Division Details

Division Data Summary

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Significant Accomplishments

New Program Focuses on the Links Between the Mind and Heart

Research shows that children with complex congenital and acquired heart disease are at a greater risk for neurodevelopmental issues. The Heart Institute-Kindervelt Neurodevelopmental and Educational Clinic (HI NDEC) at Cincinnati Children's Hospital Medical Center is a new, innovative program established by Bradley Marino, MD, MPP, MSCE, and now headed by Haleh Heydarian, MD. It provides individualized neurodevelopmental follow-up care designed to help each child reach their full potential by optimizing their neurodevelopmental capabilities and psychosocial outcome. The multidisciplinary HI NDEC team provides a comprehensive neurodevelopmental evaluation for infants, toddlers, children and adolescents. It provides families with the appropriate surveillance, screening, evaluation and treatment resources needed to ensure the best outcome possible for their child. The HI NDEC staff performs developmental assessments on infants, toddlers, and preschool children to maximize school preparedness, and assesses for difficulties in school-age children. Providers evaluate for problems with attention, task management and organization, and for behavioral and emotional problems that may impact relationships with friends and family. The HI NDEC has experts that span an array of specialties, including: Pediatric Cardiology, Developmental-Behavioral Pediatrics, Pediatric Psychology, Education, Pediatric Neurology, Occupational/Physical Therapy, Pediatric Nutrition, Cardiac Nursing, and Social Work. The clinic was prominently featured in the Health Section of the Wall Street Journal on July 31, 2013.
Gene Discovery Could Lead to Treatment to Prevent Thickening of the Heart Muscle

Cardiac fibrosis refers to the thickening or “scarring” of muscle tissue in the heart. Uncontrolled or prolonged accumulation of fibrotic material in the heart contributes to worsening heart disease and leads to heart failure and death. Thus, a better understanding of the genes and mechanisms that promote cardiac fibrosis are critical as we develop new therapies to stop or slow this process. Cardiac fibrosis is controlled primarily by a cell type known as the fibroblast. In select disease states, these fibroblasts become activated and change into a cell type known as the myofibroblast, which can generate proteins that cause fibrosis. In a recent paper in a premier scientific journal, Developmental Cell, Jeffery Molkentin, PhD, and colleagues showed that a novel gene, TRPC6, underlies the conversion of fibroblasts into myofibroblasts, thereby promoting cardiac fibrosis and disease. Molkentin showed that mice lacking TRPC6 had defective generation of myofibroblasts, with a lessening of the fibrotic response in vivo. The lab also showed how TRPC6 was activated in fibroblasts to begin this process, and identified how TRPC6 works to actually convert these cells into myofibroblasts. Their work suggests new therapies with existing experimental drugs might have an anti-fibrotic effect, possibly reducing the progression of heart failure in select disease states.

Heart Institute Sets Sights on Becoming Worldwide Training Center for Pediatric Mechanical Circulatory Support

Mechanical circulatory support for children is an emerging and quickly changing field, and, as such, no institute in the world has established itself as a training and resource center for the multiple initiatives by several worldwide companies creating pediatric ventricular assist devices and total artificial hearts. The Heart Institute is poised to become this international reference center. We have formed relationships with global companies interested in developing ventricular assist devices for pediatric patients. Many of these companies are leading the way to develop new devices that can serve as bridges to heart transplant while patients wait for a heart to become available. These companies include SynCardia Systems, HeartWare, Thoratec, Berlin Heart, and Levitronix. In the past year, we trained physicians from Japan and South America, and were invited to host training symposia for several of these companies at Cincinnati Children’s. As a direct result of these collaborations, the Heart Institute’s surgical team is now the Primary Investigator and Coordinating Center for the first pediatric total artificial heart trial. Additionally, we have created (in concert with our transportation team) an Extracorporeal Membrane Oxygenation (ECMO) transport program, which enables us to treat critically ill children while transferring them to Cincinnati Children’s. This program gives children access to care that they would not have been able to receive elsewhere. The Heart Institute is the only program in the country to provide third-party ECMO transport. We hope by the end of this year to have firmly established the Heart Institute and Cincinnati Children’s as the premier worldwide training and pediatric resource center for mechanical circulatory support.

Division Publications


17. Beekman RH, 3rd. FDA Clearance of Cardiac Devices for Children: A Primer and Call to Action.


61. Grenier MA. Looking into an athlete’s heart: Panacea or Pandora’s box?. Future Cardiol. 2012; 8:805-7.


cardiac phenotype necessitating mechanical circulatory support as a bridge to transplantation. *Pediatr Cardiol.* 2012; 33:1430-4.


111. Martin ML, Blaxall BC. Cardiac intercellular communication: are myocytes and fibroblasts fair-weather friends?. J Cardiovasc Transl Res. 2012; 5:768-82.


Intraoperative Fetal Outcomes in a Sheep Model. Anesthesiology. 2013; 118:796-808.


Grants, Contracts, and Industry Agreements

Cardiology

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<th>Grant and Contract Awards</th>
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<td>U10 HL 109673</td>
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<td><strong>The Relationship of Family Factors to Developmental and Psychosocial Outcomes in Children with Hypoplastic Left Heart Syndrome</strong></td>
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<td><strong>Understanding Mechanisms of Fontan Failure and Key Predictors for Patient Outcome</strong></td>
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**Current Year Direct** $1,135,130

**Industry Contracts**

| BEEKMAN, R |                 | $1,186 |
| The Johns Hopkins University | | |


CHIN, C
Roche Laboratories, Inc $24,623

HIRSCH, R
AGA Medical, LLC $6,427

Current Year Direct Receipts $32,236
Total $1,167,366

Molecular Cardiovascular Biology
Grant and Contract Awards Annual Direct

ACCORNERO, F

PGF Role in Regulating Cardiac Remodeling
American Heart Association
11POST7530035 07/01/11-06/30/13 $45,000

BHUIYAN, S

Functional Significance and Regulation of cMyBP-C Binding to Actin
American Heart Association
11POST7590181 07/01/11-06/30/13 $45,000

BLAXALL B

A Role for Mena in the Heart
National Institutes of Health
R01 HL 08988 02/22/13-01/31/14 $87,612

Extracellular Matrix Remodeling and Fibrosis
National Institutes of Health(University of Rochester)
R01 GM 097347 08/15/12-11/30/15 $45,991

Small Molecule Targeting of MLK3 for Heart Failure
American Heart Association
13IRG14670079 01/01/13-12/31/14 $68,183

Targeting of B-AR/GBy Signaling in the Heart with Small Molecules
National Institutes of Health
R01 HL 091475 05/31/13-05/30/14 $235,620

DOHN, T

Training in Cardiovascular Biology
National Institutes of Health(University of Cincinnati)
T32 HL 007382 01/01/13-12/31/13 $14,688
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<td>Identification of Novel Human X-Linked Heterotaxy Genes</td>
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WARE, S

Genetic and Epigenetic Mechanisms in Cardiomyopathy
American Heart Association

13EIA13460001 01/01/13-12/31/17 $72,727

Genetic Registry for Pediatric Heart Disease: The CCVM Consortium
March of Dimes National

06/01/13-05/31/16 $65,509

Genotype-Phenotype Association in Pediatric Cardiomyopathy
National Institutes of Health(University of Miami)

R01 HL 111459 04/01/12-03/31/16 $987,826

Uncovering Novel Genetic Causes and Risk in Congenital Heart Disease Patients
Burroughs Wellcome Foundation(University of Cincinnati)

BWF #1008496 07/01/09-06/30/15 $150,000

WAXMAN, J

Coup-tf Dependent Mechanisms of Ventricular and Hemangioblast Specification
National Institutes of Health

R01 HL 112893 01/15/13-02/28/18 $225,000

Illumination of Mechanisms Controlling Atrial Cell Formation
March of Dimes National

5-FY11-88 02/01/11-01/31/13 $69,327

WIRRIG, E

The Role of COX2 in the Progression of Human Calcific Aortic Valve Disease
National Institutes of Health

F32 HL 110390 07/01/12-06/30/15 $52,190

YUTZEY, K

Cell Signaling Mechanisms of Calcific Aortic Valve Disease
National Institutes of Health

R01 HL 114682 08/23/12-06/30/16 $250,000

Student Undergraduate Research Fellowship
American Heart Association

12UFEL9990000 02/01/12-01/31/14 $20,000

Wnt Signaling in Heart Valve Development and Disease
National Institutes of Health

R01 HL 094319 04/15/12-02/28/16 $238,000

Twist 1 Regulation of Valve Progenitors
National Institutes of Health
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