Division Data Summary

Research and Training Details

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Clinical Activities and Training

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Significant Publications


Cardiomyopathies are primary heart muscle disorders characterized by abnormalities in the size, thickness and function of the heart muscle. In childhood, these are typically caused by genetic and metabolic abnormalities. In this study, we determined that 76% of probands had familial, syndromic, or metabolic causes. In 43% of hypertrophic cardiomyopathy (HCM) patients, mutations in sarcomeric genes (predominantly MYH7 and MYBPC3 mutations) was noted while 17% had metabolic causes. Dilated cardiomyopathy (DCM) patients had similar rates of syndromic (20%) and metabolic (16%) causes, but fewer familial cases (24%) compared with HCM patients.


This study, on a large group of pediatric cardiac surgical patients, demonstrates the temporal rise and relationship of four early urinary biomarkers for acute kidney injury (AKI) following cardiopulmonary bypass. Importantly, it is the first study to demonstrate that the use of biomarker combinations are more predictive of AKI than a single biomarker alone. The addition a urinary biomarker “panel”, consisting of the combination of NGAL, IL-18, L-FABP, and KIM-1, to a clinical model, enhanced the prediction of AKI in the first 6-24 hours after surgery. The use of biomarker combinations may enhance early prediction and timing of AKI, allowing for
targeted therapy designed at lessening disease severity.


Echocardiography is often used to assess heart murmurs in asymptomatic children, but the utility of such testing has not been studied in a contemporary era of routine prenatal ultrasound, telemedicine, pulse oximetry screening, and expanded neonatal echocardiography. We reviewed the results of 462 sedated outpatient echocardiograms performed in asymptomatic children between 1 month and 4 years of age, categorizing cardiac findings as none/mild in 91%, moderate in 8%, and severe in 1%. No severe pathology was seen in children over 1 year of age. These results may assist clinical decision-making and inform efforts to control health-care costs in children.


Most childhood forms of cardiomyopathy have a genetic basis. The sarcomere and Z-disc are commonly affected areas of the myocardium in these disorders. We were able to show that mutations in myopalladin (MYPN), a Z-disc protein expressed in striated muscle that functions as a structural, signaling and gene expression-regulating molecule in response to muscle stress, caused a substantial number of cases of DCM, HCM and RCM, depending on the position of the mutation. This data shows that the clinical appearance of cardiomyopathies may differ widely, even when caused by mutations in the same gene.


Cardiovascular (CV) diseases are the leading cause of death throughout the world. Increased arterial stiffness is an early marker for CV disease risk as stiffer vessels predict heart attack and stroke in obese adults with insulin resistance (IR). Whether obese youth with IR have stiffer vessels is not known. Therefore, we measured CV risk factors and arterial stiffness in 343 non-diabetic adolescents and young adults 15-28 years of age. We found that obese subjects with IR had stiffer vessels than those without IR demonstrating lower brachial artery distensibility, higher pulse wave velocity and augmentation index. However, this difference was accounted for by adverse levels of CV risk factors such as obesity, BP and cholesterol and not insulin resistance per se. We concluded that obesity and elevated BP are the major factors driving increased CV risk in non-diabetic youth. Efforts to combat the obesity epidemic should be top priority to reduce future CV risk in America’s young adults.

Division Publications


Cardiovascular interventions. 2011; 4:1037-46.


54. Hor KN, Mazur W, Taylor MD, Al-Khalidi HR, Cripe LH, Jefferies JL, Raman SV, Chung ES, Kinnett KJ, Williams K, Gottliebson WM, Benson DW. Effects of steroids and angiotensin converting enzyme inhibition on circumferential strain in boys with Duchenne muscular dystrophy: a cross-sectional and


71. Mack EH, Wheeler DS, Hirsch R. **Endovascular treatment of near-fatal neonatal superior vena cava


116. Wray J, Brown K, Marino BS, Franklin R. Medical Test Results Do Not Tell the Whole Story: Health-Related Quality of Life Offers a Patient Perspective on Outcomes. World Journal for Pediatric and


Faculty, Staff, and Trainees

Faculty Members

**Jeffrey A. Towbin, MD, FAAP, FACC, FAHA**, Professor

- **Leadership** Executive Co-Director, The Heart Institute; Director and Chief, Division of Cardiology
- **Research Interests** Cardiomyopathy and Genetics

**Jeffrey B. Anderson, MD, MPH**, Assistant Professor

- **Leadership** Director, Value Delivery
- **Research Interests** Syncope, Nutritional failure in congenital heart disease, Quality improvement

**Robert Beekman, MD**, Professor

- **Research Interests** Cardiac Catheterization & Intervention, Quality Improvement, Coarctation of the Aorta

**D. Woodrow Benson, MD, PhD**, Professor

- **Leadership** Director, Cardiovascular Genetics
- **Research Interests** Cardiovascular Genetics

**Clifford Chin, MD**, Professor

- **Leadership** Medical Director, Pediatric Heart Transplant Service
- **Research Interests** Cardiomyopathy, Heart Failure, and Cardiac Transplantation

**James F. Cnota, MD**, Associate Professor

- **Leadership** Director, Neonatal Cardiology
- **Research Interests** Fetal Cardiology, Multicenter clinical trials

**David S. Cooper, MD, MPH**, Assistant Professor

- **Leadership** Associate Medical Director, Cardiac Intensive Care Unit; Director, Cardiac ECMO Program
- **Research Interests** Acute Kidney Injury in Critical Cardiac Disease, Anticoagulation on Extracorporeal Support, Outcomes research

**Linda H. Cripe, MD**, Associate Professor

- **Research Interests** Cardiomyopathies, Neuromuscular Disorders, Echocardiography

**Richard Czosek, MD**, Assistant Professor
Research Interests Cardiac pacing devices in pediatric and congenital heart disease patients and arrhythmia risk stratification in the pediatric population

Allison Divanovic, MD, Assistant Professor
Research Interests Fetal Echocardiography

Paula Goldenberg, MD, MSCE, MSW, FAAP, FACMG, Associate Professor
Research Interests Cardiovascular Genetics

Bryan H. Goldstein, MD, Assistant Professor
Research Interests Cardiac catheterization & intervention, Hybrid therapies for congenital heart disease, Single ventricle outcomes

Michelle Grenier, MD, Associate Professor
Leadership Director, 3 Dimensional Echocardiography
Research Interests Cardiomyopathy, Heart Failure, 3 Dimensional Echocardiography, Athletic Screening in Sudden Cardiac Death

Haleh Heydarian, MD, Assistant Professor
Research Interests Echocardiography Synchrony/Strain Imaging and Quality Improvement

Robert B. Hinton, MD, Assistant Professor
Leadership Director, Heart Institute BioRepository
Research Interests Cardiovascular Genetics & Developmental Biology

Russel Hirsch, MD, Associate Professor
Leadership Director, Pulmonary Hypertension Service
Research Interests Cardiac Catheterization & Intervention, Device Development

Kan Hor, MD, Assistant Professor
Research Interests MRI technology to diagnose and follow heart disease, in particular DMD cardiomyopathy

Holly M. Ippisch, MD, MS, FAAP, Assistant Professor
Research Interests Echocardiography, preventive cardiology, exercise and pediatric obesity

John Lynn Jefferies, MD, MPH, FACC, FAAP, Associate Professor
Leadership Director, Cardiomyopathy/Heart Failure & Transplantation; Co-Director, CV Genetics
Research Interests Cardiomyopathy, Heart Failure, Cardiovascular Genetics and drug trials

Thomas R. Kimball, MD, Professor
Leadership Medical Director, Heart Institute
Research Interests Echocardiography, Ventricular function, Cardiovascular Effects of Obesity and Type II Diabetes

Shelley Kirk, PhD, RD, LD, Assistant Professor
Research Interests The efficacy, safety and feasibility of interventions for the management of pediatric obesity

Timothy Knilans, MD, Professor
Leadership Director, Clinical Cardiac Electrophysiology and Pacing; Director, Pediatric Cardiac Electrophysiology Fellowship
Research Interests Identification and risk stratification of causes of sudden death

Catherine Krawczeski, MD, Associate Professor
Leadership Director, Heart Institute Quality Improvement and Clinical Effectiveness; Co-Director, Center for
Acute Care Nephrology

Research Interests Cardiac surgery-associated acute kidney injury, cardiorenal syndromes, biomarkers, quality improvement

Cong Liu, PhD, Assistant Professor
Leadership Associate Director of HIDL
Research Interests Genetic etiology of cardiomyopathy, congenital heart disease and cardiovascular diseases. New technology development in clinical genetic testing and clinical viral testing

Angela Lorts, MD, Assistant Professor
Research Interests Heart failure and myocardial remodeling

Bradley S. Marino, MD, MPP, MSCE, Associate Professor
Leadership Director, Heart Institute Research Core; Director, Heart Institute Neurodevelopmental Clinic
Research Interests Outcomes Research

Erik Michelfelder, MD, Associate Professor
Leadership Co-Director, Cardiac Imaging; Director, Fetal Heart Program
Research Interests Fetal Cardiology and Echocardiography

David Nelson, MD, PhD, Professor
Leadership Medical Director, CICU
Research Interests Inflammatory injury after cardiac surgery

Enkhsaikhan Purevjav, MD, PhD, Assistant Professor
Research Interests Genetics of Cardiovascular Disease

Robert Siegel, MD, Professor
Leadership Medical Director, The Center for Better Health and Nutrition

Robert Spicer, MD, Professor
Research Interests Heart Failure Transplant

Arnold Strauss, MD, Professor
Leadership BK Rachford Professor and Chair, Department of Pediatrics, University of Cincinnati College of Medicine; Director, Cincinnati Children's Research Foundation; Chief Medical Officer, Cincinnati Children's Hospital Medical Center

Michael Taylor, MD, PhD, Assistant Professor
Leadership Director of Advanced Imaging Innovation and Cardiac MRI (CMR)
Research Interests Non-invasive study of cardiovascular physiology and metabolism; Pre-clinical imaging of cardiomyopathy models with cardiac MR and positron emission tomography

Elaine Urbina, MD, MS, Associate Professor
Leadership Director, Preventive Cardiology
Research Interests Non-invasive assessment of vascular structure and function and relationship to CV risk factors, obesity, diabetes, renal disease and sleep disorders. Treatment of high blood pressure and cholesterol

Gary Webb, MD, FRCP(C), FACC, FAHA, Professor
Leadership Director, Adolescent and Adult Congenital Heart Disease Program
Research Interests Adolescent and Adult Congenital Heart Disease
Joint Appointment Faculty Members

Jeanne James, MD, Associate Professor (Molecular Cardiovascular Biology)
  Research Interests Manifestations and etiologies of misfolded protein response and echocardiography

Stephanie Ware, MD, Associate Professor (Molecular Cardiovascular Biology)
  Research Interests Cardiovascular Genetics

Clinical Staff Members
- Lisa Lee, MD
- Chad Connor, MD

Trainees
- Christopher Cheng, MD, PhD, PL5, New York Methodist
- David Kwiatkowski, MD, PL4, Cincinnati Children's Hospital/University of Cincinnati
- Benjamin Landis, MD, PL4, Columbia University
- Sam Hanke, MD, PL6, Cincinnati Children's Hospital/University of Cincinnati
- Chike Madueme, MD, PL7, Cincinnati Children's Hospital/University of Cincinnati
- Ryan Moore, MD, PL4, Cincinnati Children's Hospital/University of Cincinnati
- Thomas Ryan, MD, PhD, PL6, Cincinnati Children's Hospital/University of Cincinnati
- Christopher Statile, MD, PL6, Cincinnati Children's Hospital/University of Cincinnati
- Aashoo Tandon, MD, PL4, Cincinnati Children's Hospital/University of Cincinnati
- Tamara Thomas, MD, PL5, Vanderbilt University
- Chet Villa, MD, PL5, Cincinnati Children's Hospital/University of Cincinnati
- Dingding Xiong, MD, PhD, PL6, Driscoll Children's Hospital
- Matt Zussman, MD, PL7, University of North Carolina, Chapel Hill
- Anne-Cecile Huby, PhD, UPMC, Pierre and Marie Curie University, France
- Sarkies Ruben Mattheus, Martherus, PhD, Maastricht University, The Netherlands
- Charu Munjal, PhD, University of Louisville
- Kathryn M. Rafferty, PhD, Cincinnati Children's Hospital/University of Cincinnati
- Ken Takagi, MD, Baylor College of Medicine
- Varun Krishnamurthy, BS, PL5, University of Cincinnati

Division Collaboration

Neurology; Developmental and Behavioral Pediatrics; Nutrition Therapy; Cancer and Blood Diseases Institute; Social Services » Mark Shapiro, MD, Kris Wesselkamper, MD, Shannon Standridge, MPH, DO, Cameron Thomas, MD, Julia Anixt, MD, Karen Mason, MD, Jannel Phillips, PhD, Patricia Eiler-Sims, PsyD, Stacey Morrison, PsyD, Jodi Raugh, MPT, Karen Harpster, PhD, OTR/L, Kristy Keyes, RD, Megan Horsley, RD, Mary Kay Irwin, MEd, EdD, Patricia Towbin, MEd, Sarah Strong, Jamie Brauley, MSW, LISW, and Lisa Dodd

The Neurodevelopmental Clinic offers specialized neurodevelopmental care to children and adolescents with a history of heart disease. The clinic's multi-disciplinary team provides a comprehensive neurodevelopmental evaluation for infants, toddlers, children and adolescents by providing families with the appropriate surveillance, screening, evaluation and treatment resources needed to ensure the best outcome possible for the patients.

Biostatistics & Epidemiology » Jessica Woo, MHSA, PhD, Eileen King, PhD, Yu Wang, MS, MAS, Phil Khoury, MS, Zhiqian Gao, Jesse Pratt, MS, MA, and Patricia Herbers, MS

The Heart Institute Research Core (HIRC) supports innovative, clinical, and translational science by facilitating
the design of research processes, implementation of research plans, dissemination and application of findings, and development of research professionals. The collaboration between the Heart Institute and the Division of Biostatistics & Epidemiology promotes efficiency of resource utilization by providing specialized statistical support for HIRC’s research projects.

**Nephrology & Hypertension** » Stuart Goldstein, MD and Prasad Devarajan, MD
Collaborative research and clinical care of kidney injury in critical cardiac disease. In one study, we are performing vascular function in children with CKD on dialysis to see if it correlates with coronary calcification and if it differs by type of dialysis used.

**Nephrology** » David Hooper, MD
Performing cardiac and carotid ultrasound and arterial stiffness in children after kidney transplant.

**Nephrology** » Mark Mitsnefes, MD
Chronic Kidney Disease in Children study, performing and reading carotid and cardiac ultrasound in children with kidney disease.

**Hematology; Pharmacology** » Joseph Palumbo, MD, Cristina Tarango, MD, and Alexander Vinks, PharmD, PhD, FCP
Studying recombinant antithrombin III supplementation in patients on extracorporeal support (cardiopulmonary bypass and extracorporeal membrane oxygenation).

**Endocrinology** » Lawrence Dolan, MD
Search for Diabetes in Youth study, performing vascular function testing on youth with type 1 and type 2 diabetes.

**Exercise Physiology** » Nicholas Edwards, MD, MPH
BMI rebound study, analyzing previously collected vascular function data in youth to compare to activity data.

**Sports Medicine** » Nicholas Edwards, MD, MPH
A feasibility study compares the practicality and effects of high intensity interval training to standard aerobic exercise in obese teens.

**Perinatal Institute** » Foong-Yen Lim, MD, William Polzin, MD, and Mounira Habli, MD

**Anesthesiology** » Pornswan Ngamprasertwong, MD and Senthilkumar Sadhasivam, MD, MPH
Assessing fetal cardiac function in an ovine model of maternal-fetal anesthesia.

**Sickle Cell** » Punam Malik, MD
Research studying the cardiovascular effects of sickle cell, specifically the correlates of pulmonary hypertension and diastolic dysfunction.

**Pediatric Surgery; Biostatistics & Epidemiology** » Thomas Inge, MD, PhD and Jessica Woo, MHSA, PhD
A project comparing the long-term outcome of severely obese adolescents undergoing bariatric surgery to those participating in a comprehensive medical weight management program.

**Biostatistics & Epidemiology; Adolescent Medicine** » Eileen King, PhD and Maria Britto, MD, MPH
This project tests the feasibility of using wireless/continuous feedback devices in augmenting weight management in obese teens. This project has led to an R21 application, submitted to NIH in June 2012.

**Behavioral Medicine & Clinical Psychology** » Megan Ratcliff, PhD, MPH
A pilot study that looks at the effects of blueberry supplemental drink on weight management, vascular function and cognitive function in obese teens.
A study that looks at rapid cycle, serial changes in setup, design and messaging on effects on cafeteria purchases by evaluating food consumption over time.

Studying the postnatal effects on left ventricular mass and function in a mouse model of intrauterine growth retardation.

Neuromuscular Clinic

Cardiomyopathy Clinic

Cardiovascular Genetics Clinic

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