Pediatric Insights

BEST CHILDREN'S HOSPITALS U.S.News & WORLD REPORT CARDIOLOGY & HEART SURGERY 2019-20

Fall 2019

An Update From the Heart Institute at UPMC Children's Hospital of Pittsburgh

In This Issue

UPMC CHILDREN'S HOSPITAL OF PITTSBURGH

UPMC Children's Heart Institute Once Again Attains STS Three-Star Rating

The **Heart Institute at UPMC Children's Hospital of Pittsburgh** attained the prestigious Society of Thoracic Surgeons (STS) three-star rating for its congenital heart surgery program in the latest rankings that analyzed program data from participating health care systems for the four-year period from January 1, 2015, to December 31, 2018.

UPMC Children's was one of 42 high-volume centers (out of the 118 reporting institutions) during the latest reporting period. Only 10 programs in North America received a three-star designation in the latest survey period, and this is the **sixth consecutive reporting period** in which UPMC Children's has received the three-star designation.

UPMC Children's overall nonrisk-adjusted mortality rate of **1.8%** was lower than all but **three** of the 42 high-volume centers, with the overall mortality rate for the 118 STS institutions being 2.85%. Out of these high-volume centers, the lowest mortality rate was 1.4% and the highest mortality rate was 6.3%.

With respect to the observed-to-expected mortality ratio (O/E ratio), UPMC Children's program attained an overall ratio of 0.51, with an adjusted mortality rate of 1.4%. The O/E ratio is defined as the number of observed deaths divided by the number of expected deaths. An O/E greater than 1.0 implies that the hospital had more deaths than would have been expected given the case mix. Conversely, an O/E less than 1.0 suggests that the number of deaths was fewer than expected.

In the highest-risk congenital heart disease neonatal surgical cases, UPMC Children's outperformed the rest of the nation, not just in overall outcomes, but in the most complex repairs. Congenital cardiac operations are stratified according to their level of complexity. The STAT method uses five categories to group these operations according to their complexity. Across all STAT categories of neonatal cases, UPMC Children's adjusted mortality was **3.9%** and the national average was 8.0%. More compelling are the statistics for STAT 5 (the most complex) neonatal operations. In this category, UPMC Children's adjusted mortality was **4.6%** while the national average is 15.4%.

"This accomplishment is a credit to Dr. Victor Morell's commitment to excellence, and the result of an incredible Heart Institute team," says **Vivek Allada, MD**, executive director of the Heart Institute at UPMC Children's Hospital of Pittsburgh.

For complete ratings details and methodology, visit the STS website at **https://publicreporting.sts.org/chsd?title=&field_state_value=All**.

Heart Institute Network Grows

UPMC Children's Hospital of Pittsburgh and Wolfson Children's Hospital of Jacksonville, Florida, have announced a partnership that will enhance and expand specialized cardiac care for children in the North Florida/South Georgia region, as well as the entire southeastern United States.

"We are grateful to partner with Wolfson Children's Hospital to help establish an even higher level of cardiac care in the area, which will lead to improved outcomes for children with congenital heart disease," says **Victor Morell, MD**, chief, Division of Pediatric Cardiothoracic Surgery, UPMC Children's Hospital. "We will be an extension to the Wolfson surgical team to offer life-saving cardiac treatment options for families in Florida and to help these kids achieve a better and brighter quality of life."

Wolfson Children's Hospital is the second member of the UPMC Children's Hospital of Pittsburgh's Heart Institute Network, joining St. Joseph's Children's Hospital in Tampa. The network is led by Dr. Morell, who also is co-director of the Heart Institute at UPMC Children's and the hospital's surgeon-in-chief.

"For decades, our Terry Heart Center at Wolfson Children's Hospital of Jacksonville has served children with congenital heart disease from throughout the region and has patient outcomes that are equal to or better than the national benchmarks tracked by the Society for Thoracic Surgeons," says Michael D. Aubin, president of Wolfson Children's Hospital. "With the growing population in North Florida, South Georgia, and southern Alabama, as well as ever-advancing heart diagnostic capabilities, we are diagnosing and treating a higher incidence of congenital heart disease among the nearly 1 million children who live in the region we serve."

UPMC Children's Heart Institute experts are providing support to patients, families, and caregivers in Wolfson Children's Cardiovascular Intensive Care Unit via telemedicine. UPMC Children's is a leader in the development of telemedicine services to meet the needs of young patients regionally and around the world with videoconferencing technologies that provide complex pediatric cardiac care through remote and virtual examinations — whenever and wherever expertise is needed.

"The Heart Institute at UPMC Children's Hospital of Pittsburgh is an outstanding, high-volume center that is recognized nationally for treating some of the most complex cardiac surgery cases in the country and the world," says Michael S. Shillingford, MD, chief of Pediatric Cardiothoracic Surgery at the Terry Heart Center at Wolfson Children's Hospital. "In fact, they are among the top children's hospitals in the country and ranked #3 among *U.S. News & World Report's* Best Children's Hospitals for pediatric cardiology and heart surgery.

"Likewise, UPMC Children's Hospital of Pittsburgh recognizes the value of a partnership with the Terry Heart Center at Wolfson Children's Hospital, which has great outcomes and is recognized regionally for providing excellence in pediatric heart care," adds Shillingford. "We are bringing our wonderful, diverse, and growing Northeast Florida and Southeast Georgia demographic into the UPMC Children's Hospital of Pittsburgh Heart Institute Network. This allows us to combine our collective 50-plus years of heart surgery experience and expertise, as well as scientific and outcomes-based pediatric heart research, for the benefit of generations of families to come."

UPMC Physician Resources

For the latest news, events, videos, and free CME courses presented by UPMC clinicians and researchers, visit **UPMCPhysicianResources.com/Pediatrics**.

Current CME Courses in Cardiology and Cardiothoracic Surgery

Frontiers in Cardiac Intensive Care: Critical Illness and Neurodevelopment — *Presented by Justin Yeh, MD, Chief, Division of Pediatric Cardiac Critical Care Medicine*

Video Rounds

Video Rounds is a series of short, informative, and educational videos created for physicians and covering a variety of medical and surgical disciplines. Current topics in neonatology include:

The Latest in Pediatric Heart Transplantation — *Presented by Brian Feingold, MD, MS*

Norwood Procedure to Correct Hypoplastic Left Heart Syndrome — *Presented by Victor Morell, MD*

New R01 Grant Awarded to Heart Institute Researcher

UPMC Children's Heart Institute cardiologist and researcher **Mousumi Moulik, MBBS**, was awarded a new National Institutes of Health (NIH) R01 grant in July to continue her studies on the TEAD1 transcription factor and its role in maintaining normal cardiac function. Past work by Dr. Moulik and colleagues was able to show in a murine knockout model that deletion of TEAD1 brings about a fatal dilated cardiomyopathy.

New Grant: Technical Details

The TEA domain transcription factors (TEAD1-4) act as transcriptional mediators of the organ size control Hippo kinase pathway by interacting with Hippo pathway regulated coactivators Yes-Associated Protein (YAP) and its paralogue WW Domain-containing transcription regulator protein (TAZ), and are known to regulate cellular proliferation, survival, oncogenesis, and stem cell maintenance and differentiation.

Dr. Moulik's research team recently reported a critical, nonredundant role for TEAD1 in cardiomyocyte homeostasis and excitation-contraction coupling in the adult heart. Their data reveal that TEAD1 directly binds to promoter and enhancer regions of a network of genes involved in cardiac hypertrophic signaling and that multiple genes involved in cardiac hypertrophy are dysregulated upon cardiomyocyte-specific deletion of TEAD1. Mammalian cardiac muscle has minimal regenerative capacity and adapts to hemodynamic stress and injury primarily through cardiomyocyte hypertrophy and transcriptional reprogramming. This hypertrophic remodeling is eventually maladaptive and a critical intermediate step for the development of heart failure.

At the molecular level, cardiac hypertrophy is regulated by a complex network of cross-talking signaling pathways and transcription factors. The Hippo pathway regulated TEAD1 transcriptional activity is critical for cardiomyocyte proliferation and homeostasis, but its role in cardiac hypertrophy and heart failure, though postulated, is less clear. Based on Dr. Moulik's preliminary data and other published evidence, she hypothesizes that TEAD1 plays a regulatory role in physiologic cardiomyocyte hypertrophic growth and pathologic cardiomyocyte hypertrophic remodeling.

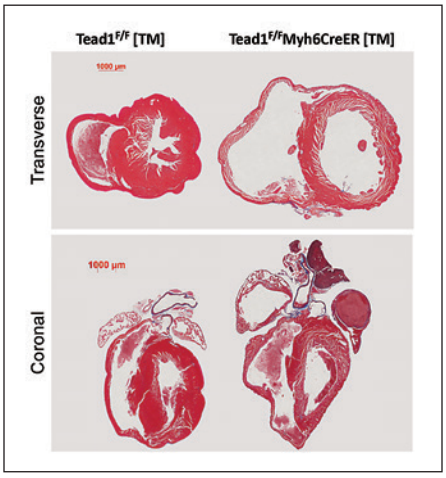
The broad goal of Dr. Moulik's R01 is to mechanistically delineate key cardiomyocyte hypertrophy signaling pathways regulated by TEAD1 in the adult heart and its significance in growth and heart failure. Further, the study has three specific aims. The first is to determine the requirement of TEAD1 for cardiomyocyte hypertrophy during postnatal physiologic growth via regulation of the IGF1 and mTOR pathways. The second aim seeks to determine if TEAD1 regulates pathologic cardiomyocyte hypertrophy in pressure overload-induced cardiac remodeling and augments NFAT and MEF2 signaling. Finally, the study will investigate if TEAD1 regulates pathologic hypertrophy pathways and fetal gene program in human heart failure.

Dr. Moulik's studies will critically address how TEAD1, the transcriptional target of the Hippo kinase pathway, regulates cardiomyocyte hypertrophy in physiologic and diseased states in the heart and translate this to pathologic cardiac hypertrophic remodeling in human heart failure. This research will further advance the understanding of the postnatal cardiac-specific role of the Hippo pathway, which is currently an active target for cardiac regeneration and novel cancer therapeutic strategies.

About Dr. Moulik

Mousumi Moulik, MBBS, is the director of the Pediatric Cardiovascular Genetics Clinic at UPMC Children's Hospital of Pittsburgh, which opened in early 2018. Dr. Moulik came to Pittsburgh after spending 10 years at the University of Texas Health Science Center at Houston following the completion of her fellowship training at the Baylor College of Medicine.

Dr. Moulik's clinical and research interests revolve around pediatric cardiomyopathies and their underlying molecular genetics. Since arriving at UPMC Children's, Dr. Moulik completed planning and implementation for the Pediatric Cardiovascular Genetics Clinic. The goals of the clinic are to facilitate the genetic diagnosis of familial cardiac disorders and expand the use of that genetic diagnosis to the larger family unit to better understand who is at risk for developing the disease. In the future, the genetic information collected also will permit clinicians and researchers to perform genotype and phenotype correlation to predict risk profile and disease severity based on underlying genetic etiology and transition to treatment based on personalized precision medicine.



Loss of TEAD1 in adult mouse hearts leads to DCM.

Dr. Moulik is very active on the research front in cardiovascular genetics and cardiac signaling in heart failure. Dr. Moulik's research group previously uncovered the critical role of the transcription factor TEAD1 in maintaining normal cardiac function in the adult heart. Additionally, Dr. Moulik's research laboratory has a focus on the role of the circadian clock in cardiac pathologic remodeling.

References and Further Reading

Liu R, Lee J, Kim BS, Wang Q, Buxton SK, Balasubramanyam N, Kim JJ, Dong J, Zhang A, Li S, Gupte AA, Hamilton DJ, Martin JF, Rodney GG, Coarfa C, Wehrens XH, Yechoor VK, Moulik M. TEAD1 is Required to Maintain Adult Cardiomyocyte Function, and Its Loss Results in Lethal Dilated Cardiomyopathy. *JCI Insight.* 2017 Sep 7; (2917). Pii:93343.

β-blockers and Heart Muscle Regeneration in Congenital Heart Disease

Surgery can mend congenital heart defects shortly after birth, but those babies will carry a higher risk of heart failure throughout the rest of their lives. Yet, according to a new study in *Science Translational Medicine* published in October by UPMC Children's Hospital of Pittsburgh researchers, β-blockers could supplement surgery to regenerate infant heart muscle and mitigate the lasting effects of congenital heart disease.

"The question is no longer 'can we save this baby?'" says senior author **Bernhard Kühn, MD**, associate professor of pediatrics at the University of Pittsburgh School of Medicine and director of the Pediatric Institute for Heart Regeneration and Therapeutics at UPMC Children's. "The challenge for our young patients is that we want to enable them to have a long lifespan, ideally as long as a person without heart disease."

For the relatively common congenital heart defect Tetralogy of Fallot, treatment typically involves surgery at around 3 to 6 months of age, which is incidentally when cardiomyocytes are at peak production. Decreased heart function during the first few months may be causing these infants to miss an essential opportunity to build heart muscle.

Dr Kühn's team collected heart tissue from 12 infants who underwent corrective surgery for Tetralogy of Fallot, and found that more than half of the cardiomyocytes in these samples had started to divide but then got stalled midway through the process, like conjoined twins. The ultimate result was fewer cardiomyocytes overall, which makes the heart more vulnerable to damage later on.

"By the time our surgeons operate on these patients, the horse is already out of the barn," says Dr. Kühn. "Our data show that they have up to 30% fewer cardiomyocytes than a normal infant has at this age. That's significant. To put that in context, an adult's heart attack can destroy up to 30% of cardiomyocytes."

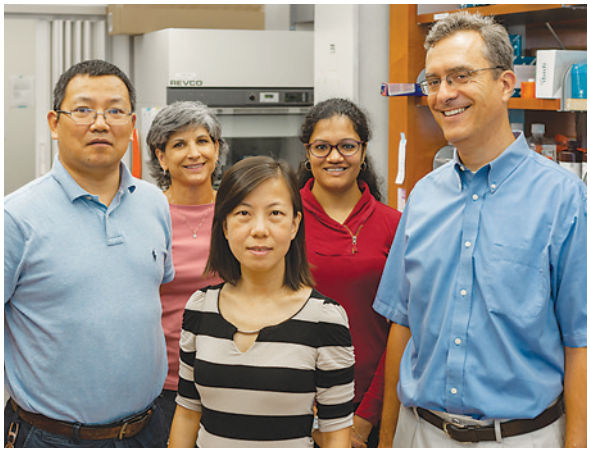
Through a series of experiments in human and murine tissue, the researchers traced this cell division failure back to β-adrenergic receptors.

The natural next step was to ask whether the β-adrenergic receptor blocker propranolol could stimulate proper cell division in infants with congenital heart defects and improve heart function.

Indeed, in the heart tissue samples taken from infants with Tetralogy of Fallot, propranolol enabled dividing cells to separate properly.

In mice, propranolol treatment during the first weeks of life allowed for better recovery from heart attacks in adulthood. Compared to untreated controls, mice who were given propranolol as pups retained 30% more cardiomyocytes and were able to eject 24% greater blood volume following a heart attack.

According to Dr. Kühn, having such promising results with a tried-and-true drug like propranolol means the pathway to clinical translation could be relatively quick.



Kühn lab research group (L to R): Honghai Liu, PhD, Jocelyn Basso, Lu Han, PhD, Niyatie Ammanamanchi, MS, Bernhard Kühn, MD.

"This all comes together in a very applicable way," says Dr. Kühn. "Propranolol was synthesized nearly 60 years ago, so we're able to bypass a lot of the ground work that would have to be done if we had identified a receptor that doesn't already have a drug for it."

Other authors on the study include Honghai Liu, PhD, Niyatie Ammanamanchi, MS, Christopher Lewarchik, PhD, Krithika Rao, PhD, Lu Han, PhD, Dean Yimlamai, MD, PhD, Balakrishnan Ganapathy, MS, Nathalie Chen, Kathryn Little, MA, RN, Kimberly Francis, Melita Viegas, MD, Dennis Kostka, PhD, Mousumi Moulik, MD, Jennifer Johnson, DO, Jacqueline Weinberg, MD, Miguel Reyes-Múgica, MD, of UPMC Children's Hospital and the University of Pittsburgh; Cheng-Hai Zhang, PhD, Sangita Suresh, PhD, Gerrida Uys, PhD, Maryline Abrial, PhD, Sangita Choudhury, PhD, Stuart Walsh, PhD, of Boston Children's Hospital and Harvard University; Christelle Guillermier, PhD, Matthew Steinhauser, MD, of Brigham & Women's Hospital and Harvard Medical School; Mugdha Khaladkar, PhD, Jennifer Spaethling, PhD, James Eberwine, PhD, Junhyong Kim, PhD, of University of Pennsylvania; Mahesh Sharma, MD, of the University of North Carolina at Chapel Hill, Jun Ding, PhD, Ziv Bar-Joseph, PhD, of Carnegie Mellon University; and Abha Bais, PhD, Yijen Wu, PhD, Vijay Yechoor, MD, of the University of Pittsburgh.

This work was supported by the National Institutes of Health (grants R01HL106302 and UL1TR001857), Foundation Leducq (grant 15CVD03), Children's Cardiomyopathy Foundation, Children's Hospital of Pittsburgh Foundation, Heartfest, and the Pennsylvania Department of Health.

Groundbreaking Research Seeks to Combat Arterial Thromboembolic Disease in Neonatal Cardiac Patients

For the last four years, **Thomas G. Diacovo, MD**, division chief of the UPMC Newborn Medicine Program, and director of Neonatal Cardiovascular Research at the Heart Institute at UPMC Children's, has been leading new studies to combat the development of acute thromboembolic events (ATE) in neonates who require surgical repair for complex congenital heart conditions.

Rates of thrombosis in postoperative neonatal cardiac patients, and in particular those requiring placement of a systemic to pulmonary artery shunt, are the highest of all pediatric patients treated in specialized centers. The current literature on the subject shows ranges of shunt thrombosis anywhere from 17 to 34 percent, with corresponding morbidity and mortality reflective of such high rates of blood clots. For Dr. Diacovo and his study companions, these rates of thromboembolic disease have been, and continue to be, completely unacceptable.

"There have been many anticoagulation agents developed for adults over many decades, going all the way back to the synthesis of aspirin in the mid-1800s, that have proven to be extremely successful in preventing clot formation in adults and saving lives. However, virtually none of these agents has ever been tested or confirmed in pediatric and neonatal patients to understand their efficacy, safety, pharmacodynamics, and optimal dosage," says Dr. Diacovo.

Platelet function in neonates also has been understudied, and the availability and development of technologies to rapidly assess platelet response in pediatric patients to various agonists and antagonists has lagged in development.

However, Dr. Diacovo's research has begun to upend this suboptimal treatment paradigm with new findings, technological advances, and animal models that are now leading to important new clinical trials in human subjects.

Uncovering Responses to Platelet Agonists and Antagonists With Microfluidic Devices and a Novel In Vivo Mouse Model

In 2017 in the *Journal of the American College of Cardiology,* Dr. Diacovo and colleagues outlined their novel and groundbreaking process analyzing responses to single agents and combinations of platelet agonists and antagonists, and their findings of the efficacy and optimal usage of cangrelor on P2Y12 receptor function in neonatal and pediatric congenital heart disease (CHD) patients.[1]

Using a novel mouse model created by the Diacovo lab while at Columbia University, and microfluidic devices by colleagues at the University of Pennsylvania capable of assessing clotting using 20-times less blood than in standard testing platforms (a significant advancement and desirous approach, particularly in neonates where blood draw amounts are limited for safety concerns), the researchers were able to not only show efficacy of the entire testing platform for determining platelet reactivity in these subjects, but they were also able to show the in vivo efficacy of cangrelor, setting the stage for the first trial in neonatal cardiac patients.

"A major success of our work during the first three years was our ability to go from our basic science studies to preclinical and then rapidly translate it into a phase 1 clinical trial that we are in the process of finishing," says Dr. Diacovo.

Predicting Response and Determining Functionality and Functional Changes

The types of studies Dr. Diacovo and colleagues are engaged in are providing the framework and foundation for a new paradigm of treatment determination to combat the scourge of arterial thromboembolic disease. By providing sound, evidence-based guidance and real-time analysis of platelet function in individuals, the most appropriate course of pharmacologic therapy to mitigate clot formation risk may be predicted.

"A large part of our research agenda from the outset has been to test these novel drugs in animal models in order to make better predictions of how these pharmaceutical agents will actually work before introducing them into a child. Just looking at laboratory values has little bearing on actual function. This functionality is a crucial part of the equation we must work to understand," says Dr. Diacovo.

The existing methodologies and dearth of evidence to support treatments to combat arterial thromboembolic disease have relied mainly on extrapolation.

"Our preliminary work shows a vast difference between the two age groups, which you may understand intuitively, but because no one has been able to do these studies in the past we lack basic, concrete knowledge of how these agents work in the very young. Knowing what the true pharmacokinetics or pharmaco-dynamics are of these drugs in our neonatal patients, again, is the crux of our entire research endeavor," says Dr. Diacovo.

Clinical Trials Details

Cangrelor Use in Neonates

This investigator-initiated study (ClinicalTrials.gov Identifier: NCT02765633) being conducted at UPMC Children's and led by Dr. Diacovo is assessing the pharmacodynamics and pharmacokinetics of cangrelor in neonatal patients who are at risk for thrombosis related to the use of pulmonary arterial shunting.

Continued on Page 6

Groundbreaking Research *Continued from Page 5*

Dr. Diacovo and his study collaborators seek to enroll up to 20 participants who are up to 28 days in age in this trial to analyze the safety and mechanistic properties of cangrelor in four discrete doses. The trial will start with a cohort of four subjects receiving the lowest dose and progress over time to additional cohorts of four — each receiving subsequently larger doses of the agent.

Apixaban and Heart Disease in Children

UPMC Children's is participating in a multicenter, randomized study investigating the use of apixaban to prevent thrombo-embolism in pediatric patients with congenital heart disease or an acquired version of heart disease (ClinicalTrials.gov Identifier: NCT01707394).

Sponsored by Bristol-Myers Squibb in collaboration with the Pediatric Heart Network and Pfizer, the study — titled "Safety and Pharmacokinetics of Apixaban Versus Vitamin K Antagonist or LMWH in Pediatric Subjects with Congenital or Acquired Heart Disease for Thromboembolism Prevention" — is a badly needed examination of how this antithrombotic functions in pediatric patients, and how it compares in usage and efficacy with low molecular weight heparin (LMWH) or vitamin K antagonist (VKA).

Dr. Diacovo is serving as the site primary investigator for this study, and is collaborating internally with colleagues from the UPMC Heart Institute at UPMC Children's Hospital of Pittsburgh.

This apixaban study is being conducted in pediatric patients from age 3 months to 18 years. Various aspects of pharmacokinetics and safety will be examined, as well as outcomes related to bleeding events, fatal bleeding, and bleeding that requires some form of medical or surgical intervention to restore hemostasis.

References and Further Reading

[1] Kaza EA, Egalka MC, Zhou H, Chen J, Evans D, Prats J, Li R, Diamond SL, Vincent JA, Bacha A, Diacovo TG. P2Y12 Receptor Function and Response to Cangrelor in Neonates With Cyanotic Congenital Heart Disease. *J Am Coll Cardiol.* 2017; 2(4): 465-476.

Neonatal and Pediatric Platelet Function and Pharmacology. NIH Project Number: 7R01HD081281-04. Principal Investigator: Thomas G. Diacovo, MD.

UPMC Children's Names New Director of Adult Congenital Heart Disease Program

Arvind Hoskoppal, MD, has been appointed as the new director of the UPMC Adult Congenital Heart Disease Program. Dr. Hoskoppal graduated from MS Ramaiah Medical College, Bangalore University, India, in 2002. He then pursued a master's degree in Health Finance and Management from Johns Hopkins University, which provided Dr. Hoskoppal advanced training and skills in the area of health care management. He then completed his residency in a combined internal medicine-pediatrics program at Creighton University Medical Center in Omaha, Nebraska, followed by a pediatric cardiology fellowship at the University of California San Francisco Medical Center. With an interest in adult congenital heart disease (ACHD), Dr. Hoskoppal further subspecialized, completing an ACHD fellowship at the Mayo Clinic in Rochester, Minnesota.

Upon completion of his training, in 2014 Dr. Hoskoppal joined the Division of Pediatric Cardiology at the University of Utah as an assistant professor of pediatrics, with an adjunct appointment in the Department of Internal Medicine. In 2015, he was appointed the director of the University of Utah ACHD program, having become a national leader in the field.

Dr. Hoskoppal's clinical area of expertise is pediatric cardiology, with a special focus on ACHD, advanced echocardiography including transesophageal echocardiography, and aortopathies.

"We are delighted to have Dr. Hoskoppal join the UPMC Children's Heart Institute where he will help to lead a vision of ACHD growth and excellence in care for western Pennsylvania and surrounding areas," says Jacqueline Kreutzer, MD, FACC, MSCAI, chief of the Division of Pediatric Cardiology, co-director of the UPMC Children's Heart Institute, and director of the Cardiac Catheterization Laboratory.

"Dr. Hoskoppal's expertise in ACHD brings a new level of care for patients at UPMC Children's. His impact in joining the UPMC Children's Heart Institute will be immediately felt in our clinical programs and patient care," says Vivek Allada, MD, director of clinical services in the Division of Pediatric Cardiology and executive director of the UPMC Children's Heart Institute.

UPMC Children's Named Center of Care by Children's Cardiomyopathy Foundation

The Heart Institute at UPMC Children's Hospital of Pittsburgh has again been named an accredited center of care by the Children's Cardiomyopathy Foundation (CCF), a national nonprofit organization committed to improving health outcomes and quality of life for children with cardiomyopathy — a chronic, potentially life-threatening heart disease that affects how the heart pumps blood through the body.

This is the third consecutive year UPMC Children's has been named an accredited center of care and is the only hospital in the region to receive this designation. "Cardiomyopathy is a complex disease and requires a team approach to comprehensive care. We have the best group of doctors, nurses, and staff providing unwavering care and expertise for children with cardiomyopathy and heart failure," says **Brian Feingold, MD, MS**, medical director, Pediatric Heart Failure and Transplantation Programs, UPMC Children's. "The CCF accreditation shows that if your child is one of 100,000 who receives a cardiomyopathy diagnosis, UPMC Children's is here to help."

As a leader in treating children with heart failure, UPMC Children's Heart Failure and Recovery program helps pediatric patients and their families on both an inpatient and outpatient basis, with its dedicated cardiomyopathy clinics seeing more than 750 visits last year.

The CCF accreditation program was established in 2017 to recognize excellence in diagnosing and treating pediatric cardiomyopathy and to assist families in selecting highly skilled cardiomyopathy care.

The national accreditation accounts for a hospital meeting CCF's criteria of managing a high volume of cardiomyopathy patients, offering a variety of pediatric services, specializing in the treatment and management of cardiomyopathy in children, and affiliating with an academic research institution.

12th Annual Master Class in Cardiac Morphology Course

The Heart Institute at UPMC Children's played host to the 12th annual Master Class in Cardiac Morphology Course on October 9-11 in Pittsburgh.

This year's course focused on atrial septal defects, ventricular septal defects (including controversies in description), congenital coronary artery abnormalities, anomalous veins, and vascular rings. This year's course invited selected attendees to submit cases for presentation and discussion. Each session of the course included sections on development, didactic morphology, pathology specimen demonstration, imaging correlation (echo, CTA, MRI), and clinical treatment (catheter-based and/or surgery).

This year's course directors were **Vivek Allada, MD**, clinical director of the Division of Pediatric Cardiology, and executive director of the Heart Institute at UPMC Children's Hospital of Pittsburgh, and **Robert H. Anderson, MD, FRCPath**, visiting professor, Pediatrics, Medical University of South Carolina.

"That's Pediatrics" Research Podcast Series

UPMC Children's Hospital of Pittsburgh medical podcast series for physicians, scientists, and other health care professionals features compelling interviews with the hospital's leading researchers and clinicians discussing innovative basic, translational, and clinical research. New episodes are released every two weeks.

Current episodes of "That's Pediatrics" from **cardiology faculty** and related topics include:

- *In Pursuit of the Self-Healing Heart* with **Bernhard Kühn, MD**
- *Neonatal Cardiovascular Research* with **Thomas Diacovo, MD**, Newborn Medicine Division Chief

Subscribe to "That's Pediatrics" in iTunes or Google Play Music to have new episodes automatically download to your phone for free when they become available. To see the current list of archived podcasts, visit **CHP.edu/health-care-professionals/podcast.**

That's PEDIATRICS
UPMC CHILDREN'S HOSPITAL OF PITTSBURGH

UPMC | CHILDREN'S HOSPITAL OF PITTSBURGH

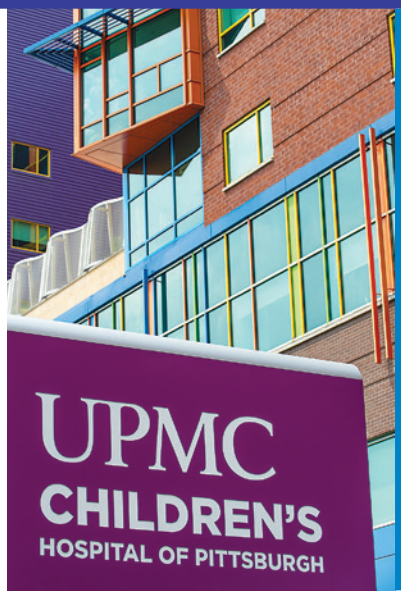
4401 Penn Ave.
Pittsburgh, PA 15224

About the Heart Institute

The Heart Institute at UPMC Children's Hospital of Pittsburgh is a leader in cardiovascular care, with a rich history in clinical research and innovation. It offers comprehensive care to patients with congenital conditions throughout their lives, from prenatal through adulthood. As a comprehensive pediatric heart transplantation center, and a national leader in the use of pediatric heart-assist devices, the Heart Institute at UPMC Children's continues to advance the field of cardiovascular medicine.

The 2019-20 *U.S. News & World Report* rankings of the country's "Best Children's Hospitals" ranked UPMC Children's #3 nationally, and #1 in Pennsylvania for cardiology and heart surgery. UPMC Children's climbed to #3 in the rankings from #6 the previous year.

Affiliated with the University of Pittsburgh School of Medicine and ranked among the nation's best children's hospitals by *U.S. News & World Report.*



About UPMC Children's Hospital of Pittsburgh

Regionally, nationally, and globally, UPMC Children's Hospital of Pittsburgh is a leader in the treatment of childhood conditions and diseases, a pioneer in the development of new and improved therapies, and a top educator of the next generation of pediatricians and pediatric subspecialists. With generous community support, UPMC Children's Hospital has fulfilled this mission since its founding in 1890. UPMC Children's is recognized consistently for its clinical, research, educational, and advocacy-related accomplishments, including ranking 15th among children's hospitals and schools of medicine in funding for pediatric research provided by the National Institutes of Health (FY2018) and ranking on *U.S. News & World Report's* Honor Roll of America's Best Children's Hospitals (2019–20).

USNW513086 AS/MP 10/19