Cardiovascular Division
Washington University
School of Medicine

Faculty Research Interests
2020-2021
Introduction

The Cardiovascular Division and related disciplines at the Washington University School of Medicine have a distinguished track record of research productivity in both the clinical and basic sciences. The objectives of this document are twofold:

1.) To provide an overview of current research activities of individual investigators within the Cardiovascular Division, as well as investigators in related fields of research; and

2.) To assist residents, fellows, graduate students, MSTPs and junior faculty members in identifying potential mentors with specific research interests.

The document is updated at least annually to reflect evolving research interests. Questions regarding ongoing or proposed research projects should be directed to individual investigators. Questions about the Mentorship Program should be addressed to members of the Research Mentorship Committee, comprising Drs. D. Brown, Davila, de las Fuentes, Gleva, Gorcsan, Joynt Maddox, Kates, Mann, and Rich, or to Dr. Barger, Associate Program Director for Mentorship.

Comments or suggestions about the utility of this document and how it could be improved should be addressed to Michael W Rich, MD, Professor of Medicine, at mrich@wustl.edu.

How to Use This Document

Residents, fellows, and others who wish to identify potential mentor(s) are encouraged to browse through the Index, which lists investigators according to their areas of interest. Names in the Table of Contents and in the Index are hyperlinked to the Investigator’s page within the document. Names on each Investigator’s page are hyperlinked to the Cardiology website (or Washington University faculty website for investigators outside the Cardiovascular Division). The website provides additional details about each investigator’s training, publications, and clinical activities. Key words at the bottom of each investigator’s page indicate terms listed in the Index.
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Jose A. Alvarez-Cardona, MD

Assistant Professor of Medicine

Current Research Interests

- Advanced heart failure and transplant cardiology
- Mechanical circulatory support
- Cardio-oncology
- Cardiac amyloidosis

Representative Publications


Key Words: cardio-oncology, amyloidosis, advanced heart failure, heart transplant, mechanical circulatory support, left ventricular assist devices
Amit Amin, MD

Associate Professor of Medicine

Current Research Interests

- Improving outcomes of percutaneous coronary intervention (PCI)
- Reducing PCI complications, including bleeding and acute kidney injury
- Reducing costs of PCI and acute coronary syndromes
- Cost-effectiveness of adjunctive therapies in interventional cardiology
- Optimizing care pathways of PCI
- Transradial PCI

Representative Publications


Key words: cost-effectiveness analysis, interventional cardiology, outcomes research
Richard G. Bach, MD
Professor of Medicine

Current Research Interests

- Hypertrophic cardiomyopathy: physiology, treatment, and genetics
- Acute coronary syndromes
- Diabetes and coronary artery disease
- Coronary physiology and imaging

Representative Publications


Key words: coronary artery disease, diabetes, hypertrophic cardiomyopathy, imaging
Philip M. Barger, MD, MSc

Associate Professor of Medicine

Current research interests

- Adult congenital heart disease
- Mechanisms of cardiac reverse remodeling and recovery

Representative Publications


Key words: congenital heart disease, reverse remodeling
Anita Bhandiwad, MD
Associate Professor of Medicine

Current Research Interests

- Cardiac magnetic resonance imaging
- Echocardiography
- Nuclear cardiology

Representative Publications


Key words: imaging, cardiac MRI, echocardiography
Alan C. Braverman, MD

Alumni Endowed Professor in Cardiovascular Diseases, Department of Medicine

Current Research Interests

- Genetically triggered aneurysm syndromes (Marfan, Loeys-Dietz, Vascular Ehlers-Danlos, Heritable Thoracic Aortic Diseases)
- Aortic dissection
- Bicuspid aortic valve and aortopathy
- Aortic disease in pregnancy
- Exercise and aortic disease

Representative Publications


Key Words: Marfan syndrome, bicuspid aortic valve, aortic dissection, thoracic aortic aneurysm
Angela L. Brown, MD

Associate Professor of Medicine

Current Research Interests

- Hypertensive Heart Disease
- Resistant hypertension
- Tools/strategies for implementing community education on cardiovascular disease prevention

Representative Publications


Key words: global health, hypertension, prevention, women and minorities
David L. Brown, MD

Professor of Medicine

Current Research Interests

- Use of Existing Public and Proprietary Databases to Answer Clinical Questions in Cardiovascular Disease
- Comparative effectiveness research of treatments for cardiovascular disease
- Meta-analysis
- Ischemic Heart Disease including microvascular dysfunction and coronary spasm

Representative Publications


Key Words: outcomes research, comparative effectiveness research, meta-analysis, coronary artery disease, health services research, patient-centered care, ischemic heart disease, microvascular dysfunction, coronary spasm
Robert M. Carney, PhD
Professor of Psychiatry

Current Research Interests

- The effects of psychiatric depression on the course and outcome of coronary heart disease
- Potential mechanisms underlying the risk of depression on cardiac related morbidity and mortality
- The effects of treating depression on course and outcome of coronary heart disease

Representative Publications


Key words: behavioral medicine, coronary artery disease, depression, sleep disorders
Murali M. Chakinala, MD
Professor of Medicine

Current Research Interests

- Therapeutics in pulmonary arterial hypertension
- Non-invasive evaluation in pulmonary hypertension

Representative Publications


Key words: pulmonary hypertension, pulmonary arterio-venous malformations, right heart failure
Sharon Cresci, MD

Associate Professor of Medicine and Genetics

Current Research Interests

- Genetic variation and clinical outcomes in individuals with cardiovascular disease
- Precision medicine
- Hypertrophic cardiomyopathy

Representative Publications


Key words: genetics, precision medicine, hypertrophic cardiomyopathy, translational research
Phillip S. Cuculich, MD

Associate Professor of Medicine
Clinical Cardiac Electrophysiology

Current Research Interests

- Development of an entirely noninvasive cardiac ablation platform combining cardiac imaging, cardiac mapping and focused radiation
- Noninvasive electrical mapping of uterine contractions to guide therapeutic interventions to prevent preterm birth

Representative Publications


Key words: Translational research, transdisciplinary research, noninvasive cardiac ablation, noninvasive mapping, ventricular tachycardia, atrial fibrillation, uterine mapping
Victor G. Davila-Roman, MD

Professor of Medicine, Anesthesiology, and Radiology

Current Research Interests

- Cardiovascular imaging: echocardiography, vascular ultrasound, nuclear cardiology, cardiac CT
- Cardiac metabolism, Hypertensive heart disease, Diastolic function
- Cardiovascular genetic epidemiology

Representative Publications


Key words: cardiac imaging, cardiac metabolism, hypertension, genetic epidemiology, translational research, diastolic function, echocardiography, global health
Lisa de las Fuentes, MD, MS

Associate Professor of Medicine and Biostatistics

Current Research Interests

- Genetic epidemiology of cardiovascular disease and drug response
- Hypertensive heart disease
- Metabolic and inflammatory cardiovascular risk factors

Representative Publications


Key words: hypertension, risk factors, genetic epidemiology, global health, diastolic function, echocardiography
**Abhinav Diwan, MD, FACC , FAHA**

Professor of Medicine, Cell Biology and Physiology, Obstetrics and Gynecology

**Current Research Interests**
- Regulation of lysosome function in cardiac myocytes and macrophages in heart failure
- Maternal dietary exposures as a determinant of offspring cardiovascular risk.
- Regulation of lysosomal machinery in Alzheimer's disease and amyloid heart disease
- Role of lysosomal pathways in beta cell regeneration in pancreatic islets

**Representative publications**

6. Ma, X*; Mani, M*; Kovacs, A; Liu, H; Murphy, JT; Foroughi L; French, B; Benjamin, IJ; Hill, JA; Javaheri, A; Diwan A. (*contributed equally). TFEB rescues advanced mutant αB-crystallin-induced cardiomyopathy by normalizing desmin localization. J Am Heart Assoc. 2019 Feb 19;8(4):e010866.
8. Murphy, JT*; Liu, H*; Ma, X; Shaver, S; Oh, C; Boyko, A; Mazer, T; Ang, S; Khopkar, R; Javaheri, A; Kumar, S; Jiang X; Ory, D; Mani, K; Matkovich, SJ; Kornfeld K*; Diwan A * (*contributed equally.) Simple nutrients activate a HLH-30-independent pathway for coupling lysosomal nutrient sensing to TOR activation. PLoS Biol. 2019 May 14;17(5):e3000245.
9. Javaheri, A; Bajpai, G; Picataggi, A; Mani, S; Foroughi, L; Evie, H; Kovacs, A; Weinheimer, C; Hyrc, K; Xiao, Q; Ballabio, A; Lee, JM; Matkovich, SJ; Razani, B; Schilling, JD; Lavine, K; Diwan A. Transcription factor EB activation in macrophages attenuates postmyocardial infarction ventricular dysfunction independently of ATG5-mediated Autophagy. JCI Insight, 2019 Nov 1;4(21):e127312.

**Key words:** autophagy, lysosome, amyloid, ischemia-reperfusion, heart failure, cell death
Gerald W. Dorn, II, MD
Philip and Sima K. Needleman Professor of Medicine

Current Research Interests

- Biology of mitochondria in the heart; metabolic remodeling
- Molecular and biochemical signaling for cardiac hypertrophy and heart failure
- Genetic diseases affecting mitochondrial dynamism and mitophagy

Representative Publications


Key words: mitophagy, heart failure, molecular cardiology
Gregory A. Ewald, MD

Professor of Medicine

Current Research Interests

- Mechanical circulatory support in advanced heart failure
- Medical therapy in patients with heart failure
- Device therapy in patient with heart failure
- Remote monitoring in management of heart failure
- Cardiac transplantation/donor evaluation and management
- Depression in heart failure

Representative Publications


Key words: heart failure, heart transplantation
Mitchell N. Faddis, MD, PhD

Professor of Medicine

Current Research Interests

- Catheter ablation techniques
- Treatment of atrial fibrillation
- Cardiac resynchronization therapy for advanced heart failure

Representative Publications


Key words: arrhythmias, atrial fibrillation, electrophysiology, heart failure, implantable devices
Kenneth E. Freedland, PhD, FAHA

Professor of Psychiatry

Current Research Interests

- Depression, anxiety, stress, and physical inactivity in patients with coronary heart disease or heart failure
- Roles of depression and inadequate self-care in heart failure rehospitalizations
- Interventions for depression and inadequate self-care in heart failure
- Clinical trials in behavioral medicine and behavioral trial methodology

Representative Publications


Key words: behavioral medicine, coronary artery disease, depression, depressive disorders, heart failure, sleep disorders, heart failure self-care
Brian F. Gage, MD, MSc

Professor of Medicine

Current Research Interests

- Anticoagulants
- Atrial fibrillation
- Pharmacogenomics

Representative Publications


Key words: aging, atrial fibrillation, epidemiology, pharmacogenomics
Edward M. Geltman, MD

Professor of Medicine

Current Research Interests

- New pharmacologic agents for the management of systolic and diastolic heart failure
- Importance of biomarkers for predicting events for CHF

Representative Publications


Key words: diastolic function, heart failure, implantable devices
Marye J. Gleva, MD

Professor of Medicine

Current Research Interests

- Complications associated with cardiac implantable electronic devices (CIEDs)
- Cardiac implantable electronic devices in congenital heart disease
- Outcomes after atrial fibrillation ablation
- Increasing the participation of women in cardiovascular device trials
- Wearable electronic device technology
- CIEDs and MRI imaging

Representative Publications


Key words: atrial fibrillation, electrophysiology, implantable devices
John Gorcsan III, MD

Professor of Medicine

Current research interests:

- Quantifying cardiac mechanics with advanced echocardiographic technology
- Assessing effects of device therapy in heart failure patients
- Refining patient selection for cardiac resynchronization therapy
- Determining prognosis by right ventricular structure and function in patients with pulmonary hypertension

Representative Publications:


Key Words: echocardiography, heart failure, imaging, right heart failure
Current Research Interests

- The biological foundations and effects of mutually beneficial relationships between humans and, their gut microbial communities
- Mechanistic studies of the role of perturbed development of the gut microbiota in the pathogenesis of malnutrition in infants/children and development of microbiota-directed therapeutics for repairing their microbiota and restoring healthy growth
- Identification of microbiota-targeted food ingredients, delineation of their mechanisms of action, and pre-clinical and human studies of their biological effects

Representative Publications


Key words: human gut microbiome; systems biology; metabolic regulation; childhood undernutrition; obesity; global health; prebiotics/probiotics/synbiotics; precision medicine
Robert J. Gropler, MD

Professor of Radiology, Medicine, and Biomedical Engineering

Current Research Interests

- Imaging of myocardial metabolic remodeling using PET, magnetic resonance spectroscopy, and other modalities
- Development of new cardiovascular molecular imaging agents

Representative Publications


Key words: molecular imaging, cardiac metabolism
Richard Gross, MD, PhD

Professor of Medicine, Chemistry, and Developmental Biology

Current Research Interests

- Metabolomics
- Diabetic Cardiomyopathy
- Heart Failure
- Phospholipases
- Signaling

Representative Publications


Key words: basic science, cardiac metabolism, diabetes, heart failure, lipid metabolism, molecular cardiology
Justin C. Hartupee, MD, PhD

Assistant Professor of Medicine

Current Research Interests

- Cardiac transplantation/ donor management and evaluation
- LVAD imaging in the evaluation of pump dysfunction
- Heart failure disease progression

Representative Publications


Key Words: heart failure, transplantation, LVAD
Mustafa Husaini, MD

Assistant Professor of Medicine

Current Research Interests

- Athletic remodeling
- Sudden Cardiac Death in athletes
- Cardiopulmonary exercise testing
- Hypertrophic Cardiomyopathy
- Cardiac rehab

Representative Publications


Key words: sports cardiology, athletes, hypertrophic cardiomyopathy, cardiac rehabilitation
Sudhir Jain MD, FACC, MBA

Associate Professor of Medicine

Current Research interest

- Preventive Cardiology
- Nuclear Cardiology
- Vascular Medicine

Representative Publications

Ali Javaheri MD, PhD

Instructor of Medicine

Current Research Interests

- Role of bioactive lipids in preventing myocardial injury
- How lipids alter lysosome function in inflammatory cells and myocytes
- We utilize both clinical samples and animal models to determine the role of bioactive lipids in multiple disease models

Representative Publications


Keywords: cholesterol efflux capacity, cardiac allograft vasculopathy, HDL, apolipoprotein M, autophagy, lysosome
Karen Joynt Maddox, MD

Assistant Professor of Medicine, Washington University School of Medicine

Assistant Professor, Washington University Brown School of Social Work

Current Research Interests

- Improving the measurement of the quality and efficiency of physicians, hospitals and health systems
- Understanding the impact of policy interventions on health care, with a focus on value-based and alternative payment models
- Reducing disparities in care, with a focus on vulnerable populations including racial and ethnic minorities, individuals living in poverty, individuals with disabilities, frail elders, and those in rural areas

Representative Publications


Key words: disparities, health policy, health services research, hospital readmissions, outcomes research, quality of care, women and minorities
Attila Kovacs, MD

Professor of Medicine

Current Research Interests

- cardiovascular phenotyping in mice
- ultrasonic tissue characterization

Representative Publications


Key words: basic science, imaging, molecular cardiology, vascular biology
Sándor J. Kovács, PhD, MD, h.c.

Professor of Medicine, Cell Biology and Physiology
Adjunct Professor of Physics and Biomedical Engineering

Current Research Interests

- Mathematical models of cardiac physiology and function/complexity theory
- Theoretical and applied cardiac physiology/pathophysiology
- Multimodal cardiac imaging: echo/magnetic resonance/catheterization/angiography

Representative Publications


Key words: cardiac physiology, complexity theory, diastolic function, imaging, mathematical modeling
Ronald J. Krone, MD

Professor of Medicine

Current Research Interests

- Cardio-oncology (cardiac toxicity from cancer)
- Cardiac protection during doxorubicin therapy
- Cardiac imaging in cancer patients

Representative Publications

General Cardiology References:


CardioOncology References:


Key words: cardio-oncology, coronary artery disease, cardiomyopathy
Gregory M. Lanza, MD, PhD

James R. Hornsby Family Professorship in Biomedical Sciences

Current Research Interests

- Nanomedicine
- Targeted Drug Delivery
- Molecular Imaging
- Magnetic Resonance Imaging
- Echocardiography

Representative Publications


Key words: basic science, imaging, molecular cardiology, nanomedicine
John M. Lasala, MD, PhD

Professor of Medicine

Current Research Interests

- Interventional cardiology with complex coronary interventions
- Drug-eluting stents
- Percutaneous aortic valve replacement and mitral valve repair
- Structural heart/congenital heart defects

Representative Publications


Key words: aortic stenosis, coronary artery disease, interventional cardiology, valvular heart disease
Kory J. Lavine, MD, PhD

Associate Professor in Medicine

Current Research Interests

- Immune mechanisms governing heart failure pathogenesis and cardiac recovery
- Precision Therapies for Dilated Cardiomyopathy
- Pathogenesis of allograft rejection and primary graft dysfunction
- Role of macrophages in coronary development, collateral growth, and regeneration

Representative Publications


Key words: heart failure, macrophage, transplant vasculopathy, coronary development, collateral, cardiac recovery
Steven J. Lavine, MD

Professor of Medicine

Current Research Interests
- Diastolic function in heart failure
- Noninvasive determinants of survival in aortic regurgitation
- Shape of the LV outflow tract and its relation to ventricular geometry
- Determinants of survival and readmission in community hospital based cohorts with heart failure

Representative Publications
   http://cardiologyres.org/index.php/Cardiologyres/issue/view/8

Key words: aortic regurgitation, diastolic function, heart failure
Daniel J. Lenihan, MD

Professor of Medicine

Current Research Interests
- Biomarkers of disease processes in Heart Failure, Amyloidosis, and Cardiotoxicity of Chemotherapy
- Optimal monitoring and treatment of cardiac disease in patients with cancer
- Best Practice for cardiac safety during cancer therapy
- Early phase clinical trials in Cardioprotection, Heart Failure, and Amyloidosis
- Fellowship training requirements for Cardio-Oncology

Representative Publications

Key words: cardio-oncology, biomarkers, amyloidosis, heart failure, practice improvement
Kathryn Lindley, MD

Associate Professor of Medicine and Obstetrics and Gynecology

Current Research Interests
- Women’s Heart Disease
- Heart Disease in Pregnancy
- Peripartum cardiomyopathy
- Cardiovascular sequelae of pre-eclampsia
- Spontaneous Coronary Artery Dissection

Representative Publications

Key words: women and minorities, pregnancy, cardiomyopathy, preeclampsia, cardioobstetrics
Thomas M. Maddox, MD, MSc

Professor of Medicine
Director, Health Systems Innovation Lab, Washington University School of Medicine/BJC Healthcare

Current Research Interests

- Healthcare delivery innovation
- Cardiac and general health services research
- Cardiac and general quality of care and outcomes research

Representative Publications:


Key words: healthcare innovation, health services research, quality of care, outcomes research
Majesh Makan, MD

Professor of Medicine

Current Research Interests:

- 3-dimensional echo and transesophageal echo
- Echocardiographic assessment of right ventricular function
- 2-dimensional speckle Doppler and strain rate imaging
- Quantification of mitral regurgitation severity

Representative Publications:


Key Words: echocardiography, imaging, valvular heart disease
Douglas L. Mann, MD

Lewin Distinguished Professor of Medicine, Cell Biology and Physiology

Current Research Interests

- Cardiac inflammation and innate immunity
- LV remodeling and reverse LV remodeling
- Heart failure, clinical trials, and circulatory assist devices
- Translational research (T1 or T2)

Representative Publications


Key words: basic science, heart failure, translational research
Joshua D. Mitchell, MD

Assistant Professor of Medicine

Current Research Interests

- Use of administrative data, EMR, and meta-analyses to answer relevant clinical questions
- Early phase clinical trials in cardiotoxicity and amyloidosis
- Early detection of cardiotoxicity during cancer therapy using biomarkers, echo or MRI strain or other novel imaging techniques.
- Optimal prevention and treatment of cardiotoxicity in patients with cancer
- Improving the diagnosis and management of cardiac amyloidosis

Representative Publications


Key words: Amyloid, biomarkers, cardio-oncology, imaging, screening, big data
Jonathan D. Moreno, MD, PhD

Instructor of Medicine

Current research interests

- Multiscale computational models to understand mechanisms of arrhythmia in cardiomyopathy, heart failure, and inherited arrhythmia syndromes
- Hypertrophic cardiomyopathy
- Computational cellular electrophysiology
- 3D ventricular models
- Drug repositioning strategies
- Translational research on cardiac transplant and LVAD patients

Recent publications

1. Raymer, DS*; Moreno, JD*; Sintek, MA; Nassif, ME; Sparrow, CT; Adamo, L; Novak, EL; LaRue, SJ; Vader, JM. The combination of TAPSE and HeartMate risk score to predict right ventricular failure after LVAD: Noninvasive testing is superior to invasive hemodynamic measurements. ASAIO Journal, 2019;65(3):247-51. *Co-first authorship
7. Moreno, JD; Verma, AM; Kopecky, BJ; Dehner, C; Kostelecky, N; Lavine, KM; Vader, JM; Lin, CY; Schilling, JD. Angiotensin II type 1 receptor antibody mediated rejection following orthoptic heart transplant: a single center experience. Manuscript in revision.
8. Moreno, JD; Kang, PW; Silva, JR. Chapter 19: Connecting cardiac excitation to the atomic interactions of ion channels. Cardiac Electrophysiology: From cell to bedside, 8th edition. Manuscript submitted.

Keywords: Hypertrophic cardiomyopathy; mathematical modeling; ion channels; arrhythmias; basic science; electrophysiology; heart failure; heart transplantation; LVAD; precision medicine; translational research.
Jeanne M. Nerbonne, Ph.D.

Professor of Medicine, Alumni Endowed Professor of Molecular Biology and Pharmacology in Developmental Biology and Medicine
Director, Center for Cardiovascular Research

Current Research Interests

• Molecular determinants of voltage-gated ion channel diversity, expression, distribution and functioning in cardiac and neuronal cells
• Inherited and acquired membrane excitability disorders in the cardiovascular and nervous systems
• Ion channels in the regulation of circadian rhythms
• Molecular mechanisms contributing to electrical remodeling in physiological and pathological cardiac hypertrophy

Representative Publications


Key words: Ion channels, electrophysiology, molecular genetics, proteomics, arrhythmias, hypertrophy, remodeling
Colin G. Nichols, PhD

Carl Cori Professor of Cell Biology and Physiology
Director of the Center for the Investigation of Membrane Excitability Diseases

Current Research Interests

- Ion channels and cardiac arrhythmias
- ion channels and cardiovascular disease
- Ion channels and blood pressure control

Representative Publications


Key words: arrhythmias, basic science, cardiac development, vascular biology, electrophysiology, hypertension, iPSC-cardiac myocytes, iPSC-vascular myocytes, mice, zebrafish, ion channels
Julio E. Pérez, MD

Professor of Medicine

Current Research Interests

- Echocardiographic assessment of ventricular function
- Applications of contrast echocardiography and myocardial perfusion imaging
- Applications of myocardial strain measurements

Representative Publications


Key words: echocardiography, imaging
Linda R. Peterson, MD

Professor of Medicine and Radiology

Current Research Interests

- Nutritional treatments for impaired myocardial and skeletal muscle function
- Lipidomics
- Effects of obesity and diabetes on cardiac metabolism, structure, and function
- Metabolic therapy for cardiac disease and for cancer

Representative Publications


Key words: cardiac metabolism, inorganic nitrate, lipidomics, diabetes, obesity, skeletal and cardiac muscle performance, heart failure, cancer, positron emission tomography, magnetic resonance spectroscopy
Nishath Quader, MD

Assistant Professor of Medicine

Current Research Interests

- Valvular heart disease: Aortic valve, Mitral valve, Tricuspid valve
- Structural heart disease
- 3D echocardiography
- Echocardiographic assessment of left and right ventricular function and strain analysis

Representative Publications


Key words: valvular and structural heart disease, 3D echocardiography
Babak Razani, MD, PhD

Associate Professor of Medicine and Pathology/Immunology

Current Research Interests
- Mechanisms of atherosclerosis and risk factors for cardiovascular disease (particularly obesity and insulin resistance) - emphasis on the role of macrophages
- Focus on emerging cellular pathways critical for cardiometabolic disease and atherosclerotic progression
  - dysfunction in autophagy
  - lysosomal dysfunction
  - activation of inflammasomes
  - inclusion body formation
- Disorders of cardiac metabolism in heart failure (with emphasis on De novo Lipogenesis)
- Novel therapeutics in cardiovascular disease (emphasis on nanoparticles)

Representative Publications

Key words: atherosclerosis, cardiac metabolism, insulin resistance, macrophage, autophagy, lysosomes, basic science, translational research, lipid metabolism, obesity, vascular biology
Stacey L. Rentschler, MD, PhD

Associate Professor of Medicine, Developmental Biology, and Biomedical Engineering

**Current Research Interests**

- Transcriptional and epigenetic basis of arrhythmias
- Development of the cardiac conduction system
- Reprogramming cardiomyocytes to pacemaker-like cells
- Notch and Wnt signaling
- Human organotypic slice culture as a translational platform
- Effects of cardiac irradiation on electrophysiology

**Representative publications**


**Key words:** basic science, cardiac development, molecular cardiology, electrophysiology, arrhythmias, conduction system, reprogramming, epigenetics, translational research
Michael W. Rich, MD

Professor of Medicine

Current Research Interests

- Cardiovascular disease in older adults, esp. heart failure, atrial fibrillation, coronary artery disease, valvular heart disease, hypertension, epidemiology, and prevention
- Cardiovascular aging, including interventions designed to slow the aging process
- Heart failure disease management

Representative Publications


Key words: aging, atrial fibrillation, epidemiology, heart failure, prevention
Yoram Rudy, PhD

Fred Saigh Distinguished Professor of Engineering; Professor of Biomedical Engineering, Medicine, Cell Biology & Physiology, Radiology, and Pediatrics
Director, Cardiac Bioelectricity and Arrhythmia Center (CBAC)

Current Research Interests

- Mechanisms of cardiac arrhythmias
- Noninvasive imaging (ECGI) of cardiac arrhythmias in patients

Representative Publications

7. Ramasubramanian S. and Rudy Y. The Structural Basis of IKs ion-channel activation: Mechanistic insights from molecular simulations. Biophysical Journal 2018 (June 5);114:2584–94.
8. Xu J. and Rudy Y. Effects of beta-subunit on gating of a potassium ion channel: Molecular simulations of cardiac IKs activation. J Mol Cell Cardiol (JMCC) 2018;124:35-44.

https://doi.org/10.1016/j.yjmcc.2018.10.003

Key words: basic science, electrocardiography, electrophysiology
Rajan Sah, MD, PhD

Associate Professor of Medicine, Cell Biology and Physiology

Current Research Interests

- Ion channel regulation of cellular metabolism: adipocytes, islet cells, skeletal/cardiac muscle
- Cardiometabolic disease
- Mechanobiology, Mechano-signaling and Mechano-transduction
- Small molecule modulators of systemic metabolism and glucose homeostasis

Representative Publications


Key words: electrophysiology, CRISPR/Cas9, genetic mouse models, patch-clamp, calcium imaging, diabetes, obesity, heart failure, hypertension, NAFLD, SWELL1, LRRC8a, TRP channel
Robert V. Same, MD
Assistant Professor of Medicine

Current Research Interests

- Preventive cardiology
- Early cardiovascular risk factor modification

Representative Publications


Key Words: prevention, risk factor modification
Associate Professor of Medicine and Pathology & Immunology

Current Research Interests

- Macrophage biology in non-alcoholic steatohepatitis
- Macrophage dysfunction in diabetes and obesity
- The interplay between macrophage metabolism and effector function
- Diabetic cardiovascular disease
- Liver macrophage-mediated inflammation in heart failure and pulmonary hypertension

Representative Publications


Key words: basic science, macrophage, diabetes, heart failure, Kupffer Cells, non-alcoholic steatohepatitis
Clay F. Semenkovich, MD

Professor of Medicine, Cell Biology and Physiology

Current Research Interests

- Lipid metabolism
- Atherosclerosis
- Diabetes

Representative Publications


Key words: atherosclerosis, basic science, diabetes, lipid metabolism
Jonathan R. Silva, PhD

Associate Professor of Biomedical Engineering and Computer Science and Engineering

Current Research Interests

- Identifying the right anti-arrhythmic drug for individual patients
- Biophysics of small molecule drug interaction with ion channels
- Advanced imaging of membrane proteins
- New cardiovascular technologies
- Computational models of arrhythmia

Representative Publications

New Arrhythmia Technologies

Precision Antiarrhythmic Medicine
4. Silva JR. How to connect cardiac excitation to the atomic interactions of ion channels, Biophysical Journal, 2018;114(3):632a-633a.

Keywords: Arrhythmias, Basic science, Electrophysiology, Ion Channels, Mathematical Modeling, Molecular Cardiology, and Translational Research
Jasvindar Singh, MD

Associate Professor of Medicine

Current Research Interests

- Interventional cardiology, especially complex interventions
- Outcomes from intervention procedures
- Stent design
- Coronary Physiology
- FFR/IVUS
- Left Main and Bifurcation Research

Representative Publications


Key words: coronary artery disease, interventional cardiology
**Timothy W. Smith, MD, DPhil**

Professor of Medicine

**Current Research Interests**

- Techniques of ICD/pacemaker implantation
- New approaches to therapy (especially ablation) of ventricular tachycardia
- Prevention of sudden death and ICD utilization
- Electrocardiography and ECG education
- Cardiac Resynchronization

**Representative Publications**


**Key words:** arrhythmias, electrocardiography, electrophysiology
Sandeep S. Sodhi, MD
Assistant Professor of Medicine
Clinical Cardiac Electrophysiology

Current Research Interests

- Clinical outcomes of premature ventricular catheter (PVC) ablation using remote magnetic-guided catheter guidance
- Psychological drivers impacting the health of adult patients with congenital heart disease

Representative Publications


Key words: complex catheter ablation, atrial fibrillation, premature ventricular contractions, ventricular tachycardia, robotic navigation
Phyllis K. Stein, PhD
Associate Professor of Medicine

Current Research Interests

- Research quality heart rate variability (HRV) analysis and outcomes in different clinical populations from infants to elderly, including use of HRV to identify high risk individuals.
- HRV in association with genetic disorders in humans and animals.
- Application of novel, non-linear HRV methods (e.g., multiscale entropy) to detect patterns of neurocardiac integration not detectable using standard HRV measures, in order to track clinical status, assess interventions and predict outcomes including: incident CVD events, dementia and survival.
- Detection of sleep-disordered breathing, circadian rhythm disorders, and sinoatrial node dysfunction from ambulatory ECG recordings and examination of their relationship to clinical status and outcomes.
- Clinical applications of HRV from bedside monitoring in the NICU, PICU and ICU, including potentially in COVID–19 patients.
- Effect of clinical and stress management interventions on cardiac autonomic functioning.
- Race and gender influences on HRV.

Representative Publications (out of 158 peer-reviewed papers)

Key words: aging, ambulatory ECG, anxiety, autonomic function assessment, cardio-oncology, cardiovascular epidemiology, circadian rhythms, dementia, depression, diabetes, epidemiology, heart failure, heart rate variability, hypertension, risk factors, sleep disorders, trauma, trauma healing, women and minorities
Nathan Stitziel, MD, PhD

Associate Professor of Medicine and Genetics

Current Research Interests

- Genetics of Mendelian cardiovascular disease
- Genetics of complex cardiovascular disease
- Clinical application of genetics

Representative Publications


Key words: atherosclerosis, basic science, genetics, translational research
**Amanda Verma, MD**

Assistant Professor of Medicine

**Current Research Interests**

- Cardiovascular disease and pregnancy, peripartum cardiomyopathy
- COVID19 and heart disease

**Representative Publications**


**Key words:** heart failure, peripartum cardiomyopathy, pregnancy, women and minorities
Carla J. Weinheimer, MS

Associate Professor of Medicine

Current Research Interests

- Murine cardiovascular phenotyping through microsurgery, hemodynamic evaluations, imaging, and histology
- Models of ischemic disease and heart failure in mice

Representative Publications


Key words: cardiovascular phenotyping, novel murine surgical models, cardiomyopathy, ischemia, imaging, molecular cardiology, basic science
Pamela K. Woodard, MD

Hugh Monroe Wilson Professor of Radiology and Professor of Biomedical Engineering

Current Research Interests

- Molecular Imaging of atherosclerosis
- Cardiac MRI
- Cardiac CT – coronary CT angiography

Representative Publications


Key words: atherosclerosis, cardiac MRI, cardiac CT, molecular imaging
Alan Zajarias, MD

Professor of Medicine
Professor in Surgery (Cardiothoracic)

Current Research Interests

- Transcatheter aortic valve implantation (TAVI)
- Use of CT for procedural planning of TAVI
- Echocardiographic assessment of RV function in patients with pulmonary hypertension undergoing TAVI for aortic stenosis
- Racial differences in aortic stenosis
- Mitral regurgitation and outcomes in patients with cardiomyopathy
- Patient selection and procedural outcomes in patients undergoing TAVI

Representative Publications


Key words: aortic stenosis, interventional cardiology, valvular heart disease
Kathleen W. Zhang, MD

Assistant Professor of Medicine

Current Research Interests
- Improving diagnosis and management of patients with cardiac amyloidosis
- Pathophysiology of cardiac amyloidosis
- Cardiovascular disease in men with prostate cancer
- Cardiotoxicity of cancer therapy

Representative Publications

Key words: amyloidosis, biomarkers, cardio-oncology, echocardiography