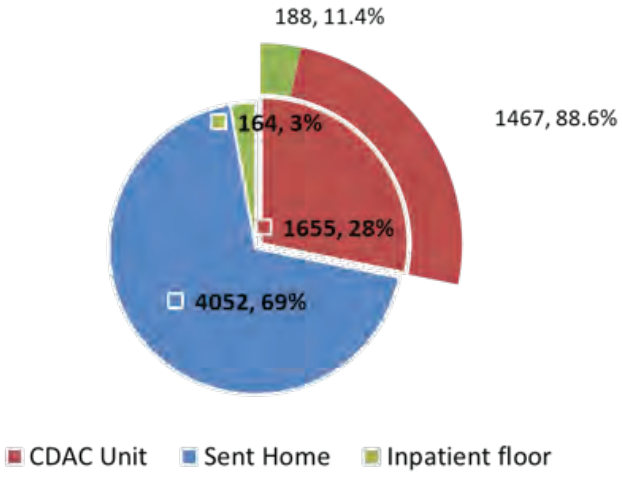
- Medical Director, CDAc
- Medical Director, CNP Service
- Medical Director, Klarman 9

Main Mentors / Collaborators

Mentor: Peter Zimetbaum, MD
Collaborator: Rishi Wadhera, MD

Figure Highlight

Breakdown of patient disposition from the CDAc over first six years.



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Can novel genomics tools be leveraged to identify new risk factors for cadiometabolic diseases?

Robert Gerszten, MD

What have you found so far?

We have identified dozens of circulating biomarkers that predict the onset of cardometabolic disorders over a decade before patients manifest clinical disease. In experimental studies, our work has also illuminated how different organs communicate on a molecular basis in the context of cardiac and metabolic diseases - or in the context of beneficial activities such as exercise. For example, we have shown that exercising muscle triggers the release of a novel metabolite that activates the burning of adipose tissue and improves glucose homeostasis in mice.

What else are you trying to figure out?

We are using large scale human genetics to parse whether novel circulating factors are "mere" disease biomarkers or whether they also contribute in a causal way to cardiovascular disease pathogenesis.

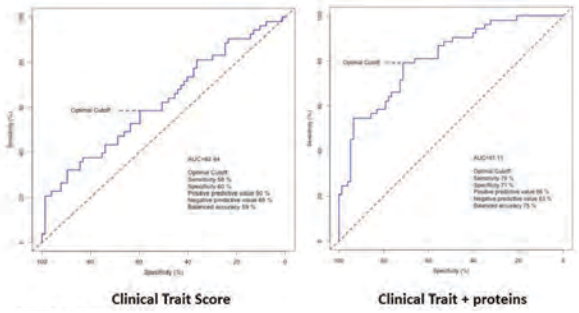
Leadership Roles

- Chief, Cardiovascular Medicine
- Senior Associate Member, Broad Institute

Publication Highlight

Human plasma proteomic profiles indicative of cardiorespiratory fitness. *Robbins, JM, et. al. Nature Metabolism. 2021 Sep;3(9):1275.*

Figure Highlight



Protein biomarkers in pre-training samples identify who will respond to an exercise training intervention: Receiver-Operating Characteristic Curves for Relative VO2max Changes (i.e., peak oxygen utilization) with Exercise Training.

What active grants, projects, or trials are you leading?

- NIH U24DK112340 (MPI: Gerszten, Carr, Clish, Newgard): A Biochemical Roadmap of Exercise Signaling (NIH MoTrPAC consortium)
- HHSN26820160 0 034I (PI: Gerszten): Proteomic and Metabolomic Profiling for the NIH TOPMed consortium (Framingham Heart Study, Jackson Heart Study, Multi-Ethnic Study of Atherosclerosis, and other cohorts)

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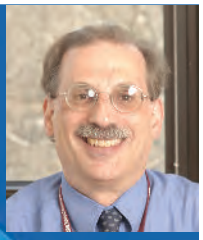
Can noninvasive measures of cardiac neuroautonomic control be used to predict major adverse cardiovascular events, including atrial fibrillation, as well as to assess biological vs. chronological aging?



Ary L. Goldberger, MD

What have you found so far?

Recently, we introduced the concept of heart rate fragmentation (HRF) and a set of computational metrics for its quantification based on analysis of heart rate dynamics. HRF reflects the integrity of cardiac autonomic control, overcoming intrinsic limitations of traditional heart rate variability (HRV) analysis. In the Multi-Ethnic Study of Atherosclerosis (MESA), we showed that the degree of HRF was predictive of major adverse cardiovascular events, atrial fibrillation, and cognitive decline. Independent studies have confirmed that HRF is associated with incident MACE and predictive of all-cause mortality.

What else are you trying to figure out?

We are investigating translational aspects of the relationship between cardiac neuroautonomic dysfunction, manifesting as HRF, and predisposition to Alzheimer's disease and related dementias. We hypothesize that HRF precedes clinical evidence of brain structural/ functional abnormalities.

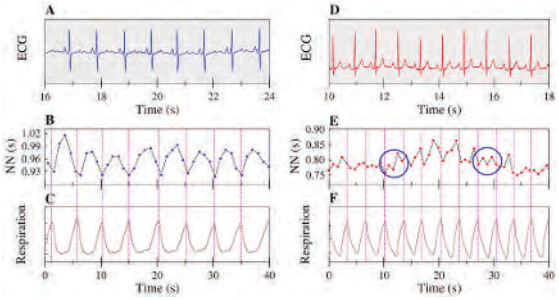
What active grants, projects, or trials are you leading?

- R01EB030362

Publication Highlight

Fragmented sinoatrial dynamics in the prediction of atrial fibrillation: the Multi-Ethnic Study of Atherosclerosis.
Costa MD, Redline S, Soliman EZ, Goldberger AL, Heckbert SR*. Am J Physiol Heart Circ Physiol. 2021;1:H256-H271 (*joint senior authors).*

Figure Highlight



Non-fragmented (left panels) vs. fragmented (right panels) heart rate dynamics. ECG (A); normal-to-normal (NN) interval time series (B); and respiration signals (C) during N2 sleep from a healthy 55 yr-old female and a 75-yr-old female with advanced cardiovascular disease (D to F). Note physiologic respiratory sinus arrhythmia in the healthy individual (B and C). Blue circles (E) highlight periods of marked sinus fragmentation, despite an ECG consistent with "normal sinus rhythm."

Leadership Roles

- Chief, Division of Interdisciplinary Medicine & Biotechnology, BIDMC
- Co-Director, Margret and H.A. Rey Institute for Nonlinear Dynamics in Medicine, BIDMC
- Program Director, PhysioNet, *NIH-sponsored Research Resource for Complex Physiologic Signals*

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Do patients supported with venoarterial extracorporeal membrane oxygenation (VA ECMO) benefit from having a concomitant mechanical left ventricular unloading device?

E. Wilson Grandin, MD, MPH, MEd

What have you found so far?

In observational data from the Extracorporeal Life Support Organization (ELSO), the concomitant use of IABP or pVAD was associated with lower inpatient mortality but higher rates of certain complications including cannula site bleeding and hemolysis.

What else are you trying to figure out?

We are trying to determine if the use of lower ECMO flows (partial flow) can provide adequate hemodynamic support and reduce complications during VA-ECMO, such as left ventricular distension, GI bleeding, and stroke events.

Leadership Roles

- Director, VA ECMO and Temporary Mechanical Circulatory Support
- Site Director, BIDMC/Tufts Advanced Heart Failure and Transplant Cardiology Fellowship
- Scientific Oversight Committee, Extracorporeal Life Support Organization

Mentors / Collaborators

Reshad Garan, MD; Shahzad Shaefi, MD; Michael Kiernan, MD; Joseph Tonna, MD

Publication & Presentation Highlights

Mechanical Left Ventricular Unloading in Patients Undergoing Venoarterial Extracorporeal Membrane Oxygenation.
Grandin, EW J Am Coll Cardiol. 2022 Apr 5;79(13):1239-1250.

Alvaro Delgado, MD, a research fellow working with our team, won the Jay N. Cohn New Investigator Award at the 2024 Heart Failure Society of America Scientific Sessions for his presentation on *"Higher ECMO Flow Index and Hyperoxia are Associated with Increased Mortality in Adults with Cardiogenic Shock Receiving Venoarterial Extracorporeal Membrane Oxygenation: An ELSO Registry Analysis."*

What active grants, projects, or trials are you leading?

2023 ELSO Research Grant
Association of initial ECMO flow index with outcomes in patients with cardiogenic shock supported with VA-ECMO. We are also conducting an analysis of the intersection of ECMO flow and arterial oxygenation with outcomes in adults with cardiogenic shock supported with VA-ECMO.

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How does obesity lead to heart failure with preserved ejection fraction (HFpEF)?

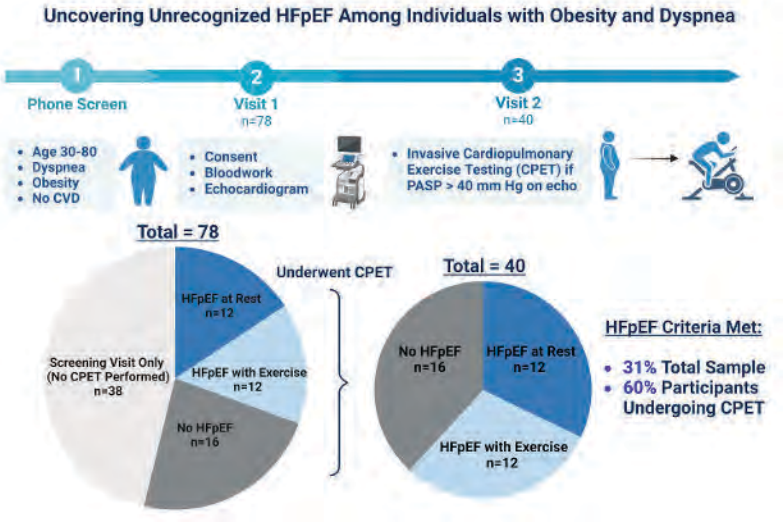
Jennifer E. Ho, MD

What have you found so far?

We found that: (1) HFpEF is often clinically underrecognized in individuals with obesity - up to a third of people with obesity and dyspnea met hemodynamic HFpEF criteria; (2) women with obesity are at greater susceptibility to develop HFpEF compared with men with obesity; (3) specific pro- and anti-inflammatory pathways likely mediate the association of obesity and metabolic dysfunction with HFpEF.

Publication Highlight

Uncovering Unrecognized Heart Failure With Preserved Ejection Fraction Among Individuals With Obesity and Dyspnea. *Kosyakovsky LB, et. al. Circ Heart Fail. 2024 May;17(5):e011366. doi: 10.1161/CIRCHEARTFAILURE. 123.011366. Epub 2024 May 14. PMID: 38742409.*



Among individuals with obesity and dyspnea without prior diagnosis of HFpEF, we found that at least 31% met HFpEF hemodynamic criteria. (Kosyakovsky LB et al, Circ Heart Fail, 2024)

What else are you trying to figure out?

We know that endothelial dysfunction is a central contributor to HFpEF. In current studies, we are investigating the effect of obesity and cardiometabolic disease on endothelial organelle stress, to better understand microvascular dysfunction across multiple vascular beds in HFpEF.

What active grants, projects, or trials are you leading?

- Mentoring in Patient-Oriented and Translational HFpEF Research (PI, K24 HL153669)
- Deep Learning to Identify Digital Biomarkers of Cardiovascular Disease (MPI: Ho/Ellinor/Maddah, AHA Collaborative Sciences Award)
- Long-Term Endothelial Effects of COVID-19 in Obesity (MPI: Ho/Hamburg, R01 HL160003)
- Endothelial Cell Health Across the Spectrum of Cardiometabolic Disease (MPI: Ho/Hamburg, R01 HL168889)
- Training Program in CV Research (MPI: Ho/Mittleman, T32 HL160522)

Leadership Roles

Director of Research, Division of Cardiology, BIDMC; Board of Directors, Sarnoff CV Research Foundation

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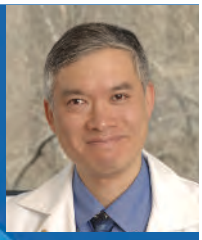
Beth Israel Deaconess Medical Center

How can we improve the quality of care provided by the Interventional Cardiology Section?



Kalon Ho, MD, MSc

What have you found so far?

It (still) takes a team effort to improve things, and we can always do even better.

Leadership Roles

- Moderator, Cardiac Catheterization Laboratory Quality Improvement Committee
- Core Faculty Member, Clinical Epidemiology and Population Health Module, Essentials of the Profession 2, HMS
- Chair, Data Governance Committee, National Cardiovascular Data Registry

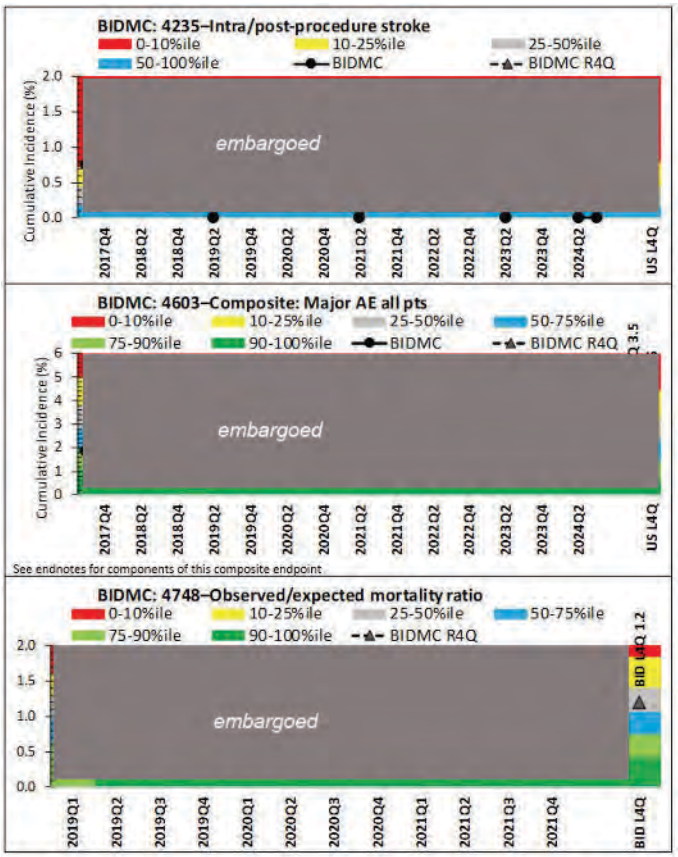
Publication Highlight

Rao SV, et. al.. Effect of Red Blood Cell Transfusion Strategy on Clinical Outcomes Among Patients with Acute Myocardial Infarction Undergoing Revascularization: A Prespecified Analysis of the MINT Trial. *Circ Cardiovasc Interv. 2025. Epub 20250330. doi: 10.1161/circinterventions. 125.015249. PubMed PMID: 40159118.*

What else are you trying to figure out?

I am working on easily customizable graphs, like the ones below, that will provide dashboards of important benchmarked metrics across our service line (e.g., PCI, TAVR, TMVR, MV-TEER, TV-TEER) and anonymized by operator, where available, that will automatically update quarterly.

Cardiac Cath Lab NCDR CathPCI Registry Dashboard



Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

Could we develop novel targeted therapy for coronary artery diseases?

Peter Kang, MD

What have you found so far?

We generated a novel genetically modified mouse model of coronary artery diseases. These mice develop atherogenic diet-induced hypercholesterolemia with a high UC:TC ratio and coronary arterial atherosclerosis and fatal heart disease. We showed that nano-polymers directed antioxidant treatment improved the cardiac functions of atherogenic diet-fed mice without altering cholesterol levels.

What else are you trying to figure out?

We are examining the effectiveness of other drugs targeted to oxidative stress and thrombus in treatment of ischemia/reperfusion injury animal models.

Publication Highlight

Nanoparticle-Directed Antioxidant Therapy Can Ameliorate Disease Progression in a Novel, Diet-Inducible Model of Coronary Artery Disease. *Su S, Chen Z, Ke Q, Kocher O, Krieger M, Kang PM Arterioscler Thromb Vasc Biol. 2024 Dec;44(12):2476-2488. doi: 10.1161/ATVBAHA.124.321030.*

What active grants, projects, or trials are you leading?

- Pfizer sponsored research grant

Collaborators

KAIST, Jeonbuk National University, Pfizer, and Celdara Medical

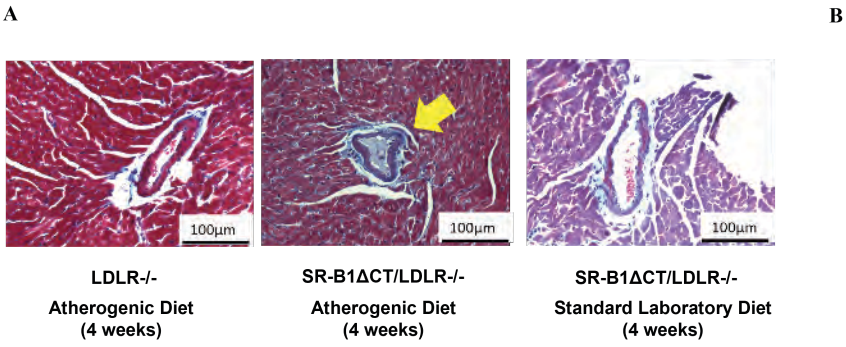


Figure. (A) The effects of atherogenic diet on coronary arteries of SR-B1D CT/LDLR-/- and control LDLR-/- mice. Representative Masson's trichrome staining of the hearts of LDLR-/- (left) and SR-B1DCT/LDLR-/- (center) mice after atherogenic diet, and SR-B1DCT/LDLR-/- mice fed a standard diet (right). The arrow indicates an occluded artery. (B) The effect of PVAX (targeted nano-polymer) treatment on the cardiac functions of the SR-B1DCT/LDLR-/- mice after atherogenic diet.

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

What is the real-world clinical and economic value of novel strategies for cardiovascular prevention in high-risk populations?

Dhruv S. Kazi, MD, MSc, MS

What have you found so far?

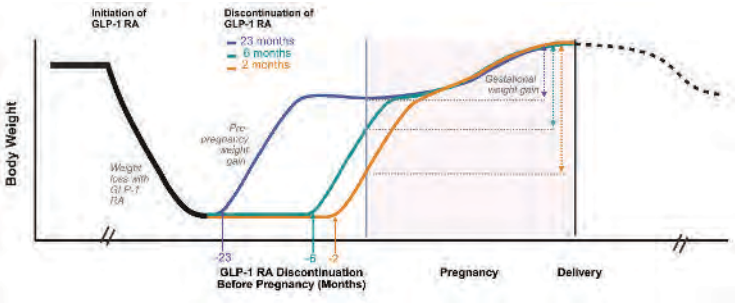
If current demographic and clinical trends continue, 180 million US adults will be living with obesity in 2050. Novel therapies like semaglutide and tirzepatide have the potential to improve population health, but only if we can address access, affordability, and adherence. Preliminary analyses suggest that the use of these therapies may not be cost-effective for the secondary prevention of CVD at current US prices and widespread uptake would cause unsustainable increases in pharmaceutical expenditures. But it is likely that there will be price reductions in the near future, and this would improve the economic value of these therapies.

What else are you trying to figure out?

How does the effectiveness of semaglutide in real-world populations compare with what was observed in clinical trials (evaluated using target trial emulation)? What is the effect of semaglutide discontinuation on cardiovascular and periconceptional outcomes? Finally, at what price would semaglutide therapy become cost effective?

Publication Highlight

Periconceptional Glucagon-Like Peptide-1 Receptor Agonist Use and Discontinuation. *Khan SS, Grobman WA, Kazi DS. JAMA Cardiol. 2025 Apr 16. doi: 10.1001/jamacardio.2025.0637. PMID: 40238124.*



Hypothetical trajectories of body weight change after initiation and discontinuation of GLP-1 RA before pregnancy and potential implications on gestational weight gain.

Leadership Roles

- Associate Director, Smith Center for Outcomes Research
- Director, Cardiac Critical Care
- Co-Chair, International Committee, AHA
- Associate Editor, Circulation

Mentors / Collaborators

- Issa Dahabreh
- Bobby Yeh
- Sadiya Khan

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

Can we improve on the standard approach to long-term management of patients with CIEDs?

Daniel B. Kramer, MD, MPH

What have you found so far?

We have started work on a large, pragmatic, multicenter clinical trial funded by the Patient-Centered Outcomes Research Institute. We will be comparing the safety and effectiveness two different strategies for monitoring patients with wireless pacemakers and implantable defibrillators. We are also exploring the experiences of patients and health care practitioners with different models of clinical care.

What else are you trying to figure out?

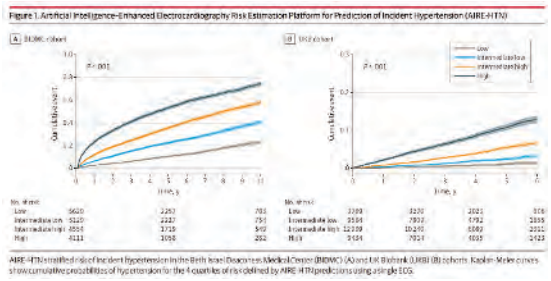
Our group is also exploring applications of artificial intelligence to ECGs, novel statistical approaches to clinical trajectories among patients with ICDs, and biomedical ethics questions arising from the growing use of smartphones for clinical care.

Leadership & Other Roles

- Director, Pacemaker and ICD Clinic at BIDMC
- Section Head, Electrophysiology and Digital Health, Smith Center for Outcomes Research
- Faculty at HMS Center for Bioethics

Publication Highlight

Mortality and readmissions after ventricular tachycardia ablation: An analysis of inpatient and outpatient state databases. *Brodeur PG, Ferro EG, Maher TG, Waks JW, d'Avila A, Zheng Z, Zimetbaum PJ, Michaud GF, Yang S, Buxton AE, Tung P, Yeh RW, Locke AH, Kramer DB. Heart Rhythm. 2025 Mar 12:S1547-5271(25)02173-3. PMID: 40086656.*



AIRE platform for AI-ECG analyses.

What active grants, projects, or trials are you leading?

- NIH: RO1AG068141, RO1HL161697
- PCORI: PLACER-2023C3-34968

Main Mentors / Collaborators

- Issa Dahabreh, MD
- Niraj Varma, MD
- David Frankel, MD

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

Is renal denervation a safe and effective treatment for uncontrolled hypertension?

Anna K. Krawisz, MD

What have you found so far?

BIDMC was one of the first sites in the country to perform commercial renal denervation (RDN) cases. We have now performed over 20 RDN procedures with no safety complications. Greater than 80% have had >5mmHg blood pressure reduction at 6 months follow-up.

What else are you trying to figure out?

We are compiling data on RDN patients at BIDMC and sites across the country to further assess safety and efficacy of the RDN procedure and durability of blood pressure response. We are also collecting blood samples from RDN patients for proteomics analysis to identify biochemical predictors of RDN response.

What active grants, projects, or trials are you leading?

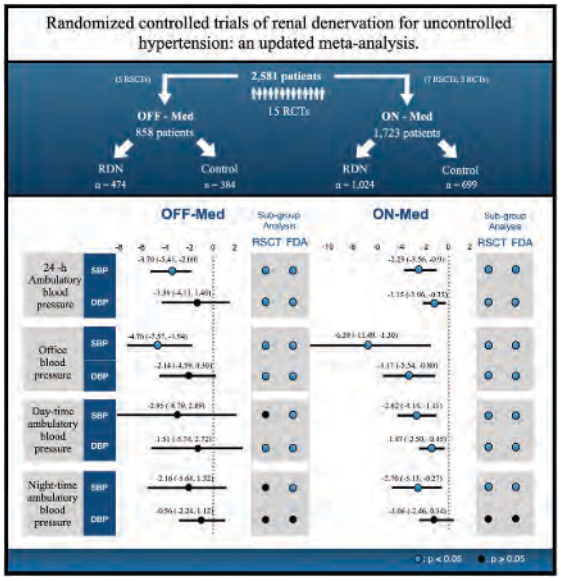
- Renal Denervation Registry
- Medtronic - SPYRAL AFFIRM trial, BIDMC

Leadership Roles

- Lead Cardiologist, Complex Hypertension Clinic

Publication Highlight

Update on the Role of Renal Artery Denervation in the Treatment of Hypertension. *Mewaldt, C., Crawford, E., Cluett, J. et al. An Curr Treat Options Cardio Med 27, 7 (2025). https://doi.org/10.1007/s11936-024-01063-1.*



Forest plots illustrating the efficacy RDN in treating uncontrolled hypertension across randomized clinical trials (RCTs), including subgroup analyses of randomized sham-controlled trials (RSCTs) and contemporary trials using US FDA–approved devices. DBP indicates diastolic blood pressure; OFF-Med, off antihypertensive medication; ON-Med, on antihypertensive medication; and SBP, systolic blood pressure.

Collaborators

Eric A. Secemsky, MD, Jennifer Cluett, MD, Robert W. Yeh, MD

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How can we improve structural heart disease (SHD) treatment?

Roger Laham, MD

What have you found so far?

- Imaging is crucial for structural heart disease treatment and we have defined imaging pathways for SHD.
- Shared decision making is essential in SHD therapy and may address health care disparities.
- New device development and novel therapies for SHD conditions.

What else are you trying to figure out?

We are developing and testing new devices and therapies for cardiac conditions. We are also examining outcomes of various SHD interventions in specific disease conditions.

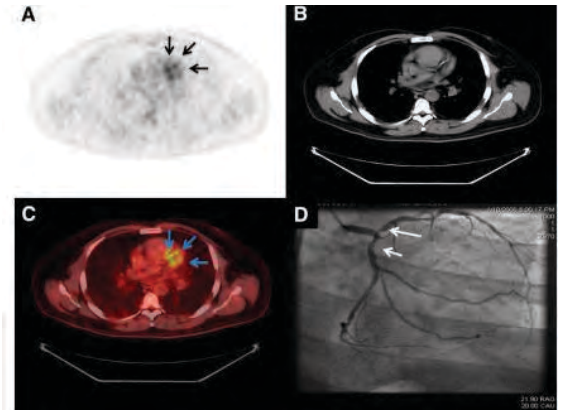
What active grants, projects, or trials are you leading?

- Medtronic/Abbott/Edwards Structural Fellowship Training Grant
- Edwards PASCAL TrAnScatheter Mitral Valve RePair System: CLASP IID/IIF Trial
- Tricuspid Valve Repair System Pivotal Triluminate Study
- Evoque Valve transcatheter valve: TRISCEND Trial
- Tendyne mitral valve for mitral valve disease: Summit Trial
- Transcatheter Mitral valve replacement: Appollo Trial

Publication Highlight

Lessons for Treating Structural Heart Patients during the COVID-19 Pandemic and Beyond. *Tuttle MK, et. al. Struct Heart. 2021 Jun;5(6):591-595. Epub 2022 Mar 21.*

Figure Highlight



Representative images of 18F-FDG PET (A), CT (B), PET/CT (C), and coronary angiography (D) from patient with good myocardial suppression and coronary 18F-FDG uptake (arrows).

Leadership Roles

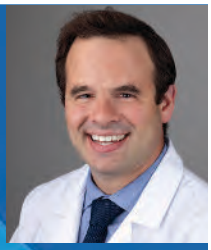
Director, Structural Heart Center

Collaborators

Mahmoud Feroze, MD, and David Liu, MD, BIDMC; Robert Lederman, MD, NIH; Core 320 study team, John Hopkins University

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

What are risk factors for the development of ventricular arrhythmias in cardiac sarcoidosis?



Andrew Locke, MD

What have you found so far?

I have found that a pseudoinfarct pattern on 12 lead ECG may predict future development of ventricular arrhythmias.

What else are you trying to figure out?

I would like to investigate additional risk markers for ventricular arrhythmias in cardiac sarcoidosis.

Mentors

- Peter Zimetbaum, MD
- Andre d'Avila, MD, PhD

Publication Highlight

Toward a Consensus for the Prevention of Sudden Death in Cardiac Sarcoidosis. *Locke AH, Zimetbaum P. JACC Clin Electrophysiol. 2021 Nov;7(11):1419-1421.*

What active grants, projects, or trials are you leading?

- Left vs. Left PCORI Trial (His/Left Bundle Pacing vs. LV Epicardial Pacing in Patients with CHF)
- eCOOL (RCT evaluating active esophageal cooling in PVI ablation)
- AIM-HIGHER: Cardiac Contractility Modulation for Patients with CHF

Table 1. CS Cohort Demographics

Characteristic	CS cohort n=34
Avg age	58 ± 11 years
Gender (male %)	76%
Race	
Caucasian	75%
African American	16%
Atrial fibrillation history	24%
Coronary artery disease history	21%

Table 2. CS Cohort Presence of Q waves

CS cohort	Q wave characteristic n=34
Presence of Q waves	12/34
Location of Q waves	
Inferior Q waves	10/12
Anteroseptal Q waves	2/12

100% (34/34) of included CS patients had evidence of LGE on CMR

Q waves on 12-lead ECG corresponded to regions of LGE in 100% of cases (12/12)

LOCATION OF LGE ON CMR

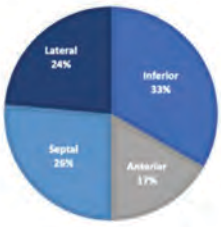


Figure 1. Representative Inferior Pseudoinfarct Pattern in a CS Patient with VT

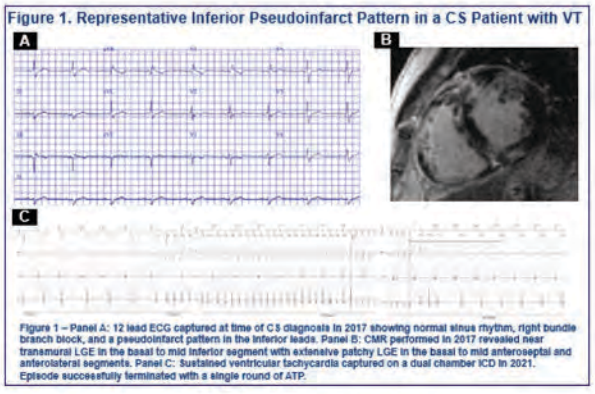


Figure 1 – Panel A: 12 lead ECG captured at time of CS diagnosis in 2017 showing normal sinus rhythm, right bundle branch block, and a pseudoinfarct pattern in the inferior leads. Panel B: CMR performed in 2017 revealed near transmural LGE in the basal to mid inferior segment with extensive patchy LGE in the basal to mid anteroseptal and anterolateral segments. Panel C: Sustained ventricular tachycardia captured on a dual chamber ICD in 2021. Episode successfully terminated with a single round of ATP.

Abstract presented at Heart Rhythm Society

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How can we locate and ablate ventricular tachycardia circuits without the need to induce dangerous arrhythmias during ablation procedures?

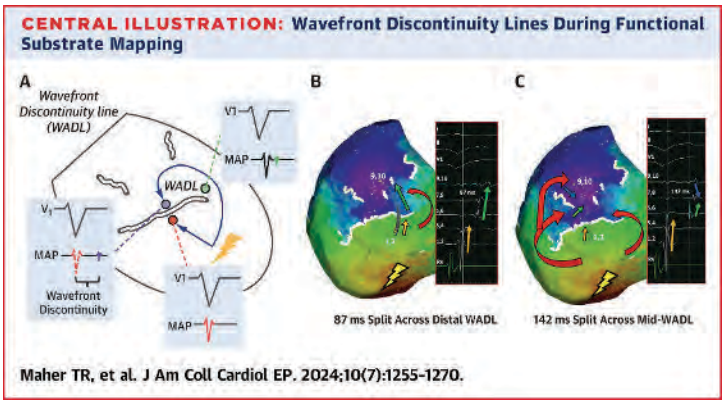
Timothy Maher, MD

What have you found so far?

We have found that during baseline rhythm, such as sinus rhythm or ventricular pacing, that abrupt timing differences in activation in adjacent areas can be visualized using 3D electro-anatomic mapping and these timing differences are often lines of conduction block that outline the boundaries of VT circuits.

Publication Highlight

Targeting Wavefront Discontinuity Lines for Scar-Related Ventricular Tachycardia Ablation: A Novel Functional Substrate Ablation Approach. *Maher TR, Freedman BL, Yang S, Locke AH, D'Angelo R, Galvao M, Buxton AE, Waks JW, d'Avila A. J Am Coll Cardiol EP. 2024 Jul, 10 (7_Part_1) 1255–1270.*



As a pacing wavefront approaches a fixed line of block, the wavefront must propagate around the barrier creating local timing differences in adjacent areas that can be mapped and targeted during VT ablation.

What else are you trying to figure out?

How do we use different ways of annotating abnormal electrograms to define ventricular lines of conduction block? How can ICD intracardiac electrograms and advanced imaging be used to predict focus areas in VT ablation?

What active grants, projects, or trials are you leading?

- FULCRUM-VT - A multicenter trial sponsored by Adagio testing ultra-low cryoablation to treat scar-related ventricular tachycardia
- Ultra HFib Redo - A multicenter trial of renal denervation as an adjunct to repeat ablation in patients with atrial fibrillation and hypertension
- Preclinical catheter ablation studies sponsored by Abbott Cardiovascular and LuxMed Systems

Leadership Roles

Associate Director of VT Ablation

Collaborator

Andre d'Avila, MD, PhD

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How do we best tailor anticoagulation for post-CABG atrial fibrillation?

Jason Matos, MD

What have you found so far?

We examined prescription patterns of anticoagulation use and amiodarone and 30 day outcomes for new atrial fibrillation after bypass surgery. We found that post-bypass anticoagulation was associated with increased bleeding without difference in stroke at 30 days.

Leadership Roles

- Firm Chief- Blumgart Firm, Internal Medicine Residency Program
- Director of Inpatient Cardiology Education

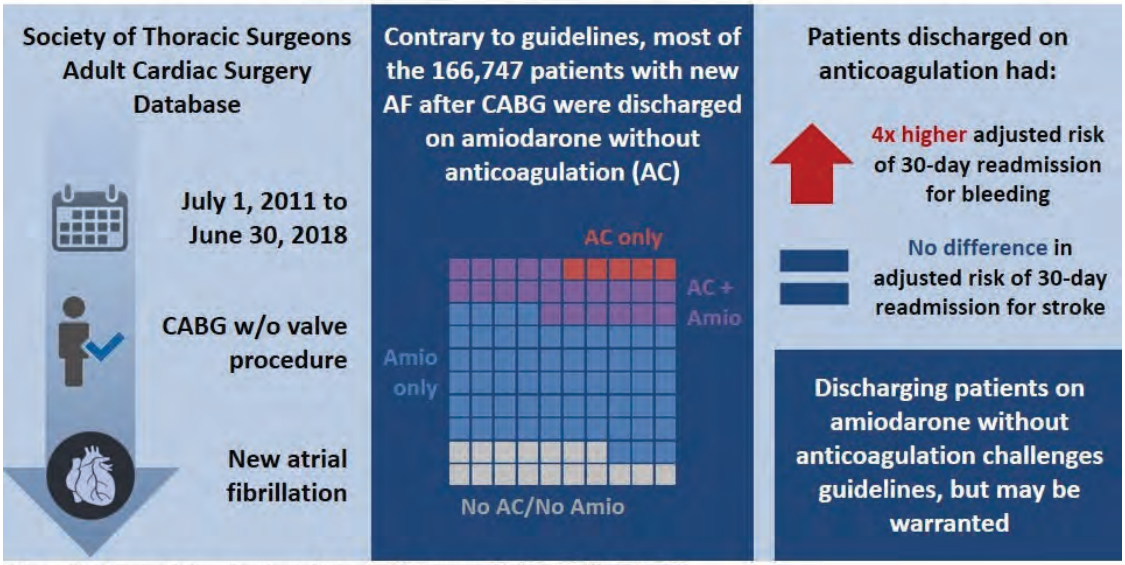
Main Mentors / Collaborators

- Peter Zimetbaum, MD

Publication Highlight

Post-Cardiac Surgery Atrial Fibrillation: Risks, Mechanisms, Prevention, and Management.
Matos, J. D., Sellke, F. W., & Zimetbaum, P. (2021). Cardiac electrophysiology clinics, 13(1), 133–140.

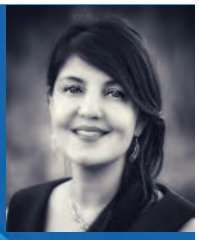
Prescription Patterns in Post-CABG Atrial Fibrillation



Matos JD, McIlvaine S, Grau-Sepulveda M, Jawitz OK, Brennan JM, Khabbaz KR, Sellke FW, Yeh RW, Zimetbaum P. *J Thorac Cardiovasc Surg.* 2019

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

Can zebrafish accelerate early-stage drug discovery for aging skeletal muscle?



Anjali K. Nath, PhD

What have you found so far?

Zebrafish are small vertebrate animals that experience a gradual, age-related decline in cognitive function, endocrine homeostasis, and skeletal muscle mass. We developed a fast, sensitive method for quantifying changes in organismal muscle function and muscle quality by noninvasively measuring electrical bioimpedance of skeletal muscle—ultimately, this creates a "virtual muscle biopsy." These bioelectrical features of muscle degeneration correlate strongly with decreased motoric function (swimming capacity) and muscle mass (myofiber size).

What else are you trying to figure out?

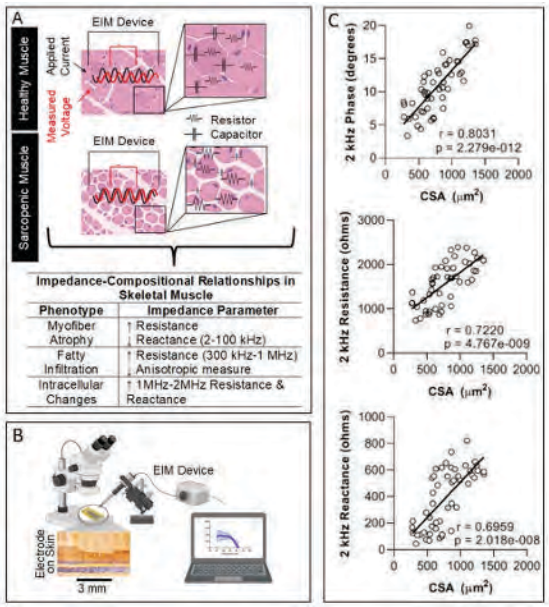
Identifying electrophysiological biomarkers of healthy young versus sarcopenic aged zebrafish is providing new opportunities to evaluate potential therapeutics for age-related disorders. Moreover, we are using our "virtual muscle biopsy" platform to interrogate novel mechanisms of aging.

Collaborators

- Seward Rutkove, MD
- Robert Gerszten, MD

Publication Highlight

Surface Electrical Impedance Myography Detects Skeletal Muscle Atrophy in Aged Wildtype Zebrafish and Aged gpr27 Knockout Zebrafish. *Rutkove SB, Chen ZZ, Pandeya S, Callegari S, Mourey T, Nagy JA, Nath AK. Biomedicines. 2023.*



A "virtual muscle biopsy" for adult zebrafish. A) Basic concepts of impedance in healthy versus sarcopenic muscle. Compositional and structural features of bulk muscle tissue affect its electrical conduction properties. B) Diagram of the overall set-up we built. C) Altered bioelectrical impedance in muscles of aged zebrafish correlates with myofiber size.

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

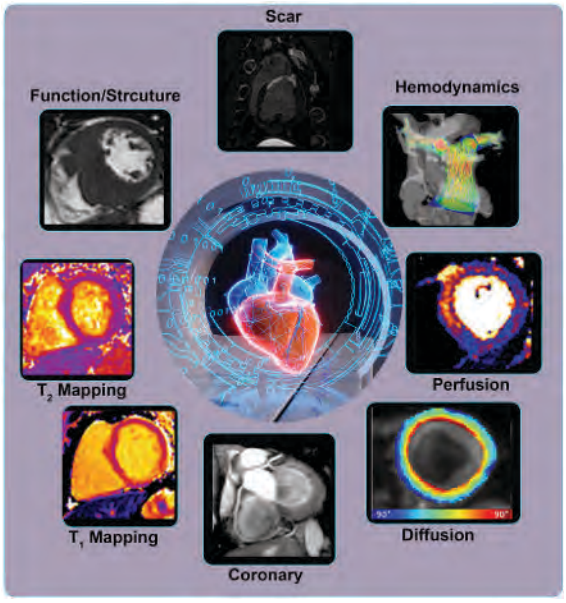
How to build the next-generation of cardiovascular MRI imaging technologies for precision phenotyping of cardiovascular disease?

Reza Nezafat, PhD

What have you found so far?

Our research focuses on the development and application of cardiovascular magnetic resonance imaging and artificial intelligence-based solutions for improving imaging efficiency, quality, image analysis, interpretation, diagnosis, and prognosis of heart disease. My laboratory uses a multi-pronged approach based on engineering, physics, and cardiovascular medicine to fulfill our mission of advancing cardiovascular imaging through innovative research.

Figure Highlight



Cardiac MR imaging provides a comprehensive assessment of the structure, function, perfusion, viability, hemodynamics, microstructure, and myocardial mapping via T1, T2, and T2. The imaging protocol typically includes basic function, structure,flow, and the remaining necessary sequences are tailored based on the patient indication with a typical scan time of 45–60 minutes.*

Publication Highlight

An Explainable Machine Learning Approach Reveals Prognostic Significance of Right Ventricular Dysfunction in Non-ischemic Cardiomyopathy. *Fahmy, AS, et. al. JACC. Cardiovascular imaging, 15(5), 766–779.*

What active grants, projects, or trials are you leading?

- National Institutes of Heath
- American Heart Association

What else are you trying to figure out?

Our current research activities include developing and applying AI-based CMR solutions and value-based AI in heart disease, novel exercise cardio-pulmonary MRI phenotyping of cardiovascular, pulmonary, and skeletal muscle physiology tissue composition, and energetics in heart failure, leveraging new imaging and AI techniques to understand mechanisms of ventricular arrhythmia and heart failure, developing non-gadolinium MRI techniques to reduce cost, environmental pollution, and improve patient safety.

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

Can artificial intelligence provide rapid and accurate mapping of plaque calcification from intracoronary optical coherence tomography images?

Eric A. Osborn, MD, PhD

What have you found so far?

A novel deep neural network based on a UNet-like architecture was developed to identify calcified atherosclerotic plaque, with 7,076 and 1,183 cross-sectional images comprising the training and testing datasets, respectively. The mean analysis time required by the AI model to analyze a 75 mm long OCT image pullback (~375 images) was 1.1 minutes, compared to 38.0 minutes for manual analysis. Pixel-based classification by the AI model performed best to identify calcified plaque (AUC = 0.96), correctly identifying 934 of the 1,248 calcified plaques with an overall diagnostic accuracy of 73.3%.

What else are you trying to figure out?

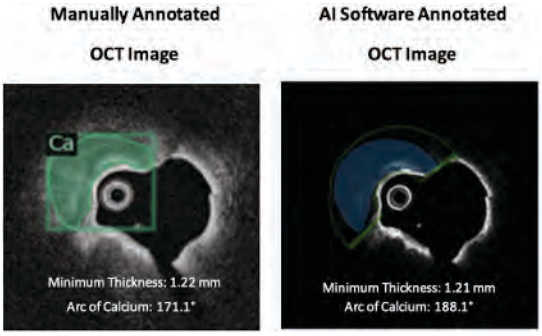
Implementation of an automated AI software algorithm provides a rapid and efficient method to comprehensively map coronary calcium in intravascular OCT images. Future work will be needed to determine how automated AI coronary calcium detection strategies impact clinical decision making and outcomes during percutaneous intervention procedures.

Leadership Roles

Program Director, Interventional Cardiology Fellowship; Director, Intravascular Imaging, Cardiovascular Core Lab

Publication Highlight

Safety and efficiency of percutaneous coronary intervention using a standardised optical coherence tomography workflow.
Osborn EA, et al. (2023) Eurointervention. Feb;18(14):1178-1187. PMID: 36373421



Intracoronary OCT image comparison of manual and automated AI coronary plaque calcium (Ca) segmentation.

What active grants, projects, or trials are you leading?

- NIH SBIR R43HL167290
- REFINE-PCI (NCT05491668)
- Physio-Anatomy (NCT05312164)
- Intracoronary Acetylcholine Stability (Philips)

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How do Medicare policies impact care delivery and outcomes for patients with cardiovascular disease?

Andrew Oseran, MD, MBA, MSc

What have you found so far?

Over half of Medicare beneficiaries are now enrolled in a Medicare Advantage plan. Despite costing the federal government billions of dollars more per year, we have found that beneficiaries with ASCVD and heart failure in Medicare Advantage are not sicker or more complex than their counterparts in traditional Medicare, and also do not experience better care (e.g., access or affordability). In addition, we found that including Medicare Advantage beneficiaries in hospital quality metrics (which are currently based only on traditional Medicare beneficiaries) substantially changes hospital performance.

What else are you trying to figure out?

Does the Inflation Reduction Act (IRA) - which caps out-of-pocket drug costs for Medicare beneficiaries and enables the federal government to negotiate prescription drug prices - lead to improvements in medication adherence and clinical outcomes for patients with heart failure?

What active grants, projects, or trials are you leading?

K23 (K23HL173636):
Evaluating Policies to Improve Heart Failure Outcomes in Medicare

Publication Highlight

Prevalence of Chronic Medical Conditions Among Medicare Advantage and Traditional Medicare Beneficiaries.
Oseran AS, Aggarwal R, Figueroa J, Joynt Maddox KE, Landon BE, Wadhera RK. Ann Intern Med. 2025 Mar;178(3):327-335. doi: 10.7326/ANNALS-24-01531. Epub 2025 Feb 25. PMID: 39993310.

AMI

FFS Only	Quintile	FFS + MA 1	2	3	4	5	Total
	1	266 (72.3)	71 (19.3)	24 (6.5)	6 (1.6)	1 (0.3)	368
	2	68 (18.4)	173 (46.9)	85 (23.0)	36 (9.8)	7 (1.9)	369
	3	24 (6.5)	83 (22.5)	145 (39.3)	95 (25.7)	22 (6.0)	369
	4	7 (1.9)	38 (10.3)	90 (24.4)	158 (42.8)	76 (20.6)	369
	5	3 (0.8)	4 (1.1)	25 (6.8)	74 (20.1)	263 (71.3)	369

Heart Failure

FFS Only	Quintile	FFS + MA 1	2	3	4	5	Total
	1	411 (73.4)	115 (20.5)	29 (5.2)	4 (0.7)	1 (0.2)	560
	2	99 (17.7)	288 (51.4)	138 (24.6)	31 (5.5)	4 (0.7)	560
	3	39 (7.0)	127 (22.6)	233 (41.5)	134 (23.9)	28 (5.0)	561
	4	11 (2.0)	24 (4.3)	137 (24.5)	296 (52.9)	92 (16.4)	560
	5	0 (0.0)	6 (1.1)	24 (4.3)	95 (17.0)	435 (77.7)	560

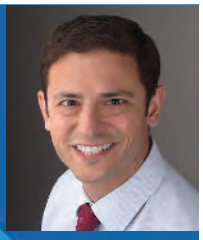
Hospitals were classified into performance quintiles, with group 1 representing "best-performing" and group 5 "worst-performing" hospitals. Each row shows hospitals falling within a specific group of mortality performance based on FFS beneficiaries only, and each column shows the number (percentage) of those hospitals that would (or would not) be reclassified with the inclusion of MA beneficiaries in performance evaluation.

Mentors / Collaborators

- Rishi Wadhera, MD, MPP, MPhil
- Robert Yeh, MD, MSc

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

What are the molecular determinants of cardiorespiratory fitness (CRF)?



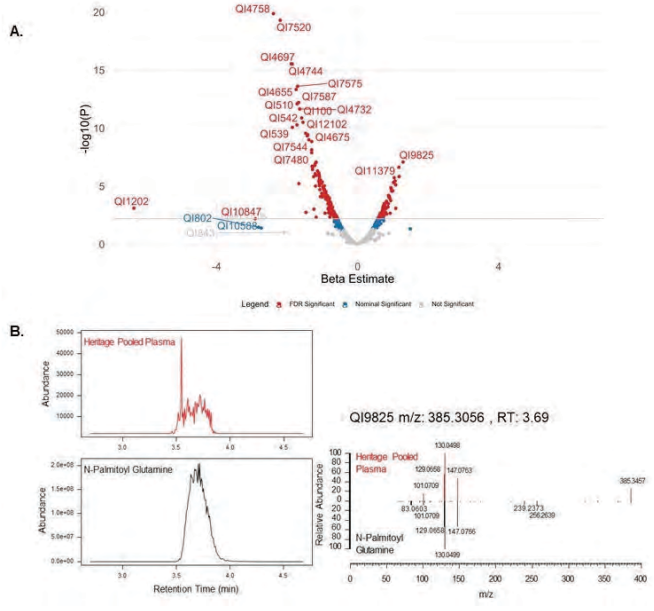
Jeremy Robbins, MD

What have you found so far?

We have identified previously unknown, circulating metabolites that are both associated with CRF, are exercise-responsive, and that induce a mitochondrial phenotype associated with aerobic exercise training.

Publication Highlight

Proteomic analysis of cardiorespiratory fitness for prediction of mortality and multisystem disease risks.
Perry AS, et. al. Nat Med. 2024 Jun;30(6):1711-1721. doi: 10.1038/s41591-024-03039-x. Epub 2024 Jun 4. PMID: 38834850; PMCID: PMC11186767.



*(A). Volcano plots showing metabolite level relationships with VO2max (ml*kg-1min-1) at baseline after adjustment for age, sex, batch, and lean body mass in analysis that combined all MS peaks. (B) MS peak QI9825 identified in the HERITAGE Family Study confirmed as N-palmitoyl glutamine using an authentic standard. m/z: mass to charge ratio, RT: retention time in minutes*

What else are you trying to figure out?

What are the shared and different blood biochemical responses to acute resistance and endurance exercise?

What active grants, projects, or trials are you leading?

- DMGV and the AGXT2 pathway in chronic exercise-induced cardiometabolic adaptations
- Integrative analysis of genomics and proteomics to identify candidate molecular transducers of CRF fitness

Leadership Roles

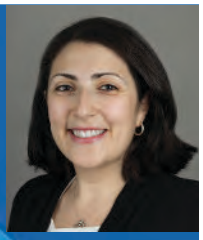
- Lead, Clinical x Omics Working Group, Molecular Transducers of Physical Activity Consortium (MoTrPAC)
- Associate Director, Clinical Physiology Laboratory
- Academy of Exercise Medicine, Founding Member

Mentors / Collaborators

Mark Sarzynski, Medical University of SC; Shingo Kajamuri, BIDMC; Scott Summers, University of Utah; Clary Clish, Broad Insitute; Charles Burant, UMich

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

Do pre-implant and residual mitral regurgitation contribute to early and late RHF in patients with LVADs?



Marwa Sabe, MD, MPH

What have you found so far?

We are currently gathering data from CCF, TMC, and BIDMC.

What else are you trying to figure out?

Does mitral valve repair either before or at the time of LVAD implantation improve the incidence of RHF and survival in this patient population?

Leadership Roles & Recognition

- Associate Director, Advanced HF/MCS Program
- Director, VAD Program
- Course Director, HMS Cardiology Rotation at BIDMC
- Shore Fellowship, 2019

Publication Highlight

Predictors and Prognostic Significance of Right Ventricular Ejection Fraction in Patients With Ischemic Cardiomyopathy.
Sabe MA, Sabe SA, Kusunose K, Flamm SD, Griffin BP, Kwon DH. Circulation. 2016 Aug 30;134(9):656-65.

Main Mentors / Collaborators

- Debbie Kwon, Cleveland Clinic Foundation
- Michael Kiernan and Gaurav Gulati, Tufts Medical Center

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How does inflammation of the vascular endothelium contribute to thrombosis?

Alec Schmaier, MD, PhD

What have you found so far?

We have identified transmembrane channels in the TMEM16 family that, in response to inflammatory stimuli, expose procoagulant phospholipids on the cell surface and release of extracellular vesicles that promote thrombosis. We have found drugs that block these channels and prevent thrombosis in animal models.

What else are you trying to figure out?

TMEM16 proteins appear to regulate other fundamental aspects of vascular biology such as barrier function, cytokine release, and angiogenesis. We are exploring these roles in future studies.

What active grants, projects, or trials are you leading?

- NHLBI K08HL161259
- AHA Career Development Grant
- BIDMC SPARK Award

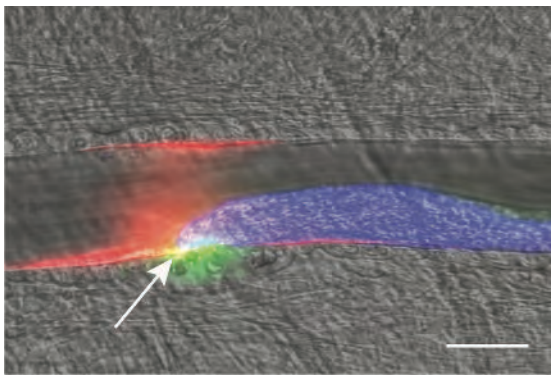
Leadership Roles

- Organizer: LMA Cardiovascular Conference and BIDMC CV Research Seminar Series
- Editorial Board, Vascular Medicine Journal

Publication Highlight

Schmaier AA, Anderson PF, Chen SM, El-Darzi E, Aivasovsky I, Kaushik MP, Sack KD, Hartzell HC, Parikh SM, Flaumenhaft R, Schulman S. **TMEM16E regulates endothelial cell procoagulant activity and thrombosis**. J Clin Invest. 2023 Jun 1;133(11):e163808. doi: 10.1172/JCI163808. PMID: 36951953; PMCID: PMC10231993.

Figure Highlight



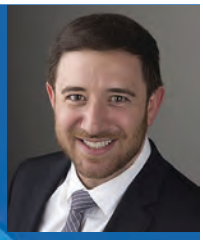
Laser injury mouse thrombosis model with intravital microscopy. Thrombus formation can be measured in real-time following laser activation of vessel wall. Externalization of procoagulant phosphatidylserine is detected with annexin V (red), along with antibodies against platelets (blue), and fibrin (green).

Collaborators

- Daniel Kramer, MD, MPH
- Robert Flaumenhaft, MD, PhD
- Sol Schulman, MD, PhD

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How do we evaluate cardiovascular devices post-FDA approval, in particular when safety concerns exist?



Eric A. Secemsky, MD, MSc

What have you found so far?

We have conducted several projects in collaboration with the FDA, including examinations of endovascular aortic repair for abdominal aortic aneurysm, safety of drug-coated devices for femoropopliteal artery revascularization, inferior vena cava filter insertion and retrieval, and treatment for critical limb-threatening ischemia. In the SAFE-PAD study, we found no evidence of long-term safety signals associated with drug-coated device use, which helped lead to a reversal of FDA restrictions on use of these devices. This work now serves as a template for CMS study protocols that use real-world data. In the SAFE-IVC study evaluating inferior vena cava filter insertion and retrieval, we found that IVCF insertion rates have notably decreased, but retrieval rates remain low.

What active grants, projects, or trials are you leading?

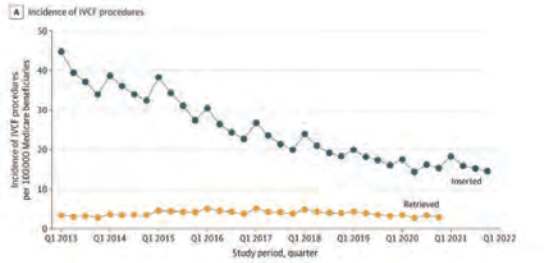
- NIH K23 HL150290-02
- Philips – Trends, Variation, and Outcomes with use of IVUS during Cardiovascular Intervention
- Boston Scientific - Variation in Intervention and Outcomes for Acute Pulmonary Embolism
- Renal Denervation Registry

What else are you trying to figure out?

We are looking at safety and efficacy of renal denervation for uncontrolled hypertension, as this procedure is now FDA-approved. We have created a multi-site registry to evaluate long-term durability of the anti-hypertensive effect of RDN.

Publication Highlight

Postmarketing Surveillance of Inferior Vena Cava Filters Among US Medicare Beneficiaries: The SAFE-IVC Study. *Ferro EG, et. al. JAMA. 2024 Dec 24;332(24):2091-2100. doi: 10.1001/jama.2024.19553. PMID: 39504004; PMCID: PMC11541742.*



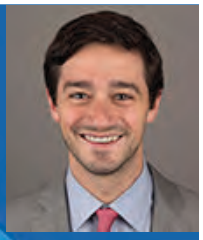
Temporal Trends in Inferior Vena Cava Filter (IVCF) Insertions and Retrievals in the USA.

Leadership Roles

Director of Vascular Intervention BIDMC; Section Head, Interventional Cardiology and Vascular Research, Smith Center BIDMC; Board of Directors, Vascular Interventional Advances

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How does an AI model's ability to diagnose heart failure with preserved ejection fraction (HFpEF) using echo images compare to existing clinical scores?



Jordan Strom, MD, MSc

What have you found so far?

The AI HFpEF model had higher classification performance than existing clinical scores, largely owing to lower rates of intermediate classifications. The greatest benefit was observed when information from existing clinical scores and AI are integrated into the decision-making process.

What else are you trying to figure out?

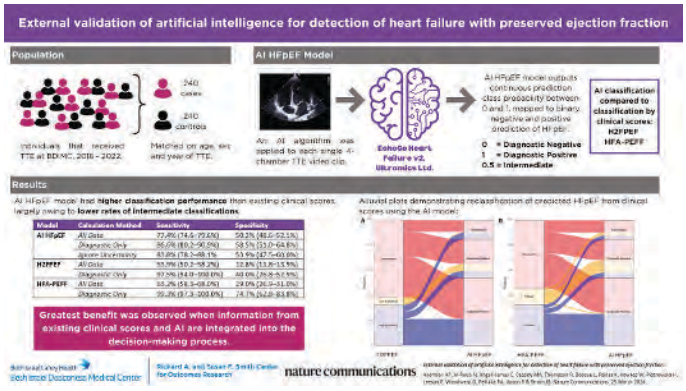
When implemented into a real-world clinical environment, how does the AI HFpEF model perform and how does it affect patient outcomes?

What active grants, projects, or trials are you leading?

- R01HL169517 Relationship of Chronic Kidney Disease to Aortic Stenosis Progression (PI)
- R01HL173998 Deep Neural Networking for AMI Phenotyping (Co-I)
- R01AG063937 A Novel Approach to Examine Within-Class Therapeutic Exchangeability of Medications (Co-I)
- HDS Innovation Grant Development of an AI model to Predict Actionable Pathology on Echo using ECG (PI)

Publication Highlight

External validation of artificial intelligence for detection of heart failure with preserved ejection fraction. *Akerman, A.P., Al-Roub, N., Angell-James, C. et al. Nat Commun 16, 2915 (2025). https://doi.org/10.1038/s41467-025-58283-7*



Graphical abstract for the manuscript: Akerman, A.P., Al-Roub, N., Angell-James, C. et al. External validation of artificial intelligence for detection of heart failure with preserved ejection fraction. Nat Commun 16, 2915 (2025). https://doi.org/10.1038/s41467-025-58283-7

Leadership Roles

- Director of the Echocardiography Laboratory, BIDMC
- Chair, ImageGuideEcho Registry
- Scientific Sessions Chair for American Society of Echocardiography 2027

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How can genetic studies in diverse populations help uncover mechanisms of cardiovascular disease?

Usman Tahir, MD, MBI

What have you found so far?

Ancestry specific genetic variants linked to cardiovascular disease in Black individuals are associated with circulating proteins and metabolites. These associations potentially highlight new pathways in genetic heart disease.

What else are you trying to figure out?

How can we leverage findings from GWAS to find proteins and metabolites that are causal in cardiometabolic disease using mendelian randomization studies?

What active grants, projects, or trials are you leading?

K08 HL161445-01A1: The Role of SECTM1 in Monocyte Biology and Atherosclerosis

Leadership Roles

- Director, Center for Cardiovascular Genetics
- Co-Director, Hypertrophic Cardiomyopathy Clinic

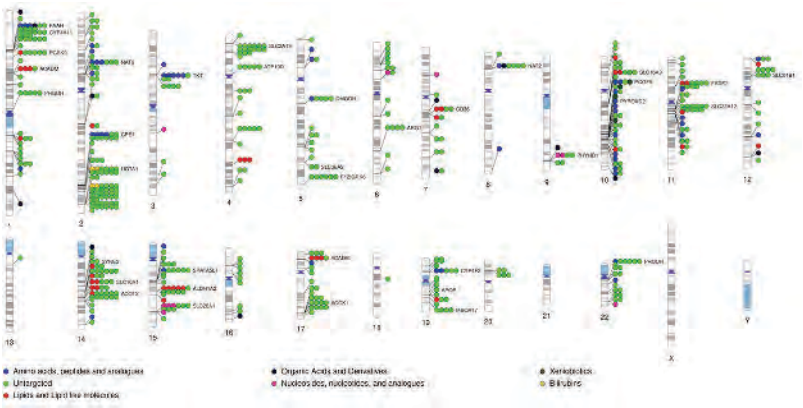
Main Mentors / Collaborators

Robert E. Gerszten, Pradeep Natarajan, Carolyn Ho

Publication Highlight

Whole Genome Association Study of the Plasma Metabolome Identifies Metabolites Linked to Cardiometabolic Disease in Black Individuals. *Tahir UA, Katz DH, Avila-Pachecho J, et. al. Nat Commun. 2022 Aug 22;13(1):4923.*

Figure Highlight



Whole genome association study of plasma metabolites.

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

What are radiographic and functional correlates of health and cardiovascular disease?

Connie Tsao, MD, MPH

What have you found so far?

Non-contrast cardiac MRI in large population cohorts is able to identify structural and functional patterns that traditional measures and the human eye cannot detect.

What else are you trying to figure out?

We are extending our work to identify other patient conditions in which artificial intelligence and machine learning applications may offer insight.

What active grants, projects, or trials are you leading?

- NIH grant to evaluate Myocardial radiomics and mechanics in the pathology and prognosis of CVD
- NIH grant with Joslin Diabetes Center to study myocardial characterization in long term T1 diabetes

Publication Highlight

Age- and Sex-Differences and Reference Values for Ventricular Strain by Cardiac MRI in Adults without CVD or CVD Risk Factors. *Pillai R, Zhang L, Peters K, Jha V, O'Donnell CJ, Manning WJ, Tsao CW. J Cardiovasc Magn Reson 2025; in press. Led by BIDMC internal medicine and cardiovascular medicine trainees.*

Leadership Roles

- Director of Cardiac MRI
- Associate Editor, J Cardiovascular Magnetic Resonance
- Associate Editor, JACC Advances

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

What biophysical and procedural factors influence the success of atrial fibrillation ablation and do these factors affect long-term arrhythmia outcomes?

Patricia Tung, MD

What have you found so far?

We know that strategies such as high frequency jet ventilation and higher ablation power increase lesion stability and quality and result in higher rates of first pass isolation. Electrical isolation of the posterior left atrial wall, in addition to pulmonary vein isolation, can be useful in management of persistent atrial fibrillation. In a retrospective analysis of our cases, predictors of first pass posterior wall isolation were lower absolute voltage and longer lesion duration.

What else are you trying to figure out?

If lack of first pass isolation is due to increased left atrial wall thickness and lack of transmural lesions, and if first pass isolation affects freedom from AF. We would like to assess prospectively the rate of first pass isolation of the pulmonary veins and posterior wall, to compare the effectiveness of various ablation strategies and to assess the relationship between first pass isolation and durability of isolation.

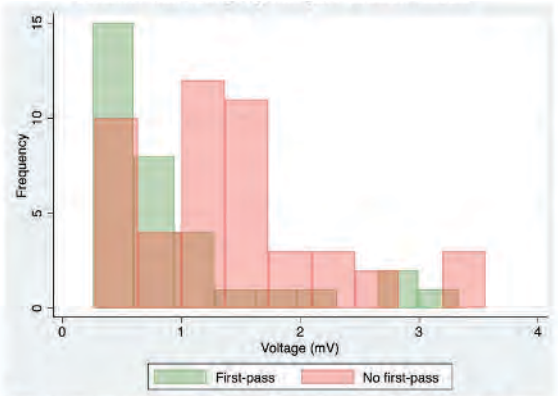
Leadership Roles

- Cardiac Electrophysiology Fellowship Program Director
- Heart Rhythm Society Research Award Selection Committee

Publication Highlight

Hemodynamic intolerance and pericardial effusion associated with high-frequency jet ventilation during pulmonary vein isolation. *Tung P, et. al. Heart Rhythm O2. 2021 May 21;2(4):341-346.*

Figure Highlight



Frequency of first pass isolation by posterior wall voltage.

What active grants, projects, or trials are you leading?

- NODE 303 - trial of inhaled etripamil for acute termination of SVT
- Abbott Tacticath post market approval study
- Hemodynamic Effects of High Frequency Jet Ventilation during PV

Mentors / Collaborators

Andre D'avila, Peter Zimetbaum, Alfred Buxton, and Jon Waks

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How can we improve cardiovascular and cancer outcomes in patients with comorbid heart disease and cancer?

Jenica Upshaw, MD, MSc

What have you found so far?

Using population-based registries, we found that older adults with newly diagnosed lymphoma have a high prevalence of comorbid cardiovascular disease, including heart failure (HF) in 13%. Patients with comorbid HF and lymphoma have high 1 year mortality, driven mostly by lymphoma-related mortality, likely related to lower use of anthracyclines in this population. Anthracycline cardioprotective strategies such as dexrazoxane or liposomal doxorubicin were used infrequently.

What else are you trying to figure out?

We are conducting a randomized trial to determine the safety and tolerability of standard of care anthracycline based chemotherapy with infusional cardioprotection in patients with newly diagnosed diffuse large B cell lymphoma who are high risk for worsening HF and determine the comparative efficacy and safety of dexrazoxane and liposomal doxorubicin in this population.

Leadership Roles

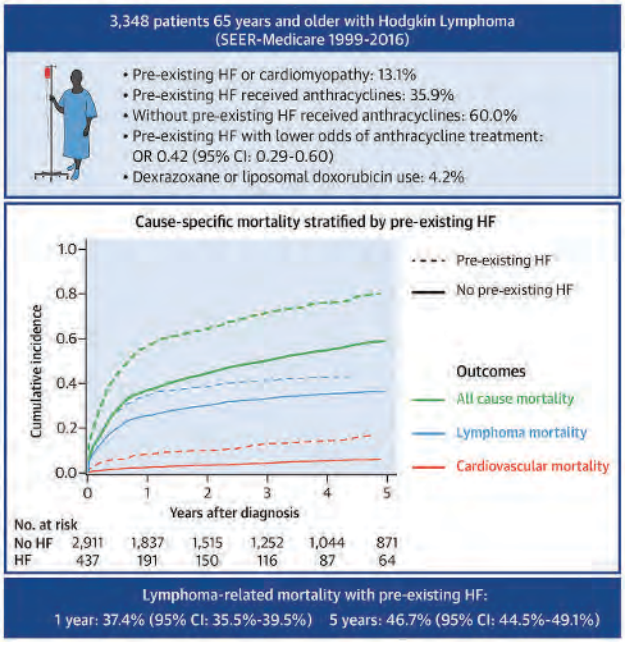
- Section Head, Cardio-Oncology and Heart Failure Research, Smith Center for Outcomes Research
- Co-Chair, ECOG-ACRIN Cardiotoxicity Subcommittee

What active grants, projects, or trials are you leading?

- NIH K08 HL146959
- NIH R01 CA300969 (pending)

Publication Highlight

Upshaw JN, et. al. ***Impact of Preexisting Heart Failure on Treatment and Outcomes in Older Patients with Hodgkin Lymphoma****. J Am Coll Cardiol: Cardiooncology. 2024; 6(2):200-213*



The cumulative incidence of lymphoma mortality (blue), cardiovascular mortality (red) and all-cause mortality (black) stratified by presence or absence of preexisting heart failure (HF). Dashed line represents patients with HF at the time of lymphoma diagnosis and solid lines patients without HF at the time of lymphoma diagnosis.

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

What ECG markers/characteristics are suitable to support clinical decision-making in management of atrial and ventricular arrhythmias?

Richard L. Verrier, PhD

What have you found so far?

We found that T-wave alternans and T-wave heterogeneity (TWH) on ambulatory ECG or exercise tolerance testing identify high-risk individuals with enhanced risk for cardiovascular mortality and sudden cardiac death across numerous studies (including Nearing et al 2021; Monteiro et al 2021; Verrier, Nearing, D'Avila 2021; Pang et al 2022; Fialho et al 2023) with patent assigned to BIDMC.

What else are you trying to figure out?

Understanding the mechanisms and utility of the reduction in P-wave alternans and heterogeneity and TWH by pulmonary vein isolation.

What active grants, projects, or trials are you leading?

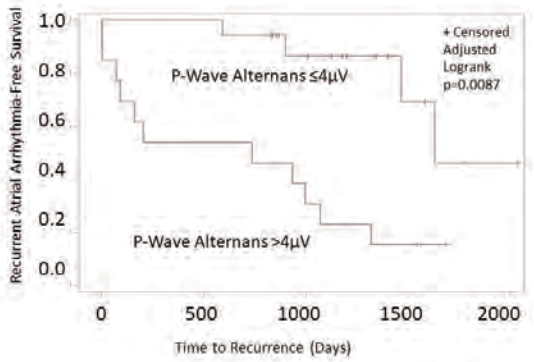
Epileptic Seizure Prediction using Noninvasive EKG Heterogeneity. Sponsor: New England Epilepsy Foundation "Blue Sky Award" coinvestigator.

Collaborators

Trudy D. Pang, MD; Steven C. Schachter, MD; Guilherme L. Fialho, MD, MPH; Andre D'Avila, MD, PhD, Jonathan W. Waks, MD

Publication Highlight

P-wave alternans rebound following pulmonary vein isolation predicts atrial arrhythmia recurrence. *Nearing BD, Fialho GL, Waks JW, Maher TR, Clarke J-R, Shepherd AJ, D'Avila A, Verrier RL. J Cardiovasc Electrophysiol 2024;35:1360–1367. doi: 10.1111/jce.16291.*



P-wave alternans (<4.0μV) at standard clinical follow-up typified patients with atrial arrhythmia-free survival (p<0.01, log-rank test). The hazard ratio for PWA (adjusted for sex, age, and persistent versus paroxysmal atrial fibrillation) was 3.4 (95% CI: 1.47–5.24, p<0.02).

Leadership Roles

- Mentor of fellows in cardiology and neurology
- Section editor for Annals of Noninvasive Electrocardiology

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How do state and national health policies impact care delivery, clinical outcomes, and population health?

Rishi K. Wadhera, MD, MPP, MPhil

What have you found so far?

We found that global measures of patient care experience worsened after US hospitals were acquired by private equity firms when compared with matched control hospitals using quasi-experimental difference-in-differences design (Bhatla, Wadhera et al. JAMA 2025). This research has contributed to the national debate about the growing presence of private equity in health care, including a recent investigative report by the Senate Budget Committee.

What else are you trying to figure out?

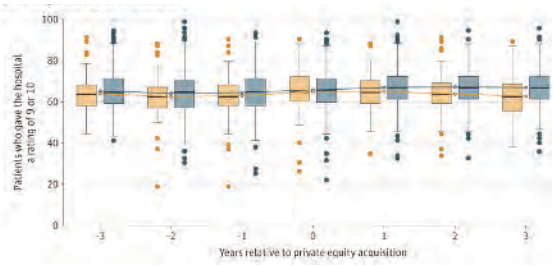
Given the rapidly evolving health policy landscape, our ongoing work has focused on the health implications of changes to safety-net policies that have recently proposed by Congress.

Leadership Roles

- Associate Director, Richard A. and Susan F. Smith Center for Outcomes Research
- Associate Program Director, BIDMC Cardiovascular Medicine Fellowship
- Associate Editor, Journal of the American College of Cardiology
- Expert Public Advisory Panel, Institute for Clinical and Economic Review (ICER)

Publication Highlight

Changes in Patient Care Experience After Private Equity Acquisition of US Hospitals.
Bhatla A, Bartlett VL, Liu M, Zheng Z, Wadhera RK. JAMA. 2025;333(6):490–497. doi:10.1001/jama.2024.23450



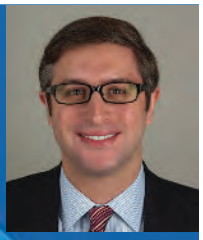
Annual trends in performance on global hospital rating measures at private equity hospitals and matched control hospitals.

What active grants, projects, or trials are you leading?

- R01HL174549 (PI) - Strategies to Improve the Cardiovascular Health of US Rural Working-Age Adults
- R01NR021686 (PI) - Leveraging SNAP Policies to Improve Cardiovascular Health of Low-Income Adults in US
- R01HL164561 (PI) - Cardiovascular Health of Low-Income Working-Age Adults in the US: Health Care Access, Policy, and the Pandemic
- AHA Established Investigator Award (PI) - The Inflation Reduction Act and Cardiovascular Health
- Donaghue Foundation GVP Grant (PI)

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How are vectorcardiographic assessments of myocardial electrical heterogeneity associated with adverse cardiovascular outcomes?



Jonathan Waks, MD

What have you found so far?

We have developed open-source software (BRAVEHEART) - to allow calculation of various parameters for ECG based research. One such parameter, the spatial ventricular gradient (SVG) is predictive for sudden cardiac death and ventricular arrhythmias in community patients and patients with heart failure and implantable cardioverter-defibrillators. The SVG can also non-invasively assess the risk of inducible ventricular tachycardia independent of ejection fraction.

What else are you trying to figure out?

Analyzing the SVG in other patient populations such as post-MI, and assessing the links between ECG parameters and cardiovascular imaging.

What active grants, projects, or trials are you leading?

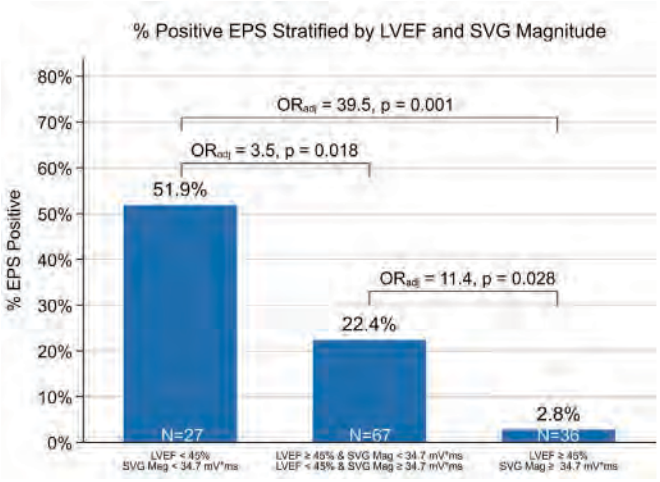
PI for ADVENT Long term outcomes study of pulsed field ablation for atrial fibrillation

Leadership Roles

Director of Electrocadiography and Cardiac Monitoring Laboratory

Publication Highlight

The spatial ventricular gradient is associated with inducibility of ventricular arrhythmias during electrophysiology study. *Saza et al, Heart Rhythm. 2024 Nov;21(11):2160-2167. doi: 10.1016/j.hrthm.2024.05.005. Epub 2024 May 6. PMID 38718942*



*Rates of ventricular arrhythmia inducibility (percentage above blue bars) at electrophysiology study (EPS) stratified by left ventricular ejection fraction (LVEF) above and below 45% and spatial ventricular gradient magnitude (SVG Mag) above and below 34.7 mV*ms*

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

What are the best methods for evaluating cardiovascular devices using real-world evidence?

Robert W. Yeh, MD, MSc

What have you found so far?

The most commonly used methods in observational analysis are vulnerable to bias when evaluating cardiovascular devices. Less frequently used approaches, including quasi-experimental methods and transportability approaches, may be more suitable alternatives. In collaboration with both the Harvard School of Public Health and MIT, we apply cutting-edge methods to a combination of randomized trial and real-world data. Our team uses these approaches to answer important questions about cardiovascular device safety and effectiveness, working closely with the partners from the US FDA, Center for Medicare and Medicaid Services, professional socieities, and industry.

What else are you trying to figure out?

In a new NIH grant, we will work with Danish and US investigators to understand the applicability of the DanGer Shock Trial to US patients with cardiogenic shock, and develop stronger approaches to studying the effectiveness of new mechanical support devices.

Leadership Roles

- Director, Richard A. and Susan F. Smith Center for Outcomes Research
- Section Chief, Interventional Cardiology, BIDMC
- Standing Member, Circulatory Devices Advisory Panel, US FDA

What active grants, projects, or trials are you leading?

- NHLBI: 2R01HL136708 (EXTEND II Study), R01HL157530 (AHA COVID-19 CVD Registry, MPI: Gersz ten/Kazi/Yeh), K24HL150321
- National PI for pivotal device trials: FORWARD CAD Trial (Intravascular lithotripsy)
- VITALYST Trial (Mechanical support device)
- MAGENTA ELEVATE Trial (Mechanical support device)

Publication Highlight

Paclitaxel-coated balloon vs. uncoated balloon for coronary in-stent restenosis: The AGENT IDE randomized clinical trial

Yeh RW, et. al. JAMA. 2024 Mar 9.*

The AGENT IDE Trial led to FDA approval of the first coronary drug-coated balloon in the United States.

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

How can we improve outcomes for patients with lead-related venous obstruction (LRVO) caused by their cardiac implantable electronic devices?

Peter Zimetbaum, MD

What have you found so far?

Among 650,000 Medicare patients who received a pacemaker or defibrillator between 2016 and 2020 in the US, we found that 1 of every 20 patients developed symptomatic LRVO. Only 15% received an intervention to address their symptoms, primarily device extraction and, less often, percutaneous revascularization (i.e. balloon or stenting). Device extraction was found to significantly reduce subsequent healthcare utilization for LRVO symptoms.

What else are you trying to figure out?

While extraction of a pacemaker or defibrillator may alleviate symptoms of LRVO, this is not a feasible strategy by itself – as patients are often dependent on these devices. We will investigate if leadless devices can reduce LRVO, and whether drug-coated balloons can reduce symptoms when extraction is not possible.

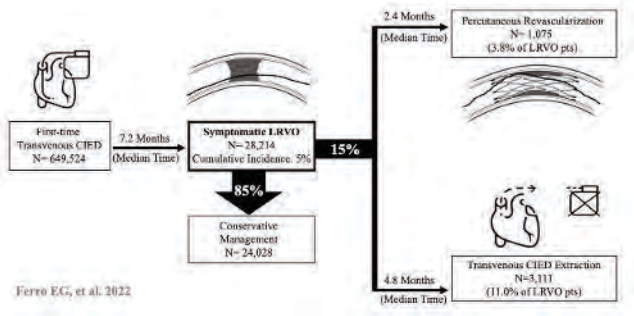
Leadership Roles

- Associate Chief and Director of Clinical Cardiology, BIDMC
- Director, ECG and Arrhythmia Core Laboratory, Baim Institute for Clinical Research

Publication Highlight

Lead-Related Venous Obstruction in Patients With Implanted Cardiac Devices: JACC Review Topic of the Week. *Zimetbaum P, Carroll BJ, Locke AH, Secemsky E, Schermerhorn M. J Am Coll Cardiol. 2022 Jan 25;79(3):299-308.*

Figure Highlight



Natural history of LRVO: incidence, treatment and outcomes among Medicare patients with cardiac implantable electronic devices in the United States

Collaborators

- Enrico G. Ferro, MD
- Eric A. Secemsky, MD, MSc
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