2013 Research Annual Report

Molecular Cardiovascular Biology

Division Details

Division Data Summary

RESEARCH AND TRAINING DETAILS	
Number of Faculty	**12**
Number of Research Fellows	**30**
Number of Research Students	**19**
Number of Support Personnel	**23**
Direct Annual Grant Support	**$6,919,459**
Peer Reviewed Publications	**54**

Division Photo

No Photo information has been entered yet.

Significant Accomplishments

To begin editing, right-click and select "Edit".

Significant Publications

Sengupta A, Kalinichenko VV, **Yutzey KE**. **FoxO1 and FoxM1 transcription factorshave antagonistic functions in neonatal cardiomyocyte cell-cycle withdrawal andIGF1 gene regulation**. *Circulation research*. 2013 Jan 18;112(2):267-77. PubMed PMID: 23152492.

After birth, cardiac muscle cells stop proliferating and the heart grows primarily by increasing the size of cells. In this publication, Sungupta et al report a novel genetic regulatory mechanism whereby FoxO and FoxM1 transcription factors regulate the withdrawal of cardiac muscle cells from cell cycle. An additional novel finding is that these transcription factors are sensitive to the metabolic state of heart muscle that undergoes a switch from using primarily glucose to using fatty acids for energy during the neonatal period.

Together these studies define a completely new regulatory mechanism for control of neonatal cardiomyocyte cell withdrawal. Since these same regulatory mechanisms are associated with adult cardiac disease, these studies also have potential implications for cardiac repair and regeneration as well as development of new therapeutic approaches.

vanBerlo JH, **MailletM**, **Molkentin JD**. **Signaling effectors underlying pathologic growthand remodeling of the heart.** *The Journal of clinical investigation.* 2013 Jan 2;123(1):37-45.

Cardiovascular diseases ultimately result in the failure of the heart to achieve its pumping function. This review discusses the development of new drugs that aim at maintaining the heart's function with cardiovascular disease. This can primarily be achieved through the modulation of the neuro-hormonal cardiac response. Neuro-hormonal signals activate G protein coupled receptors which initiate cardio-protective and deleterious intracellular signals.

While the currently available G protein coupled receptors drugs (i.e. beta-blockers or Angiotensin Receptors Blockers) indistinctly target all the G protein coupled receptors intracellular pathways, the development of biased G protein coupled receptor ligands constitutes a ground-breaking approach for the treatment of

cardiovascular diseases because they specifically activate cardio-protective signaling pathways. Additionally, drugs that would acutely restore contractility (i.e. PKCa or Calcium Calmodulin Kinase II inhibitors) could constitute a significant adjunct to the currently available treatment options.

Furthermore, a potential interesting therapeutic approach would be to reduce the levels of a non-contractile intracellular calcium pool known to contribute to the development of cardiac hypertrophy (i.e. non-selective cationic TRPC channels inhibitors). As the heart failure epidemic continues to rise despite the available treatments, the development of new drugs targeting all stages of heart disease is vital.

Division Publications

1. Antoniak S, Owens AP, 3rd, Baunacke M, Williams JC, Lee RD, Weithäuser A, Sheridan PA, Malz R, Luyendyk JP, Esserman DA, Trejo J, Kirchhofer D, Blaxall BC, Pawlinski R, Beck MA, Rauch U, Mackman N. **PAR-1 contributes to the innate immune response during viral infection**. *J Clin Invest*. 2013; 123:1310-22.
2. Aprikyan AA, Khuchua Z. **Advances in the understanding of Barth syndrome**. *Br J Haematol*. 2013; 161:330-8.
3. Auger-Messier M, Accornero F, Goonasekera SA, Bueno OF, Lorenz JN, van Berlo JH, Willette RN, Molkentin JD. **Unrestrained p38 MAPK activation in Dusp1/4 double-null mice induces cardiomyopathy**. *Circ Res*. 2013; 112:48-56.
4. Bal NC, Maurya SK, Sopariwala DH, Sahoo SK, Gupta SC, Shaikh SA, Pant M, Rowland LA, Goonasekera SA, Molkentin JD, Periasamy M. **Sarcolipin is a newly identified regulator of muscle-based thermogenesis in mammals**. *Nat Med*. 2012; 18:1575-9.
5. Belmonte SL, Blaxall BC. **Conducting the G-protein Coupled Receptor (GPCR) Signaling Symphony in Cardiovascular Diseases: New Therapeutic Approaches**. *Drug Discov Today Dis Models*. 2012; 9:e85-e90.
6. Belmonte SL, Blaxall BC. **G protein-coupled receptor kinase 5: exploring its hype in cardiac hypertrophy**. *Circ Res*. 2012; 111:957-8.
7. Bhuiyan MS, Gulick J, Osinska H, Gupta M, Robbins J. **Determination of the critical residues responsible for cardiac myosin binding protein C's interactions**. *J Mol Cell Cardiol*. 2012; 53:838-47.
8. Blaxall BC, Baudino TA, Kirshenbaum LA. **Cardiac fibroblasts and cellular cross talk in heart failure**. *J Cardiovasc Transl Res*. 2012; 5:737-8.
9. Bolte C, Zhang Y, York A, Kalin TV, Schultz Jel J, Molkentin JD, Kalinichenko VV. **Postnatal ablation of Foxm1 from cardiomyocytes causes late onset cardiac hypertrophy and fibrosis without exacerbating pressure overload-induced cardiac remodeling**. *PLoS One*. 2012; 7:e48713.
10. Braitsch CM, Combs MD, Quaggin SE, Yutzey KE. **Pod1/Tcf21 is regulated by retinoic acid signaling and inhibits differentiation of epicardium-derived cells into smooth muscle in the developing heart**. *Dev Biol*. 2012; 368:345-57.
11. Buchaklian AH, Helbling D, Ware SM, Dimmock DP. **Recessive deoxyguanosine kinase deficiency causes juvenile onset mitochondrial myopathy**. *Mol Genet Metab*. 2012; 107:92-4.
12. Carruthers CA, Alfieri CM, Joyce EM, Watkins SC, Yutzey KE, Sacks MS. **Gene Expression and Collagen Fiber Micromechanical Interactions of the Semilunar Heart Valve Interstitial Cell**. *Cell Mol Bioeng*. 2012; 5:254-265.
13. Correll RN, Molkentin JD. **CaMKII does it again: even the mitochondria cannot escape its influence**. *Circ Res*. 2013; 112:1208-11.
14. Davis J, Burr AR, Davis GF, Birnbaumer L, Molkentin JD. **A TRPC6-dependent pathway for**

myofibroblast transdifferentiation and wound healing in vivo. *Dev Cell*. 2012; 23:705-15.
15. Davis J, Maillet M, Miano JM, Molkentin JD. **Lost in Transgenesis: A User's Guide for Genetically Manipulating the Mouse in Cardiac Research**. *Circ Res*. 2012; 111:761-77.
16. Dhawan L, Liu B, Pytlak A, Kulshrestha S, Blaxall BC, Taubman MB. **Y-Box Binding Protein 1 and RNase UK114 Mediate Monocyte Chemoattractant Protein 1 mRNA Stability in Vascular Smooth Muscle Cells**. *Mol Cell Biol*. 2012; 32:3768-75.
17. Drawnel FM, Wachten D, Molkentin JD, Maillet M, Aronsen JM, Swift F, Sjaastad I, Liu N, Catalucci D, Mikoshiba K, Hisatsune C, Okkenhaug H, Andrews SR, Bootman MD, Roderick HL. **Mutual antagonism between IP(3)RII and miRNA-133a regulates calcium signals and cardiac hypertrophy**. *J Cell Biol*. 2012; 199:783-98.
18. Elrod JW, Molkentin JD. **Physiologic functions of cyclophilin D and the mitochondrial permeability transition pore**. *Circ J*. 2013; 77:1111-22.
19. Fujimoto KL, Tobita K, Guan J, Hashizume R, Takanari K, Alfieri CM, Yutzey KE, Wagner WR. **Placement of an elastic biodegradable cardiac patch on a subacute infarcted heart leads to cellularization with early developmental cardiomyocyte characteristics**. *J Card Fail*. 2012; 18:585-95.
20. Gao H, Wang F, Wang W, Makarewich CA, Zhang H, Kubo H, Berretta RM, Barr LA, Molkentin JD, Houser SR. **Ca(2+) influx through L-type Ca(2+) channels and transient receptor potential channels activates pathological hypertrophy signaling**. *J Mol Cell Cardiol*. 2012; 53:657-67.
21. James J, Robbins J. **Ablating a cardiac protein: causality at last**. *Circ Res*. 2013; 112:1415-9.
22. Kamal FA, Travers JG, Blaxall BC. **G protein-coupled receptor kinases in cardiovascular disease: why "where" matters**. *Trends Cardiovasc Med*. 2012; 22:213-9.
23. Karch J, Molkentin JD. **Is p53 the long-sought molecular trigger for cyclophilin D-regulated mitochondrial permeability transition pore formation and necrosis?**. *Circ Res*. 2012; 111:1258-60.
24. Lalani SR, Shaw C, Wang X, Patel A, Patterson LW, Kolodziejska K, Szafranski P, Ou Z, Tian Q, Kang SH, Jinnah A, Ali S, Malik A, Hixson P, Potocki L, Lupski JR, Stankiewicz P, Bacino CA, Dawson B, Beaudet AL, Boricha FM, Whittaker R, Li C, Ware SM, Cheung SW, Penny DJ, Jefferies JL, Belmont JW. **Rare DNA copy number variants in cardiovascular malformations with extracardiac abnormalities**. *Eur J Hum Genet*. 2013; 21:173-81.
25. Le Grand F, Grifone R, Mourikis P, Houbron C, Gigaud C, Pujol J, Maillet M, Pagès G, Rudnicki M, Tajbakhsh S, Maire P. **Six1 regulates stem cell repair potential and self-renewal during skeletal muscle regeneration**. *J Cell Biol*. 2012; 198:815-32.
26. Lorts A, Schwanekamp JA, Baudino TA, McNally EM, Molkentin JD. **Deletion of periostin reduces muscular dystrophy and fibrosis in mice by modulating the transforming growth factor-β pathway**. *Proc Natl Acad Sci U S A*. 2012; 109:10978-83.
27. Lowey S, Bretton V, Gulick J, Robbins J, Trybus KM. **Transgenic Mouse α- and β-Cardiac Myosins Containing the R403Q Mutation Show Isoform-dependent Transient Kinetic Differences**. *J Biol Chem*. 2013; 288:14780-7.
28. Maejima Y, Galeotti J, Molkentin JD, Sadoshima J, Zhai P. **Constitutively active MEK1 rescues cardiac dysfunction caused by overexpressed GSK-3alpha during aging and hemodynamic pressure overload**. *Am J Physiol Heart Circ Physiol*. 2012; 303:H979-88.
29. Maillet M, van Berlo JH, Molkentin JD. **Molecular basis of physiological heart growth: fundamental concepts and new players**. *Nat Rev Mol Cell Biol*. 2013; 14:38-48.
30. Martin ML, Belmonte SL, Ram R, Kamal FA, Blaxall BC. **G-Protein-Coupled Receptors in the Heart**. In: JA Hill, EN Olson, eds. *Muscle: Fundamental Biology and Mechanisms of Disease*. Waltham, MA:

Academic Press; 2012:87-112.
31. Martin ML, Blaxall BC. **Cardiac intercellular communication: are myocytes and fibroblasts fair-weather friends?**. *J Cardiovasc Transl Res*. 2012; 5:768-82.
32. Michalek AJ, Howarth JW, Gulick J, Previs MJ, Robbins J, Rosevear PR, Warshaw DM. **Phosphorylation modulates the mechanical stability of the cardiac myosin-binding protein C motif**. *Biophys J*. 2013; 104:442-52.
33. Miller EM, Wang Y, Ware SM. **Uptake of cardiac screening and genetic testing among hypertrophic and dilated cardiomyopathy families**. *J Genet Couns*. 2013; 22:258-67.
34. Molkentin JD. **Parsing good versus bad signaling pathways in the heart: role of calcineurin-nuclear factor of activated T-cells**. *Circ Res*. 2013; 113:16-9.
35. Muili KA, Wang D, Orabi AI, Sarwar S, Luo Y, Javed TA, Eisses JF, Mahmood SM, Jin S, Singh VP, Ananthanaravanan M, Perides G, Williams JA, Molkentin JD, Husain SZ. **Bile acids induce pancreatic acinar cell injury and pancreatitis by activating calcineurin**. *J Biol Chem*. 2013; 288:570-80.
36. Nicholson CK, Lambert JP, Molkentin JD, Sadoshima J, Calvert JW. **Thioredoxin 1 is essential for sodium sulfide-mediated cardioprotection in the setting of heart failure**. *Arterioscler Thromb Vasc Biol*. 2013; 33:744-51.
37. Parrott A, Ware SM. **The Role of the Geneticist and Genetic Counselor in an ACHD Clinic**. *Prog Pediatr Cardiol*. 2012; 34:15-20.
38. Piao L, Fang YH, Parikh KS, Ryan JJ, D'Souza KM, Theccanat T, Toth PT, Pogoriler J, Paul J, Blaxall BC, Akhter SA, Archer SL. **GRK2-Mediated Inhibition of Adrenergic and Dopaminergic Signaling in Right Ventricular Hypertrophy: Therapeutic Implications in Pulmonary Hypertension**. *Circulation*. 2012; 126:2859-69.
39. Powers C, Huang Y, Strauss A, Khuchua Z. **Diminished Exercise Capacity and Mitochondrial bc1 Complex Deficiency in Tafazzin-Knockdown Mice**. *Front Physiol*. 2013; 4:74.
40. Previs MJ, Beck Previs S, Gulick J, Robbins J, Warshaw DM. **Molecular mechanics of cardiac myosin-binding protein C in native thick filaments**. *Science*. 2012; 337:1215-8.
41. Ryan TD, Ware SM, Lucky AW, Towbin JA, Jefferies JL, Hinton RB. **Left ventricular noncompaction cardiomyopathy and aortopathy in a patient with recessive dystrophic epidermolysis bullosa**. *Circ Heart Fail*. 2012; 5:e81-2.
42. Schulz EM, Correll RN, Sheikh HN, Lofrano-Alves MS, Engel PL, Newman G, Schultz Jel J, Molkentin JD, Wolska BM, Solaro RJ, Wieczorek DF. **Tropomyosin dephosphorylation results in compensated cardiac hypertrophy**. *J Biol Chem*. 2012; 287:44478-89.
43. Sengupta A, Kalinichenko VV, Yutzey KE. **FoxO1 and FoxM1 transcription factors have antagonistic functions in neonatal cardiomyocyte cell-cycle withdrawal and IGF1 gene regulation**. *Circ Res*. 2013; 112:267-77.
44. Suk HY, Zhou C, Yang TT, Zhu H, Yu RY, Olabisi O, Yang X, Brancho D, Kim JY, Scherer PE, Frank PG, Lisanti MP, Calvert JW, Lefer DJ, Molkentin JD, Ghigo A, Hirsch E, Jin J, Chow CW. **Ablation of calcineurin Aβ reveals hyperlipidemia and signaling cross-talks with phosphodiesterases**. *J Biol Chem*. 2013; 288:3477-88.
45. Sutherland MJ, Wang S, Quinn ME, Haaning A, Ware SM. **Zic3 is required in the migrating primitive streak for node morphogenesis and left-right patterning**. *Hum Mol Genet*. 2013; 22:1913-23.
46. Towbin JA, Ware SM, Jefferies JL. **Congenital Cardiomyopathies**. In: JA Hill, EN Olson, eds. *Muscle: Fundamental Biology and Mechanisms of Disease*. Waltham, MA: Academic Press; 2012:459-472.
47. van Berlo JH, Maillet M, Molkentin JD. **Signaling effectors underlying pathologic growth and remodeling of the heart**. *J Clin Invest*. 2013; 123:37-45.

48. Wang Y, Tanner BC, Lombardo AT, Tremble SM, Maughan DW, Vanburen P, Lewinter MM, Robbins J, Palmer BM. **Cardiac myosin isoforms exhibit differential rates of MgADP release and MgATP binding detected by myocardial viscoelasticity**. *J Mol Cell Cardiol*. 2013; 54:1-8.
49. Weith AE, Previs MJ, Hoeprich GJ, Previs SB, Gulick J, Robbins J, Warshaw DM. **The extent of cardiac myosin binding protein-C phosphorylation modulates actomyosin function in a graded manner**. *J Muscle Res Cell Motil*. 2012; 33:449-59.
50. Wirrig EE, Yutzey KE. **Developmental Pathways in CAVD**. In: E Aikawa, ed. *Calcific Aortic Valve Disease*. Rijeka, Croatia: InTech; 2013:59-104.
51. Xu X, Kobayashi S, Chen K, Timm D, Volden P, Huang Y, Gulick J, Yue Z, Robbins J, Epstein PN, Liang Q. **Diminished autophagy limits cardiac injury in mouse models of type 1 diabetes**. *J Biol Chem*. 2013; 288:18077-92.
52. Yar S, Chowdhury SA, Davis RT, 3rd, Kobayashi M, Monasky MM, Rajan S, Wolska BM, Gaponenko V, Kobayashi T, Wieczorek DF, Solaro RJ. **Conserved Asp-137 Is Important for both Structure and Regulatory Functions of Cardiac α-Tropomyosin (α-TM) in a Novel Transgenic Mouse Model Expressing α-TM-D137L**. *J Biol Chem*. 2013; 288:16235-46.
53. Yutzey KE. **Transcriptional Control of Cardiogenesis**. In: JA Hill, EN Olson, eds. *Muscle: Fundamental Biology and Mechanisms of Disease*. Waltham, MA: Academic Press; 2012:35-46.
54. Zhang L, Malik S, Pang J, Wang H, Park KM, Yule DI, Blaxall BC, Smrcka AV. **Phospholipase Cε hydrolyzes perinuclear phosphatidylinositol 4-phosphate to regulate cardiac hypertrophy**. *Cell*. 2013; 153:216-27.

Faculty, Staff, and Trainees

Faculty Members

Jeffrey Robbins, PhD, FAHA, FISHR, Professor

Leadership Executive Co-Director, Heart Institute; Associate Chair for Core Research; Endowed Chair for Molecular Cardiovascular Biology

Research Interests Mechanisms of Normal and Abnormal Cardiovascular function

Burns C. Blaxall, PhD, FAHA, Professor

Leadership Director, Translational Science

Research Interests Molecular and signaling mechanisms of heart failure; cardiac fibrosis; drug and therapeutic discovery

James Gulick, MS, 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, Associate Professor

Leadership Director, Pediatric Cardiology Fellowship Program; Director, Mouse Echocardiography Core

Research Interests Echocardiography, Translational Research, Cardiovascular Genetics

Zaza Khuchua, PhD, 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, Instructor

Research Interests Understanding signaling pathways that lead to heart disease

Jeffery Molkentin, PhD, Professor

Leadership Howard Hughes Medical Institute Investigator

Research Interests Molecular pathways that underlie heart disease and muscular dystrophy

Sudarsan Rajan, PhD, Assistant Professor

Research Interests Understanding contractile and regulatory proteins' gene expression and their role in maintaining normal cardiovascular function

Johannes van Berlo, MD, PhD, Instructor

Stephanie Ware, MD, PhD, Associate Professor

Leadership Director of Research and Development, Associate Medical Director, The Heart Institute Diagnostic Laboratory

Research Interests Genetics of pediatric heart disease

Joshua Waxman, PhD, Assistant Professor

Research Interests Molecular genetics of cardiovascular development

Katherine Yutzey, PhD, Professor

Research Interests Heart development and disease mechanisms

Trainees

Federica Accornero, PhD, University of Turin, Italy
Sarah Beckman, PhD, University of Pittsburgh
Md. Shenuarin Bhuiyan, PhD, Tohoku University, Japan
Caitlin Braitsch, PhD, University of Cincinnati
Adam Burr, BS, University of Minnesota, Twin Cities
Santanu Chakraborty, PhD, Miami University
Rajshekhar Chatterjee, PhD, Washington University
Robert Nathan Correll, PhD, University of Kentucky
Jason Cowan, MS, University of Miami
Angela Damen, MAT, Miami University
Enrico D'Aniello, PhD, Marine Zoological Station Anton Dohrn, Italy
Jennifer Davis, PhD, Univeristy of Michigan, Ann Arbor
Allison Dixon, BS, Bellarmine University
Tracy Dohn, BS, Wittenberg University
John Elrod, PhD, Albert Einstein College of Medicine
Ming Fang, MS, Boise State University
Maria Gomez, BS, Xavier University
Ambrose Goonasekera, PhD, University of Rochester
Manish Gupta, PhD, University of Cincinnati
Yan Huang, PhD, University of Wyoming
Alexia Hulin, PhD, Cleveland Clinic
Cameron Ingram, , University of Cincinnati
Fadia Kamal, PhD, University of Rochester
Onur Kanisicak, PhD, University of Connecticut
Jason Karch, PhD, University of Cincinnati
Jennifer Kwong, PhD, Weill Medical College of Cornell University

Julie Lander, BS, Brigham Young University
Mary Lee, MS, Ball State University
Ruijie Liu, PhD, University of Illinois at Urbana Champaign
Jeffrey Lynch, PhD, University of Alberta, Canada
Amrita Mandal, MSc, University of Calcutta, India
Patrick McLendon, PhD, Virginia Polytechnical Institute and State University
Rashmi Ram, PhD, University of Rochester
Md. Abdur Razzaque, PhD, Tokyo Women's Medical University, Japan
Tara Rindler, PhD, University of Cincinnati
Ariel Rydeen, BS, University of Minnesota
Tobias Schips, PhD, Ulm University, Germany
Jeffrey Schubert, BS, College of Mount St. Joseph
Emily Schulz, PhD, University of Cincinnati
Jennifer Schwanekamp, MS, University of Cincinnati
Arunima Sengupta, PhD, Miami University
Mardi Sutherland, BS, University of Massachusetts, Boston
Muhammad Tariq, PhD, Quaid-I-Azam University, Pakistan
Andoria Tjondrokoesoemo, PhD, University of Medicine & Dentistry of New Jersey
Joshua Travers, BS, Rochester Institute of Technology
Davy Vanhoutte, PhD, University of Leuven, Belgium
Elaine Wirrig, PhD, Medical University of South Carolina
Erin Wissing, BA, DePauw University
Fuli Xiang, MD, PhD, University of Western Ontario, Canada

Division Collaboration

Allergy and Immunology; Human Genetics » Marc E. Rothenberg, MD, PhD, J. Pablo Abonia, MD, and Derek E. Neilson, MD

An open trial label of losartan in patients with eosinophilic esophagitis and connective tissue disorders.

Biomedical Informatics; Human Genetics » Bruce J. Aronow, PhD and Lisa J. Martin, PhD

Studying the genotype/phenotype correlations in pediatric cardiomyopathy.

Critical Care Medicine » Basilia Zingarelli, MD, PhD

Echocardiographic characterization of PPAR-gamma deficient mice in the setting of ischemia-reperfusion injury.

Experimental Hematology & Cancer Biology – Translational Labs » Carolyn M. Lutzko, PhD

The use of IPS cells to investigate genetic and epigenetic mechanisms of cardiomyopathy.

Experimental Hematology and Cancer Biology » Nicolas Nassar, PhD

Studying vascular requirements of Angiomotin.

Hematology; Experimental Hematology » Joseph S. Palumbo, MD and Jay L. Degen, PhD

Exploring the role of PAR-1 in cardiac disease.

Human Genetics » Daniel R. Prows, PhD

Echocardiographic characterization of right ventricular dysplasia in mice.

Human Genetics » Teresa Smolarek, PhD and Sarah L. Zimmerman, PhD

A database registry of patients with cardiovascular malformations and chromosome microarray abnormalities.

Grants, Contracts, and Industry Agreements

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
GUPTA, M		
Role of Myosin Binding Protein-C Phosphorylation in Cardiac Function		
American Heart Association		
11POST7590026	07/01/11-06/30/13	$45,000
KHUCHUA, Z		
A Mouse Model of Barth Syndrome, a Mitochondrial Cardiolipin Disorder		
National Institutes of Health		
R01 HL 108867	07/07/11-03/31/15	$238,000

KWONG, J

Defining the Role of SLC25a35 as a Regulator of the Mitochondrial Permeability Transition Pore and Cardiomyocyte Death

American Heart Association

12POSTDOC11950000	07/01/12-06/30/14	$47,000

LEE, M

Differential Twist1 Dimer Function and Gene Regulation in Valve Progenitor Cells

American Heart Association

11PRE7240023	07/01/11-06/30/13	$23,000

MCLENDON, P

The Role of Impaired Protein Degradation Pathways in CryABR120G-Mediated Desmin-R

National Institutes of Health

F32 HL 112558	01/11/12-03/11/13	$8,990

MOLKENTIN, J

Ca Signaling Domains Programming Cardiac Hyprotrophy

National Institutes of Health(The Regents of the University of California)

P01 HL 080101	08/01/11-05/31/16	$271,987

Cardiac Hypertrophic Intracellular Signaling Pathways

National Institutes of Health

R01 HL 062927	02/01/09-12/31/13	$222,750

Improving Cardiac Function after Myocardial Infarction

National Institutes of Health(Temple University School of Medicine)

P01 HL 108806	05/07/12-03/31/17	$255,000

Molecular Pathways Controling Cardiac Gene Expression

National Institutes of Health

R37 HL 060562	07/01/08-06/30/13	$247,500

Mechanisms of TGF Regulated Fibrosis in Muscular Dystrophy

The University of Chicago

P01 NS 072027	07/01/11-06/30/16	$250,000

Thrombospondin 4 Regulates Adaptive ER Stress Response

National Institutes of Health

R01 HL 105924	01/01/11-12/31/14	$312,920

RAJAN, S

Translational and Post-translational Regulation of Tropomyosin in Normal and Cardiomyopathic Hearts

American Heart Association

11SDG4980029	08/01/11-12/31/14	$70,000

ROBBINS , J

A TG Rabbit Model for the Functional Effects of FHC Mutations in B-Cardiac Myosin
National Institutes of Health(University of Vermont)

R21 HL 111847	07/15/12-06/30/14	$9,600

Cardiac Myosin Binding Protein-C: Structure, Function and Regulation
National Institutes of Health(University of Vermont)

P01 HL 059408	02/01/10-01/31/15	$307,959

Proteotoxicity: An Unappreciated Mechanism of Heart Disease
Fondation Leducq

	10/01/11-09/30/16	$247,636

Signaling Processes Underlying Cardiovascular Function
National Institutes of Health

P01 HL 069779	01/11/08-12/31/12	$1,219,260

SCHULZ, E

Training in Cardiovascular Biology
National Institutes of Health(University of Cincinnati)

T32 HL 007382	02/01/13-01/31/14	$22,904

SENGUPTA, A

FOXO Function in Cardiomyocytes During Development and Disease
American Heart Association

11POST7210026	07/01/11-06/30/13	$45,000

TARIQ, M

Identification of Novel Human X-Linked Heterotaxy Genes
American Heart Association

12POSTDOC10370002	07/01/12-06/30/14	$45,000

VAN BERLO, J

Functional Relevance and Extent of Endogenous Cardiac Regeneration by C-Kit Positive Stem Cells
National Institutes of Health

K99 HL 112852	06/04/12-03/31/17	$121,660

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 Cardimyopathy
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		
R01 HL 082716	07/01/2010-05/31/2015	$235,620

Current Year Direct	**$6,919,459**
Total	**$6,919,459**