

Name	Research Areas	Research Type	Project Description
<i>Dr. Mohammed Al-Ani, MD</i> Department of Internal Medicine Division of Cardiology	Imaging research, cardiovascular physiology, heart failure, data analysis	Clinical Science	"Decoding the Heart–Kidney Cross-Talk: MRI Markers of Renal Perfusion and Oxygen Balance" The heart and the kidneys are closely connected — what affects one often affects the other. When the heart is weak or under stress, the kidneys may not get enough blood flow (called renal perfusion) or the pressure inside the kidney vessels becomes abnormally elevated. Over time, this can cause the kidneys to function less efficiently, retain fluid in the body, and have significant effect on cardiovascular physiology. In this project, we use advanced MRI techniques that look not just at the heart structure and function but also at blood flow patterns and tissue perfusion supply / demand matching via quantifying oxygen content, to study how kidney health changes in patients with heart failure compared to normal individuals. By measuring blood flow and oxygen balance in the kidneys, we aim to find early warning signs of kidney injury that might guide clinicians in personalizing therapies to the patient's pathophysiology. The undergraduate student will help collect and organize MRI and laboratory data, learn how to interpret images and measurements, and assist in summarizing results for a scientific presentation or publication. This project offers hands-on experience in imaging research, cardiovascular physiology, and data analysis, while contributing to new knowledge about the heart–kidney connection.
<i>Dr. Moriah Bellissimo Myers, PhD, RD</i> Postdoctoral Fellow Department of Internal Medicine Division of Cardiology	Nutrition, physical activity, body composition, and metabolism	Social Science	My research investigates how lifestyle behaviors, including dietary intake and physical activity, impact cardiovascular function in women with breast cancer. Ongoing projects are investigating the beneficial impacts of physical activity to preserve cardiac function during cancer treatment. Two aspects of this are investigating if physical activity preserves muscle quality and/or mitigates systemic inflammation. Other projects involve understanding changes in dietary intake and plasma lipidomic profiles during cancer treatment and how that relates to clinical outcomes such as exercise capacity and cardiac function. The goal of this work is to design mechanistically-informed lifestyle interventions to preserve exercise capacity and reduce cardiovascular disease risk in patients treated for cancer.
<i>Dr. Justin Canada, PhD</i> Associate Professor Department of Internal Medicine Division of Cardiology	Cardiopulmonary exercise testing (CPET), exercise physiology of heart failure, cardiology, clinical research	Clinical Science	"Association of Exercise Stress variables with Non-invasive Cardiovascular Imaging Findings" The coupling of exercise stress testing with non-invasive imaging modalities such as cardiac MRI, stress echocardiography, radionuclide imaging allows the opportunity to evaluate the structure and function of the heart both at rest and during dynamic movement. The project will identify and collect variables obtained during exercise stress and determine their associations with non-invasive imaging variables and cardiovascular risk status. The student will obtain a mentored-learning experience in these exercise stress procedures, identify a clinical question, collect identified variables to answer their clinical question, analyze results, and present a summary abstract of findings.

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<i>Dr. Anindita Das, PhD</i> Professor Department of Internal Medicine Division of Cardiology	Myocardial ischemia/reperfusion injury, Myocardial pre/post-conditioning, Chemotherapeutic-induced cardiotoxicity, mTOR signaling, Cancer biology, Inflammation, Apoptosis, microRNAs	Basic Science	"Effect of Combination Therapy (with PDE5-mTOR Inhibitors) in Attenuation of Chemotherapy/ immunotherapy-induced Cardiotoxicity" Chemotherapeutic agents and immunotherapy cause systemic inflammation and serious multi-organ toxicity, including cardiotoxicity in many cancer patients. Our lab is also interested to examine the effect of a novel combination therapy (with PDE5-mTOR inhibitors) in attenuation of chemotherapy/immunotherapy-induced cardiotoxicity.
<i>Dr. Bernard Fuemmeler, PhD, MPH</i> Professor Department of Health Behavior and Policy	Cancer health equity, survivorship and cardiovascular disease risk reduction	Social Science	"Cancer health equity, survivorship and cardiovascular disease risk reduction" The student will help the laboratory be involved in examining publicly accessible data or data from ongoing research in the lab examining risk factors for cardiovascular disease among cancer survivors or among individuals living low-income communities.
<i>Dr. Yaorong Ge, PhD</i> Professor Software and Information Systems	Health Informatics, Clinical Information and Decision Support Systems, Data Warehousing, Data Analytics, Machine Learning, Medical Imaging and Image Analysis	Computer Science	"Understanding and predicting heart failure risks in cancer patients using EHR data and clinical study data" Cancer patients experience a higher rate of heart failure events following cancer treatment. In this project we will develop machine learning models to predict heart failure risks for cancer patients. We will use routine clinical data from Electronic Health Records (EHR) and research data captured in clinical studies to construct accurate and early predictive models. Using these models, we will examine the factors that contribute to significant risks as well as factors that contribute to disparities in such risks. We will also compare measurements collected in clinical studies that are of higher quality to data available in routine clinical care that are more numerous and over a longer period to investigate the best approaches to developing heart failure prediction models that leverage routine clinical data recorded in EHR.
<i>Dr. Jennifer Jordan, PhD</i> Associate Professor Department of Biomedical Engineering	Imaging, cardio-oncology, biomedical engineering	Engineering Science	"Exploring vascular toxicities of estrogen deprivation therapy for premenopausal hormone receptor positive breast cancer patients" Women experience increased protection due to estrogen from atherosclerosis and cardiovascular disease during premenopausal years. Some breast cancers that thrive on estrogen are treated with estrogen suppression, however, which is associated with higher breast cancer free survival. Through an NIH-funded multi-center study, we are performing advanced cardiovascular imaging in pre-menopausal breast cancer patients to determine the vascular changes during the first two years of estrogen suppression therapy. In this project, the student will utilize image processing software to analyze cardiovascular MRI and CT images to determine the changes in blood flow, vascular stiffness, and plaque burden during treatment.
<i>Dr. Jordana Kron, MD</i> Professor Department of Internal Medicine Division of Cardiology	Cardiac arrhythmias, electrophysiology, implantable cardioverter defibrillators, sarcoidosis	Clinical Science	"Cardiac Sarcoidosis Consortium Registry" The Cardiac Sarcoidosis Consortium is an international multicenter collaboration co-founded in 2011 by VCU, University of Michigan and University of Colorado and has a prospective registry of more than 700 patients with cardiac sarcoidosis from 25 centers. The student will help to update the database for the enrolled patients from VCU and also devise a hypothesis and query the database to try to answer a question with the current data.

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<i>Dr. Pengyang Li, MD</i> Heart Failure Fellow Department of Internal Medicine Division of Cardiology	Advanced Heart Failure/Transplantation, Takotsubo Syndrome (Stress Cardiomyopathy), Mechanical Circulatory Support Devices, Cardiogenic Shock, Outcomes Research	Clinical Science	"Clinical Outcomes in Advanced Heart Failure Patients Requiring Temporary Mechanical Support" This project will involve a comprehensive review of clinical data from patients with advanced heart failure who required temporary mechanical circulatory support, such as Impella, ECMO, or intra-aortic balloon pumps. Utilizing databases such as the National Inpatient Sample (NIS), UNOS, or re-admission databases, the student will assist in data collection, analysis, and identifying trends in patient outcomes, complications, and predictors of survival. This project offers an opportunity to gain experience in working with large Healthcare database, outcomes research, and understanding the role of mechanical support devices in heart failure management.
<i>Dr. Mohammed Makkiya, MD</i> Assistant Professor Department of Internal Medicine Division of Cardiology	Cardiac imaging, cardiac echocardiography, new software and innovation in cardiac imaging, valvular heart disease, hypertrophic cardiomyopathy	Clinical Science	Project 1: "Comparison of Global Longitudinal Strain Measured by Handheld Echocardiography versus Standard Echocardiography" A pilot prospective study to determine how portable ultrasound device (also known as handheld echocardiography, or HHE) compares with standard echocardiography is measuring heart function, specifically a parameter called global longitudinal strain (GLS), which can detect early signs of heart dysfunction Project 2: "Building a registry of hypertrophic cardiomyopathy patients with focus of overall characteristics, socioeconomic status and diversity" This study seeks to establish a registry of hypertrophic cardiomyopathy patients to examine baseline characteristics, including socioeconomic status and general determinants of outcomes. Project 3: "The role of echo-enhancing contrast in reducing the disparity in septal thickness measurements obtained via echocardiography compared to cardiac MRI" This study aims to utilize echocardiographic imaging enhancement(contrast) for the assessment of left ventricular mass and wall thickness measured with the use of echo contrast, as opposed to the conventional method, and to evaluate its correlation of these measurements with the gold standard measurements obtained using cardiac MRI.

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<i>Dr. Oxana Palesh, PhD, MPH</i> Professor Department of Psychiatry Massey Cancer Center	Breast Cancer Survivorship, insomnia, diet	Clinical Science/Social Science	"Multicenter Randomized Controlled Trial Comparing Brief Behavioral Therapy for Cancer Related Insomnia (BBT-CI) and Healthy Eating Education Learning (HEAL)" This phase III clinical trial aims to compare the two behavioral interventions, "Brief Behavioral Therapy for Cancer-Related Insomnia" and "Healthy Eating Education Learning" to discover which approach is most effective in treating insomnia in cancer patients. Insomnia is prevalent among cancer patients as a result of treatment, and there is currently no standard treatment for it. The student will help the research staff identify eligible participants for the study, engage with participants, collect and enter data from EHR. Through their mentorship, they will gain experience with wearable technology (namely actigraphy), electronic medical records, and electronic data capture. Students can expect to assist with/shadow: Screening in EPIC and clinic with CRC, Informed Consent (Shadow/mentor), Data entry into REDCap
<i>Dr. Elisa Palladino, PhD</i> Postdoctoral Fellow Department of Internal Medicine Division of Cardiology	Cardio-oncology, imaging and bioactive lipids	Basic Science	The student will work with a research team involved in the study of chemotherapy-induced cardiotoxicity. Ceramides, main constituents of the cellular sphingolipid signaling pathways, have been associated with several metabolic and cardiovascular conditions. The student will be evaluating the association between ceramide levels and cardiac function in subjects undergoing chemotherapy. Imaging sciences will represent the main tool of investigation; the student will gain exposure to echocardiography and magnetic resonance imaging and will develop and address a research question relying on one or both of these techniques. They will work on a preclinical murine model in a translational research project or on a cardiovascular human subject research trial.
<i>Dr. Ajay Pillai, MD, FACC</i> Assistant Professor Department of Internal Medicine Division of Cardiology	Cardiac arrhythmias, electrophysiology, implantable pacemakers, cardiac conduction system pacing (left bundle branch area pacing)	Clinical Science	"Translational Methods in Cardiac Conduction System Pacing and Arrhythmia Research Students will work in a multi-disciplinary research team involving translational models (animals) or human subjects research. Cardiac conduction system pacing is a novel pacemaker modality which may have significant beneficial effects on cardiovascular function over time. A multi-disciplinary approach to investigate pacing and arrhythmia research including exposure to optical mapping, cardiovascular MRI, electroanatomic mapping, and machine learning will be applied to better understand the performance and optimization of pacing and ablation strategies. The ultimate goal of this avenue of study is to improve outcomes in heart failure patients who require pacemakers and other complex cardiac procedures including cardiac ablation. The student will obtain a mentored-learning experience in these procedures, identify a clinical question, collect variables to answer their clinical question, analyze results, and present a summary abstract of findings."

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<i>Dr. Frank Raucci, MD, PhD</i> Assistant Professor Department of Pediatrics	Pediatric cardiology, cardiomyopathy, neuromuscular cardiology, cardiac magnetic resonance imaging, ion channels	Basic Science	"Targeting Pannexin 1 as a Novel Mechanism for Arrhythmia and Fibrosis in Duchenne Cardiomyopathy" The primary focus of our lab is using basic and translational studies to probe the understanding of the role of ion channels in the development of arrhythmia and fibrosis in pediatric and young adult cardiomyopathies and heart failure. One of the main projects is understanding the role of the large conductance channel, pannexin 1, in the pathophysiology of Duchenne cardiomyopathy. We use mouse and induced pluripotent stem cell models to understand the underlying mechanisms of this process. Team members will learn basic laboratory skills, allowing them to perform acquisition and analysis of data from biological models and formulate a mentored abstract at the conclusion of the rotation.
<i>Dr. Fadi Salloum, PhD</i> Sr. Associate Dean for Research VCU School of Medicine Professor Department of Internal Medicine (Cardiology) Pauley Heart Center	Cardiac physiology, molecular biology, cardio-oncology, ischemic heart disease, heart failure	Basic Science	"Translational research on the cardiac complications of targeted cancer therapies" Winning the battle against cancer and improving the prognosis of patients with malignancies remains the primary objective of the oncology field. Though certain cancers are becoming more treatable, the longer life expectancy in cancer survivors is not without limitations, particularly chemotherapy-induced cardiotoxicity and heart failure. In our lab, one of the goals is to understand the molecular mechanisms that lead to the development of chemotherapy-induced cardiotoxicity by using innovative translational approaches. The student will have the opportunity to oversee and learn essential molecular technologies applied to preclinical in-vitro cell models and in-vivo animal models of cardiotoxicity. The student will familiarize him or herself with several notions regarding cardiac physiology and pathophysiology while learning how to ask scientific questions, design relevant experiments, collect and interpret data as well as survey the literature.
<i>Dr. Arnethea L. Sutton, PhD</i> Assistant Professor Department of Kinesiology and Health Sciences	Racial Disparities in Cardio-oncology	Social Science	The student will help to identify factors, namely psychosocial factors and social drivers of health, that contribute to racial differences in cardiovascular toxicities (e.g., hypertension, heart failure). The student will have access to electronic health record data and survey data from Black and white women who are either currently receiving treatment or who have recently completed primary treatment for breast cancer. The student will also have an opportunity to work with other members of the team to recruit and interview cancer survivors.
<i>Dr. Cory Trankle, MD</i> Associate Professor Department of Internal Medicine Division of Cardiology	Exercise testing, left atrium, magnetic resonance imaging, echocardiography	Clinical Science	"Determinants of Exercise Capacity" This project aims to expand a large dataset of patients who have undergone cardiopulmonary exercise testing (CPET), which is a sophisticated form of exercise test that measures total body oxygen consumption among other datapoints. The student will be responsible for extracting retrospective data to add to the existing dataset, which may include chart review data, imaging analysis, and/or CPET data from the metabolic carts.