2015 Cardiovascular Research at Stanford | Retreat

October 27th, 2015
8:30 a.m. – 6 p.m.
Li Ka Shing Center

Wine & Cheese poster reception 4:30 p.m.
Every year, the Stanford Cardiovascular Institute hosts the Annual Cardiovascular Research Symposium to bring together its members and highlight their research.

Established in 2004, the Institute is comprised of scientists from numerous disciplines including genetics, immunology, engineering, surgery and medicine and some of the country's brightest fellows and students.

Stanford has a tradition of being at the forefront of cardiovascular innovation. Nearly 50 years ago, Stanford ushered in the new era of cardiovascular medicine in the United States by performing the country’s first adult heart transplant. Today, new opportunities have emerged to improve diagnostics and therapy design for cardiovascular diseases tailored to each patient and family.
Meeting Schedule

9:00  Welcome Remarks (Joseph C. Wu, MD, PhD)

9:05  Garret FitzGerald, MD
      Progress with Prostanoids and their Inhibitors

9:45  Todd Brinton, MD
      The Role of an Innovation Process for Development of CV Medical Devices

10:10 Paul Heidenreich, MD
      Understanding and Improving Implantable Defibrillator (ICD) Therapy

10:35  Coffee and Tea Break

10:55  Matthew Porteus, MD
      Using the CRISPR/Cas9 System to Edit Primary Hematopoietic Cells

11:20  Marlene Rabinovitch, MD
      Targeting Points of Intersection of Genetics, Metabolism and Inflammation in
      Pulmonary Hypertension

11:45  Dean Lloyd B. Minor, MD
      Precision Medicine

12:00  Buffet Lunch

1:00  Clyde W. Yancy, MD
      Addressing Racial Disparities in Heart Failure: From the Bench to the Community

1:40  Kelly LaMarco, PhD
      Translational Medicine: Minding the Gaps

2:00  Elena Matsa, PhD
      A Platform for Precision Medicine to Predict Drug Toxicity

2:10  Andrew Chang
      Dach1 is a Mechanoregulated Transcription Factor

2:20  James Priest, MD
      Maternal Mid-pregnancy Glucose Levels & Risk of Congenital Heart Disease in Offspring

2:30  Coffee and Tea Break

2:50  Thomas Quertermous, MD
      Mapping the Disease Pathways in Genome Wide Coronary Disease Associations

3:15  Matt Mell, MD
      Barriers to Regionalization for Complex Vascular Care

3:40  Alison L. Marsden, PhD
      Computational Surgical Planning in Pediatric and Congenital Heart Disease

4:00  Brian Kobilka, MD
      G Protein Coupled Receptors: Challenges in Drug Discovery

4:30  Live Music and Research Poster Reception

Research prizes: Basic and clinical research awards (students and fellows)

1st: $1,000  |  2nd: $750  |  3rd: $500

Basic Research Judges: Vincio A. de Jesus Perez, MD; Phillip C. Yang, MD; and Sean Wu, MD, PhD
Clinical Research Judges: Ngan Huang, PhD; Joshua Knowles, MD, PhD; and Themistocles "Tim" Assimes, MD, PhD
My laboratory works on the biology of three types of stem cells (adult, embryonic and induced pluripotent stem cells (iPSC)). We use a combination of genetic approaches, tissue engineering, physiological testing, and imaging technologies, to understand their fundamental biology. For adult stem cells, we are involved in industry and NIH sponsored clinical trials. For embryonic stem cells (ESC), we are studying their safety. For iPSC, we are working on cardiovascular disease modeling, personalized drug screening, cell banking, and cell-based therapy. Equally exciting are efforts to develop vectors for cardiovascular gene therapy.

**SELECTED WORK**


**CLINICAL FOCUS**

Adult Congenital Heart Disease
Cardiovascular Imaging

**EDUCATION & TRAINING**

**MD** Yale University

**PhD** UCLA

**MEDICINE RESIDENCY**

UCLA Medical Center

**CARDIOLOGY FELLOWSHIP**

UCLA Medical Center

**BOARD CERTIFICATION**

Cardiovascular Disease, ABIM
"Progress with Prostanoids and their Inhibitors"

Our laboratory has two areas of interest—prostanoid biology and the role of peripheral molecular clocks in cardiovascular biology, metabolism and aging. Perhaps the distinguishing feature of our groups is that we pursue interdisciplinary translational science with a focus on therapeutics. Thus, we work in different model systems—mammalian cells, worms, fish and mice—but also in humans. Ideally we develop quantitative approaches that can be projected from our experiments in the model systems to guide elucidation of drug action in humans.

SELECTED WORK


EDUCATION & TRAINING

MD University College, Dublin

MSc School of Hygiene University of London
"The Role of an Innovation Process for Development of CV Medical Devices"

My academic research focuses on the process of innovation for development of novel medical technologies. I specifically focus on the integration of research and development for new technologies with the clinical strategy and pre-clinical evaluation.

SELECTED WORK


EDUCATION & TRAINING

MD Chicago Medical School
RESIDENCY Stanford University
FELLOWSHIP Stanford University

Todd Brinton, MD
Clinical Associate Professor, Medicine (Cardiovascular Medicine)
tbrinton@stanford.edu
"Understanding and Improving Implantable Defibrillator (ICD) Therapy"

My current research interests include: 1) the cost-effectiveness of new cardiovascular technologies (for example, tests to screen asymptomatic patients for left ventricular systolic dysfunction); 2) interventions to improve the quality of care of patients with heart disease (for example, clinical reminders and home monitoring); 3) outcomes research using existing clinical and administrative datasets; and 4) use of echocardiography to predict prognosis.

SELECTED WORK


EDUCATION & TRAINING

**MD** University of Chicago

**MS** Health Services Research, Stanford University

**INTERNAL MEDICINE RESIDENCY** UCSF

**CARDIOVASCULAR IMAGING FELLOWSHIP** UCSF

**CLINICAL CARDIOLOGY FELLOWSHIP** UCSF
“Using the CRISPR/Cas9 System to Edit Primary Hematopoietic Cells”

My lab was the first to demonstrate that gene correction could be achieved in human cells at frequencies that were high enough to potentially cure patients. My research program focuses on developing genome editing by homologous recombination as curative therapy for children with genetic diseases. We are also interested in the clonal dynamics of heterogeneous populations and the use of genome editing to better understand diseases that affect children including infant leukemia’s and genetic diseases that affect the muscle.

SELECTED WORK


EDUCATION & TRAINING

MD Stanford University

RESIDENCY & FELLOWSHIP
Children’s Hospital Boston
"Targeting Points of Intersection of Genetics, Metabolism and Inflammation in Pulmonary Hypertension"

We investigate mechanisms leading to pulmonary arterial hypertension (PAH) with the view that we might better treat this devastating condition that has no cure except for lung transplantation. We discovered relationships between degradation of elastin by an endogenous elastase, loss of pre-capillary vessels, and proliferation of vascular cells and showed that suppression of elastase activity could reverse experimentally-induced PAH; we are now embarking on a translational project to bring elastase inhibitors into the clinic. In addition, we investigate the use of induced pluripotent stem cells to understand the genetic and epigenetic factors that cause PAH.

SELECTED WORK


EDUCATION & TRAINING

MD McGill University

PEDIATRICS RESIDENCY & INTERNSHIP University of Colorado

PEDIATRIC CARDIOLOGY FELLOWSHIP Baylor College of Medicine

PEDIATRIC CARDIOLOGY FELLOWSHIP Harvard Medical School

PEDIATRIC CARDIOLOGY RESEARCH FELLOWSHIP Harvard Medical School
"Precision Medicine"

Lloyd B. Minor, MD, is a scientist, surgeon, and academic leader. He is the Carl and Elizabeth Naumann Dean of the Stanford University School of Medicine, a position he has held since December 2012. As dean, Dr. Minor plays an integral role in setting strategy for the clinical enterprise of Stanford Medicine, an academic medical center that includes the Stanford University School of Medicine, Stanford Health Care, and Stanford Children’s Health and Lucile Packard Children’s Hospital Stanford. He also oversees the quality of Stanford Medicine’s physician practices and growing clinical networks.

With Dr. Minor’s leadership, Stanford Medicine has established a strategic vision to lead the biomedical revolution in Precision Health. The next generation of health care, Precision Health is focused on keeping people healthy and providing care that is tailored to individual variations. It’s predictive, proactive, preemptive, personalized, and patient-centered. An advocate for innovation, Dr. Minor has provided significant support for fundamental science and for clinical and translational research at Stanford. Through bold initiatives in medical education and increased support for PhD students, Dr. Minor is committed to inspiring and training future leaders.

Among other accomplishments Dr. Minor has led the development and implementation of an innovative model for cancer research and patient care delivery at Stanford Medicine and has launched an initiative in biomedical data science to harness the power of big data and create a learning health care system. Committed to diversity, he has increased student financial aid and expanded faculty leadership opportunities.

EDUCATION & TRAINING

MD Brown University

INTERNSHIP Duke University

RESIDENCIES Duke University, University of Chicago

FELLOWSHIP Ear Foundation and Otology Group of Nashville
"Addressing Racial Disparities in Heart Failure: From the Bench to the Community"

My research interests are in heart failure, heart transplantation, quality of care and health care disparities. At present I serve on the editorial boards of Circulation, Circulation Heart Failure and the American Heart Journal and am Associate Editor for the American Journal of Cardiology and Senior Section Editor (Heart Failure) for the Journal of the American College of Cardiology.

SELECTED WORK


EDUCATION & TRAINING

MD Tulane University

RESIDENCY Parkland Memorial Hospital, Internal Medicine

FELLOWSHIP University of Texas Southwestern Medical School, Dallas, Cardiology

CLINICAL INTERESTS

- Cardiomyopathy
- Heart Disease Prevention
- Heart Failure
- Hypertension
- Preventive Cardiology
- Valvular Heart Disease
"Translational Medicine: Minding the Gaps"

After receiving her MS and PhD in Biochemistry, Dr. LaMarco performed her post-doctoral research on mammalian transcriptional regulation at the Carnegie Institution of Washington. She then served as an Associate Editor for the journal Science, where she performed manuscript selection, writing, and editing. Dr. LaMarco next worked as a Staff Scientist and Project Leader of the Infectious Diseases Drug Discovery program at Tularik Inc., a then–privately-held biotechnology company. After leaving Tularik, she obtained funding for, led the development of, and served as Editorial Director of the Science of Aging Knowledge Environment (SAGE KE), AAAS’s Web-based journal for researchers in the field of aging. At the same time she served as an editor for the policy Web site SAGE Crossroads, which was co-developed by the Alliance for Aging Research and AAAS. She was also the Director of West Coast Alliances for the New York Academy of Sciences and, in her spare time, worked as a scientific writer, editor, and consultant in academics and in the private sector. Dr. LaMarco helped to co-found Science Translational Medicine and has served as a Senior Editor since its launch in 2009.

EDUCATION & TRAINING

PhD University of Pittsburgh School of Medicine

FELLOWSHIP Carnegie Institution of Washington
"Transcriptomic Analysis of Inter- and Intra-patient Variation in Human iPSCs: Platform for Precision Medicine to Predict Drug Toxicity"

Elena Matsa, PhD
Instructor, Cardiovascular Institute
ematsa@stanford.edu
(Joseph C. Wu, MD, PhD lab)

"Dach1 is a Mechanoregulated Transcription Factor that Stimulates Coronary Artery Growth and Remodeling"

Andrew Chang
PhD Student in Developmental Biology
andrewhc@stanford.edu
(Kristy Red-Horse, PhD lab)

"Maternal Mid-pregnancy Glucose Levels and Risk of Congenital Heart Disease in Offspring"

James R. Priest, MD
Fellow in Pediatric Cardiology, Lucile Packard Children's Hospital
jpriest@stanford.edu
"Mapping the Disease Pathways in Genome Wide Coronary Disease Associations"  

My laboratory is interested in the molecular mechanisms that mediate vascular disease pathophysiology and the risk for these diseases. The approach is primarily genetic, using human cohorts and large scale genome wide studies to identify genes that associate with disease and risk, and molecular genetic studies to define the mechanisms of these associations. At the human level, we collaborate with a number of centers around the world through the CARDioGRAM+C4D consortium to further identify coronary heart disease loci, and our group serves as the organizing center searching for loci that associate with gold standard measures of insulin sensitivity, the GENESIS study. For loci identified through these studies, we work to identify mechanisms by which causal variation is responsible for altered gene structure or function, and employ cellular and genetic mouse models to identify how encoded factors participate in the disease process.

**SELECTED WORK**


**EDUCATION & TRAINING**

MD University of Chicago

**MEDICINE RESIDENCY & INTERNSHIP**

University of Chicago

**CARDIOLOGY FELLOWSHIP**

Massachusetts General Hospital

**RESEARCH FELLOWSHIP**

Harvard Medical School
"Barriers to Regionalization for Complex Vascular Care"

My work focuses on comparative effectiveness of health care delivery for complex surgical diseases, including optimizing outcomes and cost effectiveness. My clinical interests include all aspects of vascular surgery, with a special emphasis on surgery for complex aortic disease, including endovascular repair of abdominal aortic aneurysm.

SELECTED WORK


EDUCATION & TRAINING

MD Harvard University

RESIDENCY Stanford University

FELLOWSHIP University of Wisconsin
“Computational Surgical Planning in Pediatric and Congenital Heart Disease”

The Cardiovascular Biomechanics Computation Lab at Stanford develops novel computational methods for the study of cardiovascular disease progression, surgical methods, and medical devices. We develop novel algorithms for patient specific models of blood flow, including multi-scale models of the circulatory physiology, vascular growth and remodeling, design optimization and uncertainty quantification. We apply these methods to a range of clinical applications spanning pediatric and adult cardiology. We have particular interest in congenital heart disease, and have developed novel surgical methods to treat children born with single ventricle heart disease that have been translated to clinical use. We collaborate closely with clinicians in pediatric cardiology at Lucile Packard Children’s Hospital and around the world. Projects in the lab aim to improve surgical designs and increased our understanding of disease progression and patient risk stratification for congenital heart defects, coronary artery disease, Kawasaki disease, and ventricular assist devices.

SELECTED WORK


EDUCATION & TRAINING

**BSE** Princeton University, Mechanical Engineering

**MSE** Stanford University

**PhD** Stanford University

POSTDOCTORAL FELLOWSHIP

Stanford University, Pediatric Cardiology
"G Protein Coupled Receptors: Challenges in Drug Discovery"

The goal of research in my lab is to characterize the structure and mechanism of activation of G protein coupled receptors (GPCRs). GPCRs represent the largest group of cellular receptors for hormones and neurotransmitters in the human body. They play central roles in the network of cellular communication that orchestrates the physiological processes essential for life. Disruption of one or more components of this complex communication network can lead to a broad spectrum of diseases ranging from cardiovascular and metabolic disorders, to neuropsychiatric and neurodegenerative disorders. GPCRs are therefore important targets for drug discovery. We apply a spectrum of biochemical and biophysical tools to investigate the molecular mechanism of GPCR signaling in cells, and the structural basis for regulation of GPCR function by drugs. We are also working to discover new approaches for the more efficient and economical development of safer and more effective therapeutics targeting these receptors.

SELECTED WORK


EDUCATION & TRAINING

MD Yale University

INTERNAL MEDICINE RESIDENCY

Washington University

RESEARCH FELLOWSHIP

Duke University
My research focus is the development of new genetic and molecular strategies for treating myocardial ischemia and heart failure. We are investigating new paths to myocardial repair using stem cells and tissue engineering. We are also exploring the newest techniques and devices for heart care: innovative approaches to mitral and aortic valve repair; smaller, more efficient mechanical heart pumps; and operations performed without stopping the heart.

SELECTED WORK


EDUCATION & TRAINING

MD University of Pennsylvania
SURGERY RESIDENCY & INTERNSHIP
University of Pennsylvania
RESEARCH FELLOWSHIP
University of Pennsylvania
CARDIOTHORACIC SURGERY FELLOWSHIP
University of Pennsylvania
BOARD CERTIFICATION Surgery, ABS
Thoracic Surgery, ABTS
Our lab has several major focuses, including: (1) The role of the G protein coupled receptors in regulating cardiac function, and specifically mitochondrial structure and function; (2) The differences between right and left ventricular responses to stress and in their modes of failure, including gene expression and miR regulation; (3) Using iPSC-derived myocytes to understand heart failure and congenital heart disease; and (4) We are developing tools for evaluation of cardiovascular physiology in transgenic and knockout mice and in isolated cardiomyocytes.

**SELECTED WORK**

**Epicardial FSTL1 reconstitution regenerates the adult mammalian heart**


**Patient-Specific Pluripotent Stem Cells in Doxorubicin Cardiotoxicity: A New Window Into Personalized Medicine.** Bernstein D, Burridge P. *Prog Pediatr Cardiol*. 2014 Dec.

**EDUCATION & TRAINING**

**MD New York University**

**PEDIATRICS RESIDENCY**
Montefiore Medical Center

**MEDICAL EDUCATION FELLOWSHIP**
Albert Einstein College of Medicine

**PEDIATRIC CARDIOLOGY FELLOWSHIP**
UCSF

**BOARD CERTIFICATION**
Pediatrics, ABP
Pediatric Cardiology, ABP
My primary research interest is the design and conduct of multi-center clinical trials and analyses of important clinical cardiac issues using large patient databases. My research focuses on novel anticoagulation agents for the treatment of acute coronary syndromes and atrial fibrillation, the study of agents targeted to protect the myocardium during reperfusion therapy for acute myocardial infarction, and the evaluation of cardiovascular safety of diabetic therapies.

**SELECTED WORK**


**EDUCATION & TRAINING**

- **BS** Stanford University
- **MD** University of Washington

**INTERNSHIP/RESIDENCY/CHIEF RESIDENCY**

University of Arizona

**RESEARCH FELLOWSHIP**

University of Pennsylvania

**FELLOWSHIP** Duke University
My research program is focused on defining and characterizing pathogenic immune responses in humans with emphasis on two disease models; inflammatory blood vessel disease and rheumatoid arthritis. In large vessel vasculitis, we have defined disease-relevant T cells, discerned mechanisms of T cell-antigen recognition, connected different T cell lineages to early and late disease and discovered micro-environmental signals that shape pathogenic immunity in the walls of human arteries. We were the first to describe the role of arterial wall dendritic cells in sensing danger-associated molecular patterns and initiating vasculitis and have implicated NOTCH-NOTCH ligand interactions in directing the tissue tropism of large vessel vasculitis. We build patient-relevant experimental models by engrafting human blood vessels, human atherosclerotic plaque and human immune cells into mice. Work in rheumatoid arthritis has identified premature immune aging as a typifying defect in this autoimmune syndrome. We are examining the contribution of DNA instability, telomeric damage and metabolic abnormalities in accelerated immune cell aging and inflammatory disease.

SELECTED WORK


EDUCATION & TRAINING

MD University of Aachen
DR. MED University of Bonn
PhD University of Heidelberg

MEDICINE RESIDENCY
Hannover Medical School

RHEUMATOLOGY FELLOWSHIP
Stanford University

BOARD CERTIFICATION
Internal Medicine, Germany
Rheumatology, Germany
**BASIC SCIENCE**

**Injectable Hydrogels with Double Network Formation To Promote Angiogenesis.** Lei Cai, Ruby Dewi, Sarah Heilshorn *Department of Materials Science & Engineering, Stanford*

**Multiclonal Large-Scale RNASeq Analyses To Define iPSC Variability, Gene Regulatory Networks And eQTLS Relating To A Complex Human Disease Model.** Carcamo-Orive, Ivan1, Cundiff, Paige2, Chang, Rui3, Knowles, Joshua W.1, Hoffman, Gabriel E.3, Whalen, Sean4, Beckman, Noam D.3, Patel, Achchhe2, Papatserko, Dimitri2, Abbasi, Fahim1, Reaven, Gerald1, Shahbazi, Mohammad1, Sevilla, Ana2, Hendry, Carolin2, Schadt, Eric3, Lemischka, Ihor2, Pandey, Gaurav1, D’Souza, Sunita2, Quertermous, Thomas1 1Cardiovascular Institute, Stanford, 2Department of Developmental and Regenerative Biology, Black Family Stem Cell Institute, Mount Sinai School of Medicine, New York, 3Department of Genetics and Genomic Sciences, Institute of Genomics and Multiscale Biology, Mount Sinai School of Medicine, New York, NY, 4Gladstone Institutes, San Francisco

**The Molecular Mechanisms of Metabolism Modulators Reduce Cellular Lipid Accumulation in Cardiomyocytes of Human Neutral Lipid Storage Disease.** Chun-Yuan Chan, Kuppusamy Rajarajan, Sean M. Wu *Stanford Cardiovascular Institute, Stanford*

**Dach1 is a Mechanoregulated Transcription Factor that Stimulates Coronary Artery Growth and Remodeling.** Andrew H Chang1,3, Aruna Poduri3, Vinay Surya2, Brian Raftrey3, Heidi Chen1,3, Alex Dunn2, Gerald Fuller2, Kristy Red-Horse3 *Department of Developmental Biology, Department of Chemical Engineering, Department of Biology, Stanford*

**Telomere and Mitochondrial Dysfunction in Duchenne Muscular Dystrophy.** Alex C.Y. Chang1,3, Sang-Ging Ong2,3, Edward LaGory4, Vittavat Termglinchan1,3, Ioannis Karakikes2,3, Ama to J Giaccia4, Joseph Wu1,3 and Helen M Blau1,3 1Baxter Laboratory for Stem Cell Biology, Department of Microbiology and Immunology, Institute for Stem Cell Biology and Regenerative Medicine, 2Division of Cardiology, Department of Medicine, 3Stanford Cardiovascular Institute, and 4Division of Radiation and Cancer Biology, Department of Radiation Oncology, Stanford

**ISL1 Gene Targets Identified Using Human Induced Pluripotent Stem Cell Derived Cardiomyocytes.** Jared M Churko1,2,3, Jaecheol Lee1,2,3, Vittavat Termglinchan1,2,3, Nathan Salamonis4, Joseph Wu1,2,3 1Institute of Stem Cell Biology and Regenerative Medicine; 2Stanford Cardiovascular Institute; 3Departments of Medicine and Radiology; 4Division of Biomedical Informatics, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH

**Physiologic Mitochondrial Fragmentation is a Cardiac Adaptation to Increased Energy Demand.** Michael Coronado1,2, Giovanni Fajardo1,2, Kim Nguyen1, Mingming Zhao1,2, Kristina Bezold Kooiker1,2, Gwanghyun Jung1,2, Dong-Qing Hu1,2, Sushma Reddy1,2, Erik Sandoval1,2, Aleksandr Statland3, Robert A. Gottlieb3, Daniel Bernstein1,2 *The Department of Pediatrics*
Targeted Delivery of RNA using Knottin-Protein Conjugates for the Treatment of Atherosclerosis and Abdominal Aortic Aneurysms. Sandra M DePorter¹, Sungwon Lim¹, Camila R Kofman², Toshinobu Saito³, Michael V McConnell³, Jennifer R Cochran¹,² Department of Bioengineering, Stanford, ¹Department of Chemical Engineering, Stanford, ¹Division of Cardiovascular Medicine, Stanford

The Cellular Origin and Transcriptional Regulation of F8 expression. Thanh Theresa Dinh, Junliang Pan, Mike Lee, Anusha Rajaraman and Eugene Butcher, Stanford

Purifying Atrial and Ventricular hiPSC-derived Cardiomyocytes Using CRISPR/Cas9. E. Dzilic¹, A. Kumar¹, K. Plonowska¹, SM. Wu¹ ¹Institute for Stem Cell Biology and Regenerative Medicine, Stanford

TCF21 Regulates Coronary Artery Disease Causing Aryl-hydrocarbon Receptor Gene Expression and its Downstream Pathway Activation by Environmental Ligands. Juyong Brian Kim, Milos Pjanić, Olga Sazanova, Trieu Nguyen, Tina Wang, Clint Miller, and Thomas Quertermous, Stanford

CDKN2B Regulates Efferocytosis and Phenotypic Switching in Atherosclerosis. Daniel DiRienzo, Yoko Kojima, Vivek Nanda, and Nicholas J. Leeper Department of Surgery, Stanford

Structural and Functional Studies on β2AR Phosphorylation by GRK5. Yang Du*¹,², Konstantin Komolov*³, Nyu M Duc⁴, KaYoung Chung⁴, Jeffrey L Benovic⁵, Brian Kobilka¹,² Stanford University, Department of Molecular and Cellular Physiology, Stanford; ²Stanford Cardiovascular Institute, Stanford; ³Thomas Jefferson University, Department of Biochemistry and Molecular Biology, Philadelphia, PA; ⁴Sungkyunkwan University, School of Pharmacy, Suwon, South Korea

Injectable Hydrogels for Tandem Cell/Gene Transplantation. Abbygail A. Foster¹,², Lei Cai¹,², Ngan F. Huang¹,³,⁴, Sarah C. Heilshorn¹,² ¹Department of Materials Science and Engineering, Stanford; ²Stanford Cardiovascular Institute; ³Veterans Affairs Palo Alto Health Care System, Palo Alto; ⁴Division of Cardiovascular Medicine, Stanford

Combinatorial Extracellular Matrices Promote Survival and Phenotype of Human Induced Pluripotent Stem Cell-Derived Endothelial Cells in Hypoxia. Luqia Hou, John Coller, Vanita Natu, Ngan F. Huang, Stanford

Correction of Human Phospholamban R14del Mutation Associated with Cardiomyopathy Using Targeted Nucleases and Combination Ytherapy. Karakikes I¹,²,³, Stillitano F³, Nonnenmacher M¹, Termglinchan V¹, Wu JC¹,², Hulot JS¹, Hajjar RJ¹ (+18 additional authors); ¹Department of Medicine, Division of Cardiovascular Medicine, Stanford; ²Stanford Cardiovascular Institute; ³Cardiovascular Research Center, Icahn School of Medicine at Mount Sinai, New York, New York, NY
Controllable Nanotopographical Cues from Electrospun PCL/PEO Fibrous Scaffolds Facilitate Endothelial Cell Differentiation of Human Pluripotent Cells. Joseph J. Kim, PhD, Luqia Hou, Nicholas Mezak, John Coller, Vanita Natu, Ngan F. Huang, Stanford

Abnormal Activation of TGFβ Signaling as a Pathogenesis of Left Ventricular Non-compaction Cardiomyopathy. Kazuki Kodo1,2, Sang-Ging Ong1,2, Fereshteh Jahanbani3, Vittavat Termglinchan1,2, Oscar J. Ablez1,2, Jared M. Churko1,2,4, Praveen Shukla1,2, Michael P. Snyder1, *Daniel Bernstein1,2, Joseph C. Wu1,2,4 1Department of Medicine, Division of Cardiology, 2Stanford Cardiovascular Institute, 3Department of Genetics, 4Institute of Stem Cell Biology and Regenerative Medicine, Stanford, Department of Pediatrics, University of Toyama

Pediatric Hypertrophic Cardiomyopathy (HCM) Mutations in Human ß-myosin Heavy Chain (b-MHC) Show Mutation-specific Changes in the Rate of ATP Hydrolysis and In Vitro Motility. Kooiker, K*1, Adhikari, A*2, Sutton, S2, Ruppel, K2, Spudich, J2 and Bernstein, D1  *Authors contributed equally to the research 1Department of Pediatrics 2Department of Biochemistry, Stanford

PPARγ Controls DNA Damage Response by Modulating UBR5 Interaction with the MRE11-RAD50-NBS1 Complex. CG Li1, CS Mahon2, E Verschueren2, V Kantamani1, K Cimprich1 and M Rabinovitch1 1Stanford University, 2University of California, San Francisco


Antagonism of Rosuvastatin-induced Elevation of Circulating PCSK9 in Hamsters by Liver-specific Knockdown of HNF1 Transcription Factors. Bin Dong, Amar Bahadur Singh, Vikram Ravindra Shende and Jingwen Liu Department of Veterans Affairs, Palo Alto Health Care System, Palo Alto

Morphine-induced Cardioprotection: The Past, Present and Future. Yao Lu, Eric R. Gross* Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University, School of Medicine, Stanford

The Unraveling Stent. Toby Lundh Visiting Professor in the VIBE Lab at Stanford Medicine, Vascular Surgery Professor in Mathematics at Chalmers University of Technology, Gothenburg, Sweden

Transcriptomic Analysis of Inter- and Intra-patient Variation in Human iPSCs: Platform for Precision Medicine to Predict Drug Toxicity. Elena Matsa1,2,3, Paul W. Burridge1,2,3, Kun-Hsing Yu4,5, John H. Ahrens1, Haodi Wu1,2, Praveen Shukla1,2,5, Jared M. Churko1,2, Joseph D. Gold1, Michael P. Snyder4, Joseph C. Wu1,2,3 1Stanford Cardiovascular Institute, 2Departments of Medicine and Radiology, 3Institute of Stem Cell Biology and Regenerative Medicine, 4Department of Genetics, 5Biomedical Informatics Training Program, Stanford
Investigating the Role of Wall Shear Stress Gradients on Human Lymphatic Endothelial Cells. Eleftheria Michalaki, Vinay Surya, Yorgos Katsikis, Gerald Fuller, and Alex Dunn. 1Department of Chemical Engineering, Stanford, 2Department of Mechanical Engineering, Stanford, 3Stanford Cardiovascular Institute

Integrative Fine-mapping of Regulatory Variants and Mechanisms at Coronary Artery Disease Loci. Clint L. Miller*, Milos Pjanic, Tina Wang, Trieu Nguyen, Ariella Cohain, Jonathan Lee, Themistocles L. Assimes, Eric E. Schadt, Thomas Quertermous, +7 additional authors, 1Department of Medicine, Division of Cardiovascular Medicine, Stanford, 2Department of Genetics and Genomic Sciences, Icahn Institute for Genomics and Multiscale Biology, Icahn School of Medicine at Mount Sinai, NY

Contact-Mediated Interaction Between Pulmonary Artery Endothelial and Smooth Muscle Cells Promotes a BMPR2-Notch1 Signal Causing Hyperpolarization of Endothelial Mitochondria and a Stalk Cell-Like Phenotype. Kazuya Miyagawa, Caiyun G. Li, Jan K. Hennigs, Shalina Taylor, Jan-Renier Moonen, Silin Sa, Lingli Wang, Aiqin Cao, Marlene Rabino-vitch Department of Pediatrics, Vera Moulton Wall Center for Pulmonary Vascular Disease and Cardiovascular Institute, Stanford

Nanoscale Extracellular Matrix Alters Endothelial Function Under Disturbed Flow. Karina H. Nakayama, Vinay Narayanan, Monica Gole, Travis Walker, Weiguang Yang, Edwina S. Lai, Maggie Ostrowski, Gerald G. Fuller, Alex R. Dunn, Ngan F. Huang. 1Stanford Cardiovascular Institute, Stanford, CA 2Department of Cardiothoracic Surgery, Stanford School of Medicine, Stanford, CA 3Veterans Affairs Pfine-lo Alto Health Care System, Palo Alto, 4Department of Chemical Engineering, Stanford University School of Engineering, Stanford, CA 5Department of Chemical Engineering, Oregon State University, Corvallis, OR 6Department of Pediatrics, Stanford

CDKN2B Regulates TGFβ1 Mediated Smooth Muscle Cell Recruitment to Ischemic Blood Vessels. Vivek Nanda, Kelly P. Downing, Yoko Kojima, Daniel M DiRenzo, Joshua M. Spin, Andrew J Connolly, Sonny Dandona, Ljubica Perisic, Ulf Hedin, Lars Maegdefessel, Jessy Dalman, Liang Guo, XiaoQing Zhao, Frank D. Kолодgie, Renu Virmani, Harry R. Davis Jr., Nicholas J. Leeper, Departments of Surgery, Medicine and Pathology Stanford; Department of Medicine, McGill University, Montreal, Canada; Departments of Molecular Medicine and Surgery and Medicine, Karolinska Institute, Stockholm, Sweden; and CVPath Institute, Gaithersburg, MD

Regulation of GSK3β by TRPV1 in Cardiomyocytes. Honit Piplani, Carl M Hurt, Yao Lu, Eric R Gross Department of Anesthesiology, Perioperative and Pain Medicine, Stanford

Multifunctional Assessment of the Cardiac Activity of Single iPSC-derived Cardiomyocytes for Disease Modeling. Alexandre J. S. Ribeiro, Olivier Schwab, Mo A. Mandegar, Ekaterina Frolov, Nathaniel Huebsch, Bruce R. Conklin, Beth L. Pruitt. Department of
Assimilation and Propagation of Clinical Data Uncertainty in Cardiovascular Modeling. Daniele E. Schiavazzi¹, Alison L. Marsden¹ ¹Department of Pediatric, Bioengineering and ICME, Stanford

Deciphering Molecular Mechanisms Underlying Familial Hypertrophic Cardiomyopathy with Isogenic Induced Pluripotent Stem Cells. Timon Seeger¹, Ioannis Karakikes¹, Vittavat Termglinchan¹, Caressa Chen¹, Mohammed Ameen¹, Joseph C. Wu¹. ¹Stanford Cardiovascular Institute

Biomaterial Approaches for Cardiovascular Tissue Engineering. Vahid Serpooshan¹, Daniel A. Hu¹, Tony Sinclair¹, Soah Lee², Xinming Tong², Pu Chen³, Utkan Demirci⁴, Fan Yang⁴, Sean M. Wu¹-⁴ ¹Stanford University Cardiovascular Institute; ²Dept. of Materials Sci. and Eng.; ³Dept. of Orthopedic Surgery; ⁴Dept. of Radiology; ² Division of Cardiovascular Medicine, Dept. of Medicine; ³Institute for Stem Cell Biology and Regen. Medicine, ⁴Child Health Research Institute, Stanford

Single Cell Cloning of Human Pluripotent Stem Cells: Clonal Expansion of Single Genetically Modified hPSCs through Co-culture with their Un-modified Counterparts. Mohammad Shahbazi¹, Paige Cundiff², Fahim Abbasi¹, Sunita D’Souza², Ihor Lemischka², Joshua W. Knowles¹, Thomas Quertermous¹. ¹Stanford School of Medicine and Stanford Cardiovascular Institute, Stanford, ²Icahn School of Medicine at Mount Sinai, Department of Developmental and Regenerative Biology, New York, NY

High-Throughput Screening of Tyrosine Kinase Inhibitors in Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes Reveals a Class-Specific Cardiotoxicity Pattern. Arun Sharma, BS¹, ²,³,⁴*, Paul W. Burridge, PhD¹,²,⁴*, Alexandra Holmström, PhD¹,²,³, Elena Matsa, PhD¹,²,³, Jared M. Churko, PhD¹,²,³, Wesley McKeithan, BS², Yuan Zhang¹,²,³, Anusha Kumar, BS¹,²,³, Mark Mercola, PhD⁵, Sean M. Wu, MD PhD¹,²,³, Joseph C. Wu, MD PhD¹,²,³ ¹Stanford Cardiovascular Institute, ²Institute for Stem Cell Biology and Regenerative Medicine; ³Department of Medicine, Division of Cardiology, Stanford; ³Department of Pharmacology and Center for Pharmacogenomics, Northwestern University Feinberg School of Medicine, Chicago, IL; ³Muscle Development and Regeneration Program, Sanford-Burnham Medical Research Institute, La Jolla, CA

Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes as an In Vitro Model for Doxorubicin-Induced Cardiotoxicity. Alice Shieh¹,²,³, Ryoko Hamaguchi¹,²,³,⁴, Arun Sharma¹,²,³,⁴, Paul W. Burridge⁶, Joseph C. Wu¹,²,³,⁴,⁵, Sean M. Wu¹,²,³ ¹Department of Medicine, Division of Cardiology; ²Institute for Stem Cell Biology and Regenerative Medicine; ³Stanford Cardiovascular Institute; ⁴Department of Biology, ⁵Department of Radiology, Stanford School of Medicine; ⁶Department of Pharmacology, Northwestern Feinberg School of Medicine, Chicago, IL
Delineating Hypokalemia-induced Ventricular Arrhythmogenicity Using Human iPSC-derived Cardiomyocytes. Praveen Shukla¹-³, Priyanka Garg¹-³, Evangeline Tzatzalos¹-³, Elena Matsa¹-³, Wenyi Chen¹-³, Arun Sharma¹-³, Oscar J. Abilez¹-³, Joseph D. Gold¹-⁵, & Joseph C. Wu¹-³ ¹Stanford Cardiovascular Institute, ²Institute for Stem Cell Biology and Regenerative Medicine, ³Department of Medicine, Division of Cardiology, ⁴Department of Chemistry, ⁵Department of Cardiothoracic Surgery, Stanford University School of Medicine, Stanford

Vitamin D Restores Functional Abilities of Fetal Endothelial Progenitor Cells From Pregnancies Complicated by Preeclampsia. Frauke von Versen-Höynck, MD, MSc¹-³, Lars Brodowski MD¹; Jennifer Burlakov MD¹; Carl A. Hubel, PhD², ¹Division of Reproductive Endocrinology and Infertility, Stanford, ²Department of Obstetrics and Gynecology, Hannover Medical School, Germany ³Magee Womens Research Institute and Foundation, Pittsburgh, PA

Mitochondrial Transient Receptor Potential Vanilloid 1 (TRPV1) Mediates Endothelial Dysfunction in Diabetes Nana-Maria Wagner MD, PhD, Carl M. Hurt MD, PhD, Stacy McAllister PhD, Eric R. Gross MD, PhD Department of Anesthesiology, Perioperative and Pain Medicine, Stanford

Cell-cell adhesions and tension as regulators of myofibrils and sarcomeres. Robin E. Wilson, Alexandre J.S. Ribeiro, Beth L. Pruitt, Department of Mechanical Engineering, Stanford

Cord Blood Endothelial Progenitor Cells are Altered in Preeclampsia. Diane Gumina, BA¹, Claudine P Black, BS², Vivek Balasubramaniam, MD², Virginia Winn, MD, PhD¹-³ and Christopher D Baker, MD². ¹Dept of Obstetrics and Gynecology, ²Dept of Pediatrics, University of Colorado School of Medicine, Aurora, CO, and ³ Dept. of Obstetrics and Gynecology, CHRI, CVI, Stanford

Epigenetic Activation of Phosphodiesterase Subtypes Lead to Compromised Beta-adrenergic Signaling in Induced Pluripotent Stem Cell-derived Cardiomyocytes From Dilated Cardiomyopathy Patients. Haodi Wu, Jaecheol Lee, Mingxia Gu, Feng Lan, Jared Churko, Elena Matsa, Karim Sallam, Joseph D. Gold, Joseph C. Wu. Department of Medicine, Division of Cardiology, Cardiovascular Institute, Stanford

Addressing the Controversy of Estimating Pulmonary Arterial Pressure by Echocardiography. Myriam Amsallem1*, Joshua M. Sternbach2, Sasikanth Adigopula1, Yukari Kobayashi1, Thu A. Vu1, Roham Zamanian1, David Liang1, Gundeep Dhillon1, Ingela Schnittger1, Michael V. McConnells2, François Haddad1, 1Department of Cardiovascular Medicine, Stanford, 2Department of Pulmonary and Critical Care, Stanford

Importance of Beta-blocker Subtype for the Risk of Perioperative Adverse Events in Low and High Risk Patients Undergoing Non-cardiac Surgery. Mads Emil Jørgensen1,2, Gunnar Hilmar Gislason1,3,4,5, Christian Torp-Pedersen6, Mark Hlatky2, Charlotte Andersson1. 1The Cardiovascular Research Center, Department of Cardiology, Gentofte Hospital, University of Copenhagen, Denmark, 2Department of Health Research and Policy, Stanford, 3Faculty of Health and Medical Sciences, University of Copenhagen, Denmark, 4National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark, 5The Danish Heart Foundation, Copenhagen, Denmark, 6Department of Health Science and Technology, Aalborg University, Denmark

Secular Trends In Complications of Atrial Fibrillation 2004-2012: The Treat-AF Study. Daniel W. Kaiser, MD1,2 Alexander C. Perino1, Jun Fan MS1, Susan Schmitt PhD1, Mintu P. Turakhia1,2, 1Veterans Affairs Palo Alto Health Care System, Palo Alto, CA; 2Stanford University School of Medicine


Myocardial Deformation Imaging and Obstruction in Hypertrophic Cardiomyopathy, Insights From Cross-sectional and Post-myectomy Analysis. Yukari Kobayashi, Gherardo Finocchiaro, Genevieve Giraldeau, David Boulate, Yuhei Kobayashi, Richard Ha, David Lee, Matthew Wheeler, David Liang, Ingela Schnittger, Francois Haddad, Euan Ashley, Stanford

Ventricular Remodeling of the Athlete’s Heart: A Systematic Review and Meta-analysis. Zoë Kooreman1, Guillaume Fadel1, David Hsu1, Myriam Amsallem MD2, Euan Ashley MD3, Keith George PhD4, Victor Utomi PhD4, Victor Froelicher MD5, Francois Haddad MD1. 1Department of Cardiovascular Medicine, Stanford; 2Cardiorespiratory Research Group, Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, UK

Heart Failure Patients Hospitalized with Bacterial Infections: A Nationwide Analysis of Concomitant Clostridium Difficile Infection Rates and In-Hospital Mortality. Petra Mamic, MD1; Paul A Heidenreich, MD, MS1,2,3, Haley Hedlin, PhD4, Lakshika Tennakoon, MD MS5, Kristan L Staudenmayer, MD MS4, 1Department of Medicine, Stanford; 2Stanford Cardiovascular Institute; 3VA Palo Alto Health Care System, Palo Alto; 4Department of Surgery, Stanford
Maternal Mid-pregnancy Glucose Levels and Risk of Congenital Heart Disease in Offspring. James R Priest MD1,2,3, Wei Yang MS 3, Gerald Reaven MD1, Joshua W. Knowles MD PhD3, Gary M. Shaw Dr PH 3. 1Division of Pediatric Cardiology and Stanford Cardiovascular Institute, Stanford; 2Staford Cardiovascular Institute; 3Department of Pediatrics, Stanford; 4Division of Cardiovascular Medicine and Stanford Cardiovascular Institute, Stanford

Towards the Promise of Personalized Medicine: Using Machine Learning to Identify Patients with Undiagnosed Atherosclerotic Disease and Predict Major Adverse Cardiovascular Events. Elsie (Gyang) Ross, MD, MSc 1, Nicholas Leeper, MD 1, Nigam Shah, PhD2, 3Division of Vascular Surgery, Stanford; 2Department of Biomedical Informatics, Stanford

Engineered Anisotropic Substrates Promote the Function of Cardiomyocytes Derived from Human Pluripotent Stem Cells. Maureen Wanjare, Joseph Jung-Woong Kim, Ngan F. Huang, Stanford

Mechanisms For Discrepancies Between Phase and Activation Timing Maps in Identifying Sites where Local Ablation Terminates Human Persistent Atrial Fibrillation. Junaid Zaman, Gautam Lalani, Tina Baykaner, Mark Swerdlow, Shirley Park, David Krummen, Paul Wang, Sanjiv Narayan 1Stanford Cardiovascular Institute, 2VA Medical Center, University of California-San Diego, CA

Safety and Effectiveness of Catheter Ablation of Atrial Fibrillation in Patients with Chronic Kidney Disease. Aditya J. Ullal BA1,2, Daniel W. Kaiser MD2, Jun Fan MS1, Susan Schmitt PhD1, Claire T. Than MPH1, Wolfgang C. Winkelmayer MD MPH ScD3, Paul A. Heidenreich MD MS1,2, Jonathan P. Piccini MD MHSc4, Marco V. Perez MD5, Paul J. Wang MD2, Mintu P. Turakhia MD MAS1,2 Veterans Affairs Palo Alto Health Care System, Palo Alto; 2Stanford University School of Medicine, Stanford; 3Baylor College of Medicine, Houston, TX; 4Duke University Medical Center, Durham, NC

POPULATION RESEARCH

Cardioversion and Risk of Adverse Events with Dabigatran Versus Warfarin: A Nationwide Cohort Study. Jannik Langtved Pallisgaard1,2, MD; Tommi Bo Lindhardt1,2, MD, PhD; Morten Lock Hansen1,2, MD, PhD; Anne-Marie Schjerning Olsen1, MD, PhD; Jonas Bjerring Olesen1, MD, PhD; Laila Staerk, MD1,2; Christian Torp-Pedersen1, MD, DMSc; Gunnar Gislason1,2,5,6, MD, PhD. 1Department of Cardiology, Copenhagen University Hospital Gentofte, Hellerup, Denmark; 2Faculty of Health and Medical Sciences, University of Copenhagen, Denmark; 3The Heart Centre, Copenhagen University Hospital Rigshospitalet, Copenhagen, Denmark; 4Institute of Health, Science and Technology, Aalborg University, Aalborg, Denmark; 5The National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark; 6The Danish Heart Foundation, Copenhagen, Denmark