Division Introduction

The Pediatric Cardiology Division provides comprehensive care for children with heart disease, conducts seminal research, and oversees a nationally recognized training program.

Under the direction of Gerald Greil, M.D., Ph.D., the Division provides services at Children’s Medical Center Dallas and Children’s Medical Center Plano in:

- Outpatient clinics (~12,000 visits/year)
- A 22-bed inpatient telemetry floor dedicated to cardiac patients
- A 32-bed dedicated Cardiac Intensive Care Unit
- Two catheterization laboratories for diagnostic and interventional procedures, including catheter ablation
- A 1.5T cardiac MRI scanner fully dedicated to Pediatric Cardiac Imaging with and without general anesthesia. The close proximity of this scanner to the cardiac catheterization laboratory allows combined MRI – cardiac catheterization procedures (XMRI).
- All imaging facilities are in close proximity to the OR allowing intra- and perioperative assessment of surgical and cardiac catheterization procedures.
- An echocardiography suite, including special areas for fetal echocardiography, as well as a complete non-invasive monitoring laboratory
- Outreach services are available at multiple sites throughout North Texas

Faculty

The Division has 27 board-certified pediatric cardiologists, each with a special area of expertise, including critical care medicine, interventional catheterization, electrophysiology, advanced imaging including echocardiography and fetal echocardiography, cardiac Magnetic Resonance Imaging (MRI) and Computed Tomography (CT), fetal cardiology, cardiac transplantation, heart failure, prevention, and adults with congenital heart disease.

Three new faculty members joined the Pediatric Cardiology team in 2016.

Ryan J. Butts, M.D.
Assistant Professor

B.A., B.S., magna cum laude  
College of Charleston, Charleston, SC, 2001

M.D.  
Medical University of South Carolina, Charleston, SC, 2005

Postdoctoral Training
- Residency, Pediatrics  
  Baylor College of Medicine, Houston, TX, 2005-2008
- Fellowship, Pediatric Cardiology  
  Medical University of South Carolina, Charleston, SC, 2008-2011

Interests
- Heart failure in single ventricle patients, outcomes after pediatric heart transplantation, pediatric heart failure
C. Richard Kirk, M.A., FRCP, FRCOCH
Professor

B.A.
Cambridge University, Cambridge, UK, 1976

M.B.
Christ’s College, Cambridge University, Cambridge, UK, 1979
Guy’s Hospital, London, UK, 1979

Postdoctoral Training
- Residency, General Surgery
  Guy’s Hospital, Great Maze Pond, London, UK, 1979-1980
- Residency, General Medicine
  Pembury Hospital, Tunbridge Wells, Kent, UK, 1980
- Chief Residency, Pediatrics
  Kettering General Hospital, Kettering, UK, 1981
- Chief Residency, Pediatrics
  Bristol Royal Hospital for Children, Bristol, UK, 1982-1983

Fellowship, Pediatrics
- Alder Hey Children’s Hospital, Liverpool, UK, 1986-1987
- Fellowship, Cardiothoracic Medicine
  Harefield Hospital, Hill End Road, Harefield, Middlesex, UK, 1987-1989
- Fellowship, Pediatric Cardiology
  Freeman Hospital, High Heaton, Newcastle upon Tyne, UK, 1989-1990
- Visiting Fellowship, Pediatric Cardiology (only a month long)
- Harvard Medical School/Children’s Hospital Boston, Boston, MA, 1990
- Visiting Fellowship, Pediatric Cardiology (only a month long)

Children’s Hospital, University of California, San Francisco, CA, 1990

Interests
- Heart failure and transplantation

David L. Sutcliffe, M.D.
Assistant Professor

B.S.
Texas A&M University, College Station, TX, 2001

M.D.
UT Southwestern Medical School, Dallas, TX, 2008

Postdoctoral Training
- Residency, Pediatrics
  UT Southwestern Medical Center/Children’s Health, Dallas, TX, 2008-2011
- Chief Residency, Pediatrics
  UT Southwestern Medical Center/Children’s Health, Dallas, TX, 2011-2012
- Fellowship, Pediatric Cardiology
  UT Southwestern Medical Center/Children’s Health, Dallas, TX, 2012-2015
- Fellowship, Pediatric Heart Failure/Transplant
  Harvard Medical School/Children’s Hospital Boston, Boston, MA, 2015-2016

Interests
- Heart failure, ventricular assist devices, cardiac transplantation
Honors / Awards

Maria Bano
• Promotion to Assistant Professor

Ryan Butts
• Mitchell I Rubin Research Award, Medical University of South Carolina Department of Pediatrics

Tarique Hussain
• Awarded funding from NuMED for Children’s, LLC for research on Modified CP Stent with variable cell dimensions

David Sutcliffe
• Kane/Owens Award for Compassionate Care, Children’s Hospital Boston

Animesh Tandon
• Early Research Career Award, Thrasher Foundation
• Early Career Research Award, Children’s Clinical Research Advisory Committee (CCRAC)

Surendranath Veeram Reddy
• Promotion to Associate Professor

Best Pediatric Specialists in Dallas, D Magazine
• Vivian Dimas
• Lynn Mahony
• Claudio Ramaciotti
• William Scott
• Thomas Zellers

Texas Super Doctors, Texas Monthly Magazine
• Adrian Dyer
• Matthew Lemler
• Lynn Mahony
• Alan Nugent
• Claudio Ramaciotti
• William Scott
• Surendranath Veeram Reddy

Invited Lectures

Ryan Butts
• Panelist, 2016 American Heart Association Scientific Sessions, New Orleans, LA, November 2016
  • “Pediatric Mechanical Circulatory Support Simulation”

Vivian Dimas
• SCAI Scientific Sessions Annual Meeting, Orlando, FL, May 2016
  • “Congenital Scanning: Beyond Structure and Function”
• SCAI Fall Fellows Course, Session 2: Diagnostic Catheterization in Congenital Heart Disease, Las Vegas, NV, December 2016
  • “Basic Hemodynamic Assessment: Waveforms, Shunt Calculations and Cardiac Output Assessment”
Gerald Greil

- Moderator, Session 4, Society for Cardiovascular Magnetic Resonance, Los Angeles, January 2016
  - “Congenital Scanning: Beyond Structure and Function”
- Association for European Paediatric and Congenital Cardiology, 50th Annual Meeting, Rome, Italy, June 2016
  - “ECHO is the Best Non-invasive Imaging Tool We Have for Monitoring Patients with Kawasaki Disease! Against Rebuttal”
- 14th SPR Hands-On Course on Pediatric Cardiovascular MR, Houston, TX, October 2016
  - “MR protocol for ventricular function”
  - “Hands-on post-processing”
  - “Interactive MR scanning”
- 12th SPR Advanced Symposium on Cardiovascular Imaging, Houston, TX, October 2016
  - “Work in Progress – Dallas”
  - Moderator, “Clinical Imaging Update 2: Coronary Imaging”

Mohammed Hussain

- Society for Cardiovascular Magnetic Resonance Annual Scientific Meeting, Los Angeles, January 2016
  - “Vessel Wall Imaging & Vascular Function: Fad or Future?”

Conference Presentations

Byrne N, Velasco Forte MDLN, Narayan S, Tandon A, Greil GF, Valverde I, Hussain T.

Poster, Society for Cardiovascular Magnetic Resonance (SCMR) Scientific Sessions, Los Angeles, CA, January 2016
“Steps Towards an Automated 3D Printing Pipeline in Congenital Heart Disease”

Byrne N, Velasco Forte MDLN, Narayan S, Tandon A, Greil GF, Valverde I, Hussain T.

Poster, Mimics Innovation Conference, Tampa, FL, February 2016
“Steps Towards an Automated 3D Printing Pipeline in Congenital Heart Disease”


Poster, Mimics Innovation Conference, Tampa, FL, February 2016
“Pediatric Acute Myocarditis in a Contemporary Multi-Center Cohort”

Velasco Forte MDLN, Byrne N, Tandon A, Bell A, Hussain T.

Poster, Mimics Innovation Conference, Tampa, FL, February 2016
“3D Printed Models for Complex Heart Diseases: Assessment in Coronary Fistula”

Bano M, Das B.

Poster, International Society for Heart and Lung Transplantation Meeting, Washington, DC, April 2016
“15 Year Old Female Presenting with Hemiplegia Seven Years after Heart Transplantation”


Poster, International Society for Heart and Lung Transplantation Meeting, Washington, DC, April 2016
“Pediatric Acute Myocarditis in a Contemporary Multi-Center Cohort”

Oral, International Society for Heart and Lung Transplantation Meeting, Washington, DC, April 2016
“Risk Factors for Heart Failure Readmission after Pediatric Myocarditis”


Oral, International Society for Heart and Lung Transplantation Meeting, Washington, DC, April 2016
“Risk Factors for Poor Outcomes in Pediatric Myocarditis”

Snarr B, Dyer A, Thankavel P.

Poster, American College of Cardiology Scientific Sessions, Chicago, IL, April 2016
“Diagnosing Vascular Rings: Evaluation of Imaging Modalities”

Webb MK, Dyer AK, Hussain T, Reddy S, Zellers TM, Nugent AW, Forbes JM, Dimas VV.

Oral, Society for Cardiac Angiography and Interventions Scientific Sessions, Orlando, FL, May 2016
“Successful Hybrid Valve Sparing Repair of TOF with Intervention Free Follow Up To 2 Years”

Tandon A, Dyer AK, Byrne N, Velasco Forte MDLN, Dillenbeck JM, Greil GF, Hussain T.

Moderated Oral Poster, Association for European Paediatric and Congenital Cardiology, 50th Annual Meeting, Rome, Italy, June 2016
“Use of a Semi-automated Cardiac Segmentation Tool Improves Reproducibility and Speed of Segmentation of Contaminated MRA Datasets”

Welch T, Souza D, Nugent AW.

Poster, Biomedical Engineering Society, Minneapolis, MN, October 2016
“Poly-L-Lactide Fiber Mechanical Properties and Degradation for Biodesorbable Stents”


“The Influence of Fontan-associated Protein-losing Enteropathy on Outcomes in Patients Referred for Heart Transplant: a Multicenter Study”

Selected Chairs

Gerald Greil

- Chairperson – Scientific Session: Working Group Symposium: Imaging, Pulmonary Hypertension and Heart Failure, Genetics and Basic Science, Cardiac Dysrhythmias and Electrophysiology, 50th Annual Association for European Paediatric and Congenital Cardiology (AEPC), Rome, Italy, June 2016
  - “Risk Stratification in Hypertrophic Cardiomyopathy”
**Education and Training**

The Division is dedicated to the training of medical students, residents, and fellows.

**Medical Students**

- **Third-Year Pediatric Rotations:**
  - Cardiology inpatient rotations with three medical students throughout the year
  - Pediatric Cardiology Clinic Days
- **Fourth-Year Electives in Pediatric Cardiology:**
  - Cardiac Outpatient Clinic Rotation
  - Cardiac Intensive Care Unit Rotation
  - Cardiac Imaging Rotation (MRI, CT, echocardiography)

**Residents**

The Division of Pediatric Cardiology plays a major role in the training of pediatric residents. Training occurs at many levels.

- **Inpatient Training:**
  - Three interns and one senior resident typically participate on the cardiology inpatient service, caring for patients on a 22-bed cardiology floor with the supervision of the attending cardiologist
  - An elective is available for residents to rotate in the Cardiac Intensive Care Unit
- **Outpatient Training:**
  - One or two second- or third-year residents are typically training in the Cardiology Outpatient Clinic under the supervision of the attending cardiologists

**Fellows**

The Pediatric Cardiology fellowship currently accepts two trainees per year in the categorical program, and advanced training is available in cardiac critical care, catheterization/intervention, advanced imaging, and cardiac transplantation. The program provides fellows the training, tools, and philosophy necessary for advancing the field of pediatric cardiology within their areas of choice.

Fellows rotate through all subspecialty areas of cardiology. They also spend one year participating in prospective clinical, translational, or basic science research.

Two new fellows are recruited each year in the three-year Pediatric Cardiology Fellowship Program. Many fellows choose to complete a fourth year to pursue a specialized clinical interest. All pediatric cardiology faculty members are actively involved in the fellows’ training.

In addition to the standard three-year fellowship program, qualified fellows are offered an additional fourth-year training programs in cardiac critical care, interventional cardiology, advanced cardiac imaging, electrophysiology, heart transplantation, preventive cardiology, prospective clinical research, and basic research. The structure of these experiences depends on the interests and skills of the individual fellow.
Research Activities

Members of the Division of Pediatric Cardiology are engaged in multiple research projects to advance the care of children with heart disease.

Basic Science

An exciting new area of investigation is the development of biodegradable stents for use in the cardiovascular system. Current research is directed at an evaluation of the tissue response to these materials in animals. Cardiopulmonary bypass is known to have adverse effects on neurologic development, but a clear understanding of the mechanisms is lacking. Using a mouse model of bypass, investigation is underway to evaluate biomarkers of injury.

Another new area of investigation is to optimize cardiovascular support therapy for pediatric patients with end-stage heart failure. Currently the only ventricular assist devices available require surgical placement. Researchers are investigating in an animal model the feasibility of a catheter delivered devise. One additional animal research area is the optimization of technologies for fetal intervention.

In close cooperation with the Department of Radiology faculty have access to the Advanced Imaging Research Center at UT Southwestern. This gives staff members access to novel cardiovascular research technology to contribute to existing research as well as opportunity to design their individual research projects.

Clinical Sciences

The Pediatric Cardiology Division participates in multiple multicenter trials. In interventional catheterization, current trials are assessing various devices, including the Amplatzer and Helex occluders, and management of coarctation, including the placement of stents. It is anticipated that a recently completed multicenter trial of athletic screening processes will be used for a broader national evaluation.

The Division is contributing to a quality initiative to assess the care of patients with hypoplastic left heart syndrome. A multicenter effort is also underway to evaluate the use of ventricular assist devices in the pediatric population.

Collaborative studies within the Department of Pediatrics include protocols to evaluate stroke, migraine, and complications of sickle cell disease and childhood cancer.

Ongoing areas of research interest include epidemiologic studies of congenital heart disease, particularly within the state of Texas, natural history studies of patent ductus arteriosus in pre term neonates; evaluation of renal function with heart catheterization, markers for cardiac transplant rejection, development of new techniques for pediatric cardiovascular MRI; 3D printing and modeling of congenital heart disease; and using cutting-edge wearable sensors, combined with innovative big data techniques, to improve monitoring of children with heart disease while at home.
Clinical Activities

The Pediatric Cardiology division offers a comprehensive program of specialized care at the Heart Center at Children’s Health™ for children with congenital and acquired heart diseases, and children who have grown into adults with congenital heart disease. The Heart Center's team of professionals includes cardiologists, cardiac surgeons, cardiac intensivists, neonatologists, and cardiac anesthesiologists. In addition to providing the highest quality clinical and surgical care, our faculty members are committed to improving the health of children everywhere by sharing innovations and research.

Inpatient Services

Inpatient service is divided between the cardiac intensive care unit and the cardiology inpatient floor, on which all beds have telemetry capability with central monitoring. The inpatient floor functions as a “step-down” unit with the capacity to manage higher acuity patients, including those with temporary pacemakers and vasoactive infusions. There are usually 20 patients in the cardiac intensive care unit and 20 patients on the cardiology floor. New consultations average three to five per day.

Outpatient Services

Approximately 12,000 cardiology outpatients are seen each year at the Heart Center and regional outreach clinics. Subspecialty cardiology clinics, including heart transplantation, heart failure, arrhythmia, pacemaker, preventive cardiology, and young adult congenital heart disease, are held on a weekly or monthly basis.

Preventive Cardiology Clinic

A preventive cardiology clinic serves children with hyperlipidemia and hypercholesterolemia and children with metabolic syndrome (i.e. obesity, insulin resistance, increased triglycerides, decreased high density lipoprotein, and hypertension). A team of physicians, dietitians, and nurses provides comprehensive physical assessments and dietary evaluations for patients and their families, with the development of individualized programs, including:

- Diet
- Life style modification
- Treatments, including natural as well as prescription medications

Pediatric Echocardiography Laboratory

The pediatric echocardiography laboratory at Children’s Health is Intersocietal Accreditation Commission (IAC) accredited for pediatric transthoracic, transesophageal, and fetal echocardiography. Six dedicated sub-specialty trained physicians staff the laboratory and provide coverage 24/7. The team consists of highly trained pediatric sonographers who perform approximately 11,000 studies a year and provides direct services for 4 primary hospitals and 2 outpatient sites. In addition, we provide support services for tele-echocardiography at 3 additional hospitals and 4 outreach clinics.
The laboratory offers the latest technology including fetal echocardiography, stress imaging, 3 dimensional and strain imaging and provides imaging support for the cardiac operating rooms, ECMO cannulation, and catheterization laboratory.

The fetal heart program is Joint Commission Disease Specific Certified. We perform between four and five hundred fetal echocardiograms and consultations a year. The program expertly coordinates prenatal testing and delivery planning to ensure critical congenital heart conditions receive the care they need at precisely the right time. Comprehensive multidisciplinary consultations may include an imaging cardiologist, electrophysiology cardiologist and nurse, cardiothoracic surgeon, social work, neurodevelopmental specialist, and introduction to our “safe at home” program for interstage single ventricle monitoring program. We also participate in multi-institutional studies investigating rare congenital heart disease that can be detected in utero.

The laboratory has a strong track record of academic endeavors, including research on congenital coronary artery imaging, identification of rejection in transplanted hearts, and evaluation of single ventricle palliation. We have many successful research collaborations with other divisions in pediatrics including neonatology, hematology/oncology and neurology. We have recently participated in a multi-center National Institute of Health (NIH) funded study to determine normal values for pediatric echocardiography.

2015 Patient Statistics

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<th>Children’s Medical Center Dallas</th>
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<td>New outpatient visits</td>
<td>2,985</td>
<td>7,916</td>
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<tr>
<td>Total</td>
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<td>Inpatient admissions</td>
<td>898</td>
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<td>CATH procedures</td>
<td>741</td>
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<td>ECHO volume</td>
<td>8,840</td>
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<th>Cardiology at Children’s Legacy</th>
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<td>New outpatient visits</td>
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<td>Total</td>
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<td>ECHO volume</td>
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<th>Cardiology at Children’s Southlake</th>
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<td>New outpatient visits</td>
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<td>Total</td>
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<td>ECHO volume</td>
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<th>Cardiology at Outreach</th>
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<tr>
<td>New outpatient visits</td>
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<td>Total</td>
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<td>ECHO volume</td>
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<th>Telemedicine</th>
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<td>ECHO</td>
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<td>Holter</td>
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Current Grant Support

Ryan Butts

Grantor: American Heart Association Mentored Clinical Research Program
Title of Project: Effect of Carvedilol on Exercise Performance in Fontan Patients
Role: Principal Investigator
Dates: 07/2016 - 07/2018

Gerald Greil

Grantor: Children’s Clinical Research Advisory Council (Children’s Health)
Title of Project: 3D Printing of Patient Specific Congenital Heart Defects and Comparisons to Conventional Imaging Methods
Role: Co-Investigator
Dates: 02/2016 – 02/2018

Grantor: Association of European Cardiology (AEPC)
Title of Project: 3D printing of congenital heart disease: hands-on imaging from fetal development to long term follow up
Role: Co-Investigator
Dates: 02/2016 – 02/2017

Grantor: NIHR
Title of Project: MRI-augmented guidance for X-ray fluoroscopic pediatric cardiovascular interventions.
Role: Principal Investigator
Dates: 01/2015 – 12/2016

Grantor: Medical Research Foundation
Title of Project: Accelerated 3D Cardiac Functional Assessment using Cardiac Self-gating and Under sampled Respiratory Motion Compensation Techniques.
Role: Co-Investigator
Dates: 05/2015 – 08/2016

Grantor: Technology Strategy Board (EPSRC)
Title of Project: Atherosclerosis stratification using advanced imaging and computer-based models
Role: Co-Investigator
Dates: 01/2014 – 12/2016

Grantor: NIHR
Title of Project: Healthcare Technology Co-operative: Cardiovascular Technologies
Role: Co-Investigator
Dates: 01/2013 – 12/2016

Tarique Hussain

Grantor: NuMED for Children, LLC
Title of Project: Modified CP Stent with variable cell dimensions
Role: Principal Investigator
Dates: 02/2016 – ongoing
Grantor: Children’s Clinical Research Advisory Council  
**Title of Project:** 3D Printing of Patient Specific Congenital Heart Defects and Comparisons to Conventional Imaging Methods  
**Role:** Principal Investigator/Scientific Mentor  
**Dates:** 02/2016 – 02/2018

Grantor: Action Medical Research  
**Title of Project:** Improving surgical decisions in hypoplastic left heart syndrome (HLHS) through computational cardiac models  
**Role:** Co-Investigator  
**Dates:** 09/2015 – 02/2019

Grantor: BHF PG/15/104/31913  
**Title of Project:** How accurate are our clinical measures of aortic stiffness? A combined in vitro, in silico and in vivo study  
**Role:** Co-Investigator  
**Dates:** 02/2016 – 02/2019

Grantor: Association of European Cardiology  
**Title of Project:** 3D printing of congenital heart disease: hands-on imaging from fetal development to long term follow up  
**Role:** Co-Investigator  
**Dates:** 02/2016 – 02/2017

Grantor: NIHR  
**Title of Project:** Healthcare Technology Co-operative: Cardiovascular Technologies  
**Role:** Co-Investigator  
**Dates:** 01/2013 – 12/2016

Richard Kirk  
Grantor: International Society of Transplantation  
**Title of Project:** International Pediatric Heart Failure Registry  
**Role:** Co-Investigator  
**Dates:** 2015 – 2018

Lynn Mahony  
Grantor: National Heart, Lung and Blood Institute  
**Title of Project:** Pediatric Heart Disease Research Network  
**Role:** Steering Committee Chair  
**Dates:** 2011 – 2016

Grantor: Cincinnati Children’s Hospital  
**Title of Project:** Quality of Life Assessment in the Pediatric Cardiac Population: Testing the Pediatric Cardiac Quality of Life Inventory  
**Role:** Principle Investigator  
**Dates:** 2005 – ongoing

Grantor: SWAT Small Group Program Award  
**Title of Project:** Matters of the Heart: A New Ambulatory Pediatric Cardiology Curriculum  
**Role:** Principal Investigator  
**Dates:** 2015 – 2016
Alan Nugent

Grantor: NIH
Title of Project: Development of Large Diameter Biodegradable Stents for Congenital Heart Disease
Role: Principal Investigator
Dates: 07/2015 – 06/2017

Animesh Tandon

Grantor: Thrasher Foundation
Title of Project: Predictive analytics to prevent adverse events in interstage single ventricle heart disease
Role: Principal Investigator
Dates: 02/2016 – 01/2018

Grantor: Children’s Clinical Research Advisory Committee (CCRAC)
Title of Project: 3D Printing of Patient-Specific Congenital Heart Defects and Comparisons to Conventional Imaging Methods
Role: Principal Investigator
Dates: 02/2016 – 01/2018

Grantor: UT Southwestern Center for Translational Medicine Service Package Grant
Title of Project: Cardiac Magnetic Resonance Imaging for Patients with High Cardiometabolic Risk Factors
Role: Principal Investigator
Dates: 11/2016 – 01/2017

Grantor: Texas Neurofibromatosis Foundation Grant
Title of Project: Cardiovascular abnormalities in pediatric patients with neurofibromatosis type 1
Role: Co-Investigator
Dates: 05/2016 – 05/2017

Surendranath Veeram Reddy

Grantor: American Heart Association SWA Beginning Grant-in-Aid. Lawrence J. and Florence A. De George Award
Title of Project: Evaluation of a Novel Design Biodegradable Stent in Porcine Model of Aortic Coarctation
Role: Principal Investigator
Dates: 01/2015 - 12/2016

Grantor: NIH
Title of Project: Novel Design Biodegradable Stent for Treatment of Porcine Pulmonary Artery Stenosis
Role: Co-Investigator; Principal Investigator
Dates: 01/2015 – 12/2016

Grantor: Children’s Clinical Research Advisory Committee (CCRAC)
Title of Project: 3D Printing of Patient-Specific Congenital Heart Defects and Comparisons to Conventional Imaging Methods
Role: Co-Investigator
Dates: 02/2016 – 02/2018

Ilana Zeltser

Grantor: NIH / Children’s Hospital of Philadelphia
Title of Project: Hypertrophic Cardiomyopathy in Children: Age Specific Risk Stratification for Sudden Death
Role: Co-Investigator
Dates: 06/2014 – 06/2019
Peer-Reviewed Publications


