Heart Institute Annual Report, 2009-10

Institute Photo

Center: J. Towbin and J. Robbins

First Row Left to Right: L. Lee, C. Liu, B. Siegel, M. Maillet, E. Urbina, K. Yutzey, E. Purevjav, A. Lorts, M. Grenier, A. Divanovic, H. Ippisch, K. Hor.

Second Row: P. Goldenberg, P. Eghtesady, T. Kimball, J. Woo, J. Gulick, Z. Khuchua, R. Meyer, J. James, L. Cripe, J. Cnota, P. Manning, R. Beekman, R. Spicer, J. Anderson

Third Row: S. Ware, R. Czosek, M. Taylor, B. Gottliebson, R. Hinton, W. Benson, T. Knilans, C. Krawczeski, J. Mokentin

Absent from Picture: S. Goldstein, H. Heydarian, R. Hirsch, B. Johnson, S. Kirk, R. Leahy, B. Marino, E. Michelfelder, D. Nelson, J. Shuhaiber, A. Strauss, K. Uzark, J. Waxman, G. Webb

Institute Data Summary

Research and Training Details

Number of Faculty	50
Number of Joint Appointment Faculty	2
Number of Research Fellows	26
Number of Research Students	15
Number of Support Personnel	111
Direct Annual Grant Support	$7,055,474
Direct Annual Industry Support	$59,153
Peer Reviewed Publications	124

Clinical Activities and Training

Number of Clinical Staff	12
Number of Clinical Fellows	10
Number of Other Students	3
Inpatient Encounters	1,896
Outpatient Encounters	13,023

Highlights

Faculty

Cardiology

Jeffrey A. Towbin, MD, FAAP, FACC, FAHA, Professor Clinical; *Executive Co-Director, The Heart Institute; Director and Chief, Division of Cardiology*
Research Interests: Cardiomyopathy and Genetics

Jeffrey B. Anderson, MD, MPH, Assistant Professor Clinical;
Research Interests: Syncope, nutritional failure in congenital heart disease, quality improvement

Robert Beekman, MD, Professor Clinical; *Co-Medical Director, Cardiology*
Research Interests: Cardiac Catheterization & Intervention, Quality Improvement, Coarctation of the Aorta

D. Woodrow Benson, MD, PhD, Professor Clinical; *Director, Cardiovascular Genetics*
Research Interests: Cardiovascular Genetics

Randal Claytor, PhD, Adjunct Associate Professor;

James F. Cnota, MD, Associate Professor Clinical;
Research Interests: Fetal Cardiology

Linda H. Cripe, MD, Associate Professor Clinical;
Research Interests: Cardiomyopathies, Neuromuscular Disorders, Echocardiography

Richard Czosek, MD, Assistant Professor Clinical;
Research Interests: Cardiac pacing devices in pediatric and congenital heart disease patients and arhythmia risk stratification in the pediatric population

Allison Divanovic, MD, Assistant Professor Clinical;
Research Interests: Fetal Echocardiography

William M. Gottliebson, MD, MS, Associate Professor Clinical; *Director, MRI Cardiology; Director, Heart Institute Informatics*
Research Interests: Cardiac MRI Techniques to Evaluate myocardial Synchrony Energetics, and Regional Function.

Michelle Grenier, MD, Associate Professor Clinical; *Director, 3 Dimensional Echocardiography*
Research Interests: Cardiomyopathy, Heart Failure, 3 Dimensional Echocardiography

Haleh Heydarian, MD, Instructor Clinical;
Research Interests: Echocardiography Synchrony/Strain Imaging and Quality Improvement

Robert B. Hinton, MD, Assistant Professor Clinical;
Research Interests: Cardiovascular Genetics & Developmental Biology

Russel Hirsch, MD, Associate Professor Clinical; *Director, Cardiac Catheterization Lab*
Research Interests: Cardiac Catheterization & Intervention, Device Development

Kan Hor, MD, Assistant Professor Clinical;
Research Interests: MRI technology to diagnose and follow heart disease, in paticular DMD cardiomyopathy.

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

Beth Ann Johnson, MD, MA, Assistant Professor Clinical;
Research Interests: Premature infants with congenital heart defects, Fetal diagnosis

Thomas R. Kimball, MD, Professor Clinical; *Co-Medical Director, Cardiology; Director, Cardiac Ultrasound; Director, Cardiovascular Imaging Core Research Lab*
Research Interests: Echocardiography, Ventricular function, Cardiovascular Effects of Obesity and Type II Diabetes.

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

Timothy Knilans, MD, Professor Clinical; *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 Clinical; *Director, Quality Improvement and Clinical Effectiveness; Co-Director, Center for Acute Care Nephrology*
Research Interests: Bypass associated acute kidney injury (biomarkers, epidemiology, early therapy

Ryan Leahy, MD, Instructor Clinical;

Cong Liu, PhD, Research Assistant Professor; *Assoicate 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 Clinical;

Research Interests: Heart failure and myocardial remodeling

Bradley S. Marino, MD, MPP, MSCE, Associate Professor Clinical; *Director, Heart Institute Research Core*
Research Interests: Outcomes Research

Richard A. Meyer, MD, Professor Clinical;
Research Interests: Adult Congenital Heart Disease and Marfan/EDS

Erik Michelfelder, MD, Associate Professor Clinical; *Director, Fetal Cardiology*
Research Interests: Fetal Cardiology and Echocardiography

David Nelson, MD, PhD, Professor Clinical; *Medical Director, CICU*
Research Interests: Inflammatory injury after cardiac surgery

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

Robert Siegel, MD, Professor Clinical; *Medical Director, The Center for Better Health and Nutrition*

Robert Spicer, MD, Professor Clinical; *Director Fellowship Program; Medical Director, Cardiac Transplantation Program*
Research Interests: Heart Failure Transplant

Arnold Strauss, MD, Professor Clinical; *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*

Elaine Urbina, MD, MS, Associate Professor Clinical; *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.

Karen Uzark, PhD, CPNP, Associate Professor Clinical; *Director of Process Improvement and Outcomes Research*
Research Interests: Heart Transplant, Quality of Life, Outcomes in Children wtih Heart Disease

Gary Webb, MD, FRCP(C), FACC, FAHA, Professor Clinical; *Director, Adolescent and Adult Congenital Heart Disease Clinic*

Cardiothoracic Surgery

Peter B. Manning, MD, Professor; *Director, Cardiothoracic Surgery; Co-director The Heart Center*

Jodie Y. Duffy, PhD, Research Associate Professor;
Research Interests: Reoxygenation and Reperfusion Injury with Cardiopulmonary Bypass

Pirooz Eghtesady, MD, Associate Professor; *Surgical Director, Cardiac Transplantation*
Research Interests: Fetal Cardiac Surgery

Jeffrey Shuhaiber, MD, Assistant Professor;

Molecular Cardiovascular Biology

Jeffrey Robbins, PhD, Professor; *Executive Co-Director, The Heart Institute; Associate Chair of the CCHMC; Endowed Chair for Molecular Cardiovascular Biology*
Research Interests: Mechanisms of Normal and Abnormal Cardiovascular function

James Gulick, MS, Research Instructor;
Research Interests: Molecular interactions between certain cardiac contractile proteins and how such interactions can be altered by mutations that are associated with cardiomyopathies

Jeanne James, MD, Research Associate Professor; *Director, Mouse Echocardiography Core*
Research Interests: Manifestations and etiologies of misfolded protein response and echocardiography

Zaza Khuchua, PhD, Research Associate Professor;
Research Interests: Congenital cardiac disorders caused by inborn errors in mitochondrial energy-producing enzymes, and model systems to study molecular mechanisms of these diseases

Marjorie Maillet, PhD, Research Instructor;
Research Interests: Understanding signaling pathways that lead to heart disease

Jeffery Molkentin, PhD, Professor; *Howard Hughes Medical Institute Investigator*
Research Interests: Molecular pathways that underlie heart disease

Hiroyuki Nakayama, MD, PhD, Research Instructor;
Research Interests: Role of calcium in cardiac pathogenesis

Sakthivel Sadayappan, PhD, Research Instructor;

Research Interests: Effects of muscle protein structure on heart function and how certain proteins protect the heart from injury

Stephanie Ware, MD, PhD, Assistant Professor; *Director of Research and Development, Associate Medical Director, The Heart Institute Diagnostic Laboratory; Co-Director, Cardiovascular Genetics*
Research Interests: Genetics of pediatric heart disease

Joshua Waxman, PhD, Assistant Professor;
Research Interests: Molecular Genetics of Heart Development

Katherine Yutzey, PhD, Professor;
Research Interests: Heart development and disease mechanisms

Publications

Cardiology

1. Martin GR, Beekman RH, Ing FF, Jenkins KJ, McKay CR, Moore JW, Ringel RE, Rome JJ, Ruiz CE, Vincent RN. The IMPACT registry: IMproving Pediatric and Adult Congenital Treatments. *Semin Thorac Cardiovasc Surg Pediatr Card Surg Annu.* 2010; 13: 20-5.
2. Wansapura JP, Hor KN, Mazur W, Fleck R, Hagenbuch S, Benson DW, Gottliebson WM. Left ventricular T2 distribution in Duchenne muscular dystrophy. *J Cardiovasc Magn Reson.* 2010; 12: 14.
3. Benson DW. Genetic origins of pediatric heart disease. *Pediatr Cardiol.* 2010; 31: 422-9.
4. Dixon CA, Anderson JB, Ruddy RM, Cripe LH. Infantile-onset Pompe disease: a diagnosis not to miss. *Pediatr Emerg Care.* 2010; 26: 293-5.
5. Kilner PJ, Geva T, Kaemmerer H, Trindade PT, Schwitter J, Webb GD. Recommendations for cardiovascular magnetic resonance in adults with congenital heart disease from the respective working groups of the European Society of Cardiology. *Eur Heart J.* 2010; 31: 794-805.
6. Marcus FI, McKenna WJ, Sherrill D, Basso C, Bauce B, Bluemke DA, Calkins H, Corrado D, Cox MG, Daubert JP, Fontaine G, Gear K, Hauer R, Nava A, Picard MH, Protonotarios N, Saffitz JE, Sanborn DM, Steinberg JS, Tandri H, Thiene G, Towbin JA, Tsatsopoulou A, Wichter T, Zareba W. Diagnosis of arrhythmogenic right ventricular cardiomyopathy/dysplasia: proposed modification of the Task Force Criteria. *Eur Heart J.* 2010; 31: 806-14.
7. Vuletin JF, Lim FY, Cnota J, Kline-Fath B, Salisbury S, Haberman B, Kingma P, Frischer J, Crombleholme T. Prenatal pulmonary hypertension index: novel prenatal predictor of severe postnatal pulmonary artery hypertension in antenatally diagnosed congenital diaphragmatic hernia. *J Pediatr Surg.* 2010; 45: 703-8.
8. Wadwa RP, Urbina EM, Anderson AM, Hamman RF, Dolan LM, Rodriguez BL, Daniels SR, Dabelea D. Measures of arterial stiffness in youth with type 1 and type 2 diabetes: the SEARCH for diabetes in youth study. *Diabetes Care.* 2010; 33: 881-6.
9. Yang Z, Funke BH, Cripe LH, Vick GW, 3rd, Mancini-Dinardo D, Pena LS, Kanter RJ, Wong B, Westerfield BH, Varela JJ, Fan Y, Towbin JA, Vatta M. LAMP2 microdeletions in patients with Danon disease. *Circ Cardiovasc Genet.* 2010; 3: 129-37.
10. Marcus FI, McKenna WJ, Sherrill D, Basso C, Bauce B, Bluemke DA, Calkins H, Corrado D, Cox MG, Daubert JP, Fontaine G, Gear K, Hauer R, Nava A, Picard MH, Protonotarios N, Saffitz JE, Sanborn DM, Steinberg JS, Tandri H, Thiene G, Towbin JA, Tsatsopoulou A, Wichter T, Zareba W. Diagnosis of arrhythmogenic right ventricular cardiomyopathy/dysplasia: proposed modification of the task force criteria. *Circulation.* 2010; 121: 1533-41.
11. Bushby K, Finkel R, Birnkrant DJ, Case LE, Clemens PR, Cripe LH, Kaul A, Kinnett K, McDonald C, Pandya S, Poysky J, Shapiro F, Tomezsko J, Constantin C. Diagnosis and management of Duchenne muscular dystrophy, part 2: implementation of multidisciplinary care. *Lancet Neurol.* 2010; 9: 177-89.
12. Hinton AC, Grigsby PL, Pitzer BA, Brockman DE, Ittenbach RF, Hinton RB, Myatt L. Hormonal regulation of prostaglandin E2 receptors: localization and expression in rat cervical tissue. *Reprod Sci.* 2010; 17: 136-46.
13. Hor KN, Gottliebson WM, Carson C, Wash E, Cnota J, Fleck R, Wansapura J, Klimeczek P, Al-Khalidi HR, Chung ES, Benson DW, Mazur W. Comparison of magnetic resonance feature tracking for strain calculation with harmonic phase imaging analysis. *JACC Cardiovasc Imaging.* 2010; 3: 144-51.
14. Ippisch HM, Kimball TR. Anomalous origin of the right coronary artery from the left ventricle. *J Am Soc Echocardiogr.* 2010; 23: 222 e1-2.
15. Stein EA, Marais AD, Szamosi T, Raal FJ, Schurr D, Urbina EM, Hopkins PN, Karki S, Xu J, Misir S, Melino M. Colesevelam hydrochloride: efficacy and safety in pediatric subjects with heterozygous familial hypercholesterolemia. *J Pediatr.* 2010; 156: 231-6 e1-3.
16. Wu J, Shimizu W, Ding WG, Ohno S, Toyoda F, Itoh H, Zang WJ, Miyamoto Y, Kamakura S, Matsuura H, Nademanee

K, Brugada J, Brugada P, Brugada R, Vatta M, Towbin JA, Antzelevitch C, Horie M. KCNE2 modulation of Kv4.3 current and its potential role in fatal rhythm disorders. *Heart Rhythm.* 2010; 7: 199-205.

17. Xu T, Yang Z, Vatta M, Rampazzo A, Beffagna G, Pilichou K, Scherer SE, Saffitz J, Kravitz J, Zareba W, Danieli GA, Lorenzon A, Nava A, Bauce B, Thiene G, Basso C, Calkins H, Gear K, Marcus F, Towbin JA. Compound and digenic heterozygosity contributes to arrhythmogenic right ventricular cardiomyopathy. *J Am Coll Cardiol.* 2010; 55: 587-97.
18. Bergersen L, Marshall A, Gauvreau K, Beekman R, Hirsch R, Foerster S, Balzer D, Vincent J, Hellenbrand W, Holzer R, Cheatham J, Moore J, Lock J, Jenkins K. Adverse event rates in congenital cardiac catheterization - a multi-center experience. *Catheter Cardiovasc Interv.* 2010; 75: 389-400.
19. Ye M, Coldren C, Liang X, Mattina T, Goldmuntz E, Benson DW, Ivy D, Perryman MB, Garrett-Sinha LA, Grossfeld P. Deletion of ETS-1, a gene in the Jacobsen syndrome critical region, causes ventricular septal defects and abnormal ventricular morphology in mice. *Hum Mol Genet.* 2010; 19: 648-56.
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21. Bauce B, Nava A, Beffagna G, Basso C, Lorenzon A, Smaniotto G, De Bortoli M, Rigato I, Mazzotti E, Steriotis A, Marra MP, Towbin JA, Thiene G, Danieli GA, Rampazzo A. Multiple mutations in desmosomal proteins encoding genes in arrhythmogenic right ventricular cardiomyopathy/dysplasia. *Heart Rhythm.* 2010; 7: 22-9.
22. Bushby K, Finkel R, Birnkrant DJ, Case LE, Clemens PR, Cripe L, Kaul A, Kinnett K, McDonald C, Pandya S, Poysky J, Shapiro F, Tomezsko J, Constantin C. Diagnosis and management of Duchenne muscular dystrophy, part 1: diagnosis, and pharmacological and psychosocial management. *Lancet Neurol.* 2010; 9: 77-93.
23. Jefferies JL, Belmont JW, Pignatelli R, Towbin JA, Craigen WJ. PTPN11 mutation associated with aortic dilation and hypertrophic cardiomyopathy in a pediatric patient with Noonan syndrome. *Pediatr Cardiol.* 2010; 31: 114-6.
24. Kapplinger JD, Tester DJ, Alders M, Benito B, Berthet M, Brugada J, Brugada P, Fressart V, Guerchicoff A, Harris-Kerr C, Kamakura S, Kyndt F, Koopmann TT, Miyamoto Y, Pfeiffer R, Pollevick GD, Probst V, Zumhagen S, Vatta M, Towbin JA, Shimizu W, Schulze-Bahr E, Antzelevitch C, Salisbury BA, Guicheney P, Wilde AA, Brugada R, Schott JJ, Ackerman MJ. An international compendium of mutations in the SCN5A-encoded cardiac sodium channel in patients referred for Brugada syndrome genetic testing. *Heart Rhythm.* 2010; 7: 33-46.
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26. Mohapatra B, Vick GW, 3rd, Fraser CD, Jr., Clunie SK, Towbin JA, Sinagra G, Vatta M. Short-term mechanical unloading and reverse remodeling of failing hearts in children. *J Heart Lung Transplant.* 2010; 29: 98-104.
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35. James J, Hor K, Moga MA, Martin LA, Robbins J. Effects of myosin heavy chain manipulation in experimental heart failure. *J Mol Cell Cardiol.* 2010; 48: 999-1006.
36. Urbina EM, Wadwa RP, Davis C, Snively BM, Dolan LM, Daniels SR, Hamman RF, Dabelea D. Prevalence of increased arterial stiffness in children with type 1 diabetes mellitus differs by measurement site and sex: the SEARCH for Diabetes in Youth Study. *J Pediatr.* 2010; 156: 731-7, 737 e1.
37. Hagenbuch SC, Gottliebson WM, Wansapura J, Mazur W, Fleck R, Benson DW, Hor KN. Detection of progressive cardiac dysfunction by serial evaluation of circumferential strain in patients with Duchenne muscular dystrophy. *Am J Cardiol.* 2010; 105: 1451-5.
38. Ohye RG, Sleeper LA, Mahony L, Newburger JW, Pearson GD, Lu M, Goldberg CS, Tabbutt S, Frommelt PC, Ghanayem NS, Laussen PC, Rhodes JF, Lewis AB, Mital S, Ravishankar C, Williams IA, Dunbar-Masterson C, Atz AM, Colan S, Minich LL, Pizarro C, Kanter KR, Jaggers J, Jacobs JP, Krawczeski CD, Pike N, McCrindle BW, Virzi L, Gaynor JW. Comparison of shunt types in the Norwood procedure for single-ventricle lesions. *N Engl J Med.* 2010; 362: 1980-92.
39. Hambrook JT, Kimball TR, Khoury P, Cnota J. Disparities exist in the emergency department evaluation of pediatric chest pain. *Congenit Heart Dis.* 2010; 5: 285-91.
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42. Anderson JB, Beekman RH, 3rd, Border WL, Kalkwarf HJ, Khoury PR, Uzark K, Eghtesady P, Marino BS. Lower weight-for-age z score adversely affects hospital length of stay after the bidirectional Glenn procedure in 100 infants with a single ventricle. *J Thorac Cardiovasc Surg.* 2009; 138: 397-404 e1.
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45. Schwerzmann M, Salehian O, Harris L, Siu SC, Williams WG, Webb GD, Colman JM, Redington A, Silversides CK. Ventricular arrhythmias and sudden death in adults after a Mustard operation for transposition of the great arteries. *Eur Heart J.* 2009; 30: 1873-9.
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Grants, Contracts, and Industry Agreements

Cardiology

Grant and Contract Awards		Annual Direct / Project Period Direct
Benson, D		
Genetic Mechanisms of Cardiac Disease in the Young National Institutes of Health		
K24 HL 069712	06/01/06 - 05/31/11	$161,893 / $808,223
Preoperative Therapy for Prevention of Postoperative Low Cardiac Output Syndrome National Institutes of Health		
U01 HL 085057	09/04/06 - 08/31/11	$194,200 / $976,800
Pediatric Heart Disease Clinical Research Network The New England Research Institute (National Institutes of Health)		
U01 HL 68270	12/01/06 - 12/31/12	$46,354 / $46,354
Benson	Trial of Beta Blocker vs Angiotensin Receptor Blocker	36,190
Krawczeski	Single Ventricle Reconstruction Extension Study (SVR II)	3,080
Krawczeski	Single Ventricle Reconstruction Study (SVR I)	7,084
Musculoskeletal Ancillary Study The Johns Hopkins University (National Marfan Foundation)		
	01/01/08 - 06/30/12	$1,250 / $18,750
Hinton Jr., R		
Genetic & Developmental Basis of Pediatric Aortic Valve National Institutes of Health		
K23 HL 085122	08/03/06 - 04/30/11	$122,831 / $614,420
Ippisch, H		
Effects of Dietary Fat on Post-Prandial Vascular Function National Institutes of Health		
K23 HL 091174	09/01/08 - 07/31/13	$126,007 / $627,746
Kimball, T		

Chronic Kidney Disease in Children
Children's Mercy Hospital (National Institutes of Health)
U01 DK 066143 | 08/01/08 - 07/31/13 | $55,222 / $276,110

Schmidt, M

CALERIE Phase II
Duke University (National Institutes of Health)
U01 AG 022132 | 09/30/09 - 08/31/12 | $48,389 / $86,885

Towbin, J

Pediatric Cardiomyopathy Specimen Repository
National Institutes of Health
RO1 HL 087000 | 09/01/09 - 04/30/11 | $399,859 / $399,859

Urbina, E

Mechanisms of Vascular Dysfunction in Obesity & the Metabolic Syndrome
National Institutes of Health
K23 HL 080447 | 06/01/06 - 05/31/11 | $120,329 / $613,194

Modifying Dietary Behavior in Adolescents with Elevated Blood Pressure
University of Cincinnati (National Institutes of Health)
R01 HL 088567 | 02/01/08 - 01/31/13 | $37,095 / $152,609

Kirk, S

Healthworks! Steps Out
Saucony Run for Good Foundation
09/01/09 - 08/31/10 | $10,000 / $10,000

Current Year Direct **$1,323,429**

Industry Contracts

Beekman, R
AGA Medical , LLC | $ 7,641

Hirsch, R
AGA Medical , LLC | $ 12,473

Current Year Direct Receipts **$ 20,114**

Total $1,343,543

Cardiothoracic Surgery

Grant and Contract Awards | **Annual Direct / Project Period Direct**

Duffy, J

Student Undergraduate Research Fellowships
American Heart Association
06/01/2010 - 05/31/2012 | $20,000 / $40,000

Eghtesady, P

Mechanisms of Vasopressin-Mediated Placental Vascular Resistance after Fetal Bypass
National Institutes of Health
R21 HL 093683 | 04/01/2009 - 03/31/2011 | $125,000 / $275,000

Mechanism of Vasopressin-Mediated Placental Vascular Resistance after Fetal Bypass
National Institutes of Health
R21 HL 093683 | 07/15/2009 - 06/30/2011 | $120,259 / $120,259

Hypoplastic Left Heart Syndrome: Expression of RHD in the Fetus?
National Institutes of Health
R01 HL 098634 01/15/2010 - 12/31/2014 $269,012 / $1,346,611

Current Year Direct $ 534,271

Total $534,271

Molecular Cardiovascular Biology

Grant and Contract Awards **Annual Direct / Project Period Direct**

Braitsch, C

Tbx18 Regulation of Epicardial-Derived Cell Proliferation, Migration, and Differentiation in Cardiac Development
American Heart Association
07/01/09 - 06/30/11 $23,000 / $46,000

Chakraborty, S

Twist1 and Tbx20 Function in Heart Valve Development
American Heart Association
07/01/08 - 06/30/10 $45,000 / $88,000

Correll, R

Regulation of Cardiac Gene Expression by the L-Type Calcium Channel, CaV1.2
National Institutes of Health
F32 HL 097551 09/07/09 - 09/06/12 $47,210 / $115,809

Davis, J

The Non-Hypertrophic Role of Calcineurin in Regulating Cardiac Structure-Function
National Institutes of Health
F32 HL 095353 12/15/08 - 12/14/11 $49,646 / $149,454

Elrod, J

Defining the Role of Necrotic Cell Death in the Progression of Heart Failure
National Institutes of Health
F32 HL 092737 07/28/08 - 07/27/10 $50,054 / $96,880

Goonasekera, A

Role of Cardiac L-type Calcium Channels in the Pathophysiology of Cardiac Hypertrophy and Heart Failure
American Heart Association
07/01/08 - 06/30/10 $45,000 / $88,000

Khuchua, Z

The shRNA-Mediated Tafazzin Knockdown Mouse Model of Barth Syndrome
Barth Syndrome Foundation, Inc.
01/01/10 - 12/31/11 $20,001 / $36,362

Krishnamurthy, V

Valve Tissue Mechanics and Cell Phenotype in a Mouse Model of Aortic Valve Disease
American Heart Association
07/01/09 - 06/30/11 $23,000 / $46,000

Liu, Q

Role of TAK1 Signaling Network in Cardiac Hypertrophy
National Institutes of Health
K99 HL 098076 03/01/10 - 02/29/12 $89,574 / $181,085

McLendon, P

Training in Cardiovascular Biology
University of Cincinnati (National Institutes of Health)
T32 HL 007382 | 02/11/10 - 08/31/10 | $20,241 / $20,241

Molkentin, J

Adaptive and Maladaptive Signaling in Cardiac Growth and Regeneration
Fondation Leducq
10/01/05 - 09/30/10 | $296,584 / $1,183,370

Calcium as a Molecular Signal in the Heart
Temple University School of Medicine (National Institutes of Health)
R01 HL 089312 | 08/15/07 - 06/30/12 | $244,186 / $1,235,879

Role of Calcium Influx in Miyoshi Myopathy
Jain Foundation, Inc.
05/01/07 - 10/31/10 | $70,000 / $209,986

Cardiac Hypertrophic Intracellular Signaling Pathways
National Institutes of Health
R01 HL 062927 | 02/01/09 - 12/31/13 | $250,000 / $1,250,000

Molecular Pathways Controlling Cardiac Gene Expression
National Institutes of Health
R37 HL 060562 | 07/01/08 - 06/30/13 | $250,000 / $1,250,000

Nakayama, H

Role of T-Type Calcium Current Reappearance in Cardiac Hypertrophy
American Heart Association
01/01/10 - 12/31/13 | $70,000 / $280,000

Robbins, J

Cardiac Myosin Binding Protein-C: Structure, Function and Regulation
University of Vermont (National Institutes of Health)
P01 HL 059408 | 02/01/10 - 01/31/15 | $362,669 / $362,669

Signaling Processes Underlying Cardiovascular Function
National Institutes of Health
P01 HL 069779 | 01/11/08 - 12/31/12 | $2,216,836 / $3,670,750

Cardiomyocyte Toxicity and Heart Failure in Desmin Related Cardiomyopathy
National Institutes of Health
R01 HL 087862 | 02/01/08 - 01/31/11 | $100,000 / $400,000

Ware, S

Role of the Embryonic Node in Cardiac Development and Congenital Heart Disease
National Institutes of Health
R01 HL 088639 | 04/01/07 - 03/31/12 | $250,000 / $1,250,000

Uncovering Novel Genetic Causes and Risks in Congenital Heart Disease Patients
University of Cincinnati (Burroughs Wellcome Foundation)
07/01/09 - 06/30/15 | $75,000 / $750,000

Genetic Causes of Congenital Heart Defects
March of Dimes - National
06/01/10 - 05/31/13 | $89,790 / $279,301

Genes and Modifiers in Pediatric Cardiomyopathy
Children's Cardiomyopathy Foundation
01/01/10 - 01/01/12 | $86,735 / $86,735

Role of the Embryonic Node in Cardiac Development and Congenital Heart Disease
National Institutes of Health
R01 HL 088639 | 07/15/09 - 06/30/11 | $55,920 / $113,134

Wu, X

Regulation of Calcineurin & Cardiac Hypertrophy by PMCA

American Heart Association

07/01/08 - 06/30/10 $45,000 / $88,000

Yutzey, K

The Function of Notch1 in Heart Valve Development
American Heart Association

07/01/09 - 06/30/11 $23,000 / $46,000

Notch Signaling in Heart Valve Development and Disease
National Institutes of Health
R01 HL 094319 07/01/09 - 06/30/11 $299,328 / $607,545

Current Year Direct **$ 5,197,774**

Industry Contracts

Molkentin, J
Wyeth Pharmaceuticals $ 39,039

Current Year Direct Receipts **$ 39,039**

Total $5,236,813