A Simple Blood Test May Unearth the Earliest Signs of Heart Transplant Rejection by Krista Conger

Is there an organ more precious than a donated heart? Heart transplant recipients would likely say no. But, in order to keep their new heart healthy, they have to identify any signs of rejection as early as possible. Unfortunately (and ironically), the gold standard procedure to detect rejection – repeated heart biopsies – involves snipping away and analyzing tiny bits of tissue from the very organ they waited so long to receive. The procedure is also uncomfortable, and can cause complications.

Now, Stanford bioengineer Stephen Quake, PhD, and his colleagues have found that a simple blood test that detects donor DNA in the bloodstream of the recipient can detect...

Continues on page 2
For many scientists, the clinical promise of stem cells has been dampened by very real concerns that the immune system will reject the transplanted cells before they could render any long-term benefit. Previous research in mice has suggested that even stem cells produced from the subject’s own tissue, called iPS cells, can trigger an immune attack.

Now researchers at the Stanford University School of Medicine have found that coaxing iPS cells in the laboratory to become more-specialized progeny cells (a cellular process called differentiation) before transplantation into mice allows them to be tolerated by the body’s immune system.

“Induced pluripotent stem cells have tremendous potential as a source for personalized cellular therapeutics for organ repair,” said Joseph Wu, MD, PhD, director of the Stanford Cardiovascular Institute. The findings are described in a paper published online May 30 in Nature Communications.

Wu is senior author of the paper. Postdoctoral scholars Patricia Almeida, PhD, and Nigel Kooreman, MD, and assistant professor of medicine Everett Meyer, MD, PhD, share lead authorship. Previous studies have suggested that differentiation of iPS cells could reduce their tendency to inflame the immune system after transplantation, but this study is the first to closely examine, at the molecular and cellular level, why that might be the case.

“Coaxing iPS cells Prior to Transplantation Cuts Rejection Risks by Krista Conger

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“We’ve demonstrated definitively that, once the cells are differentiated, the immune response to iPS-derived cells is indistinguishable from its response to unmodified tissue derived from elsewhere in the body,” said Kooreman.

Pluripotent stem cells can give rise to any cell in the body. Although embryonic stem cells are naturally pluripotent, iPS cells are created by scientists from existing adult cells, such as skin or blood. In this recent study, Kooreman and his co-lead authors decided to look more closely at the immune response to transplanted stem cells.

“The immune response to the iPS-derived endothelial cells and the aortic endothelial cells, and the longevity of the grafts, was very similar,” said Kooreman. “If we specifically look at the T cells, we see they’re also very similar and that they look much different from grafts that are rejected.”

Wu, who is also a professor of cardiovascular medicine and of radiology, said, “This study certainly makes us optimistic that differentiation — into any nonpluripotent cell type — will render iPS cells less recognizable to the immune system. We have more confidence that we can move toward clinical use of these cells in humans with less concern than we’ve previously had.”

Full story: http://goo.gl/0abTqv
Stanford University School of Medicine and Oxford University united again to host the second Big Data in Biomedicine Conference this past May. Over 590 guests representing academia, information technology corporations, venture capital firms, the U.S. government and foundations participated at the Li Ka Shing Center for Learning and Knowledge on Stanford campus and others streaming online. Eighteen companies were showcased. The conference featured a number of eminent speakers, including Ewan Birney, PhD, director of the European Bioinformatics Institute; David Glazer, director of engineering at Google; Taha Kass-Hout, MD, the Food and Drug Administration’s first chief health informatics officer; Vinod Khosla, MBA, founder. Leading discussions in Genomic Medicine was Stanford Cardiovascular Institute (CVI) members, Euan Ashley, MD, PhD, Director of the Stanford Clinical Genomics Service and John Ioannidis, MD, Dsc, Professor of Medicine and Director of the Stanford Prevention Research Center. The Devices & Technology session was led by CVI members, Paul Yock, MD, PhD, Professor of Medicine and Bioengineering and Michael McConnell, MD, Professor of Cardiology. Michael Snyder, MD, Professor and Chair of Genetics and Director of Genomics and Personalized Medicine, led the Single Cell to Exacycles session. Atul Butte, MD, PhD, Chief of the Division of Systems Medicine and Associate Professor of Pediatrics and Genetics, was also a moderator of two sessions. Stephen Quake, PhD, Professor of Engineering, and Bob Harrington, MD, Chair of the Department of Medicine, were other CVI member participants.

Todd Park, United States Chief Technology Officer, delivered a keynote address.

Big Data in Biomedicine: http://goo.gl/mMP8wR
SPARK Program Helps Cross the ‘Valley of Death’ Between Discovery and Development by Lia Steakley

Several years ago, Stanford neuroscientist Craig Garner, PhD, found himself facing a common problem for researchers: figuring out how to cross the so-called “valley of death” between drug discovery and development. In his case, he wanted to get pharmaceutical companies interested in funding his lab’s promising new Down syndrome treatment. The answer was SPARK, a hands-on training program that assists scientists in moving their discoveries from bench to bedside. The program was created by Daria Mochly-Rosen, PhD, after she experienced challenges in getting her own entrepreneurial venture off the ground. A story published in Inside Stanford Medicine explains how Mochly-Rosen and a group of industry experts search hundreds of patents submitted to the university’s Office of Technology Licensing and select projects, such as Garner’s, that could benefit from SPARK’s help. My colleague Ranjini Raghunath writes:

Since SPARK’S founding, 51 research teams have “graduated” from the program. More than half of its projects have been licensed or have advanced to clinical use, or both, in sharp contrast to the pharmaceutical industry’s own success rate of approximately five percent. With SPARK’s support, a research team led by dermatologist Alfred Lane, MD, has received a fundable score on a Food and Drug Administration orphan grant for phase-2 trials of a repurposed drug to treat lymphatic malformations that disfigure and disable children. Another team, led by immunologists William Robinson, MD, PhD, and Jeremy Sokolove, MD, is testing a combination of drugs to treat early stages of cartilage loss and joint degeneration in bone arthritis. Findings of a third research team led by bioinformatics expert Atul Butte, MD, PhD, and Bruce Ling, PhD—biomarkers for detecting dangerously high blood pressure in pregnancy—have already been picked up for licensing by a start-up biotechnology company. Former SPARK beneficiaries, or “SPARKees,” have credited the program with helping them get research grants, publish papers in reputable journals and even land a tenure-track position, Mochly-Rosen said. The piece goes on to note that universities around the world have launched, or are developing, their own SPARK programs. Mochly-Rosen’s overall goal for the program is to integrate Stanford and other institutions’ programs under one brand and use it to attract commercial investors to support early-stage research discoveries.

Full story: http://goo.gl/RDcJCe

The Heart Gadgeteers by Kris Newby

“I knew I wanted to study the heart before I knew I wanted to go to medical school...It represents the best of engineering-fluids, electrical and mechanical—all in one organ.”

-- Michael McConnell, MD

Supposing Stanford were to name a chief heart gadgeteer, it might be Michael McConnell, MD, a cardiologist with degrees from MIT in electrical engineering and bioengineering. McConnell, tall and fit with laser-blue eyes, isn’t wearing a physician’s white coat on the day he escorts two young Silicon Valley fitness app developers out of his office. He is among a new breed of physician-engineers, fluent in both medicine and technology.

This year, in addition to caring for heart patients, McConnell is trying to figure out how to integrate a new wave of heart- and fitness-monitoring devices into the medical system. Traditional heart-monitoring equipment lives in hospitals. The equipment is utilitarian, safe and ugly, hooked up to wires, electrodes and monitors. A new generation of portable heart gadgets has the potential to leapfrog these old approaches. Looking more like fashion accessories than medical equipment, these gadgets leverage advances in smartphones, sensors and digital video, and, in many cases, perform their functions better and faster than the old equipment — for a fraction of the price.

Yet the medical establishment isn’t quite ready for them. So the heart gadgeteers are working overtime to address the regulatory hurdles, funding issues and institutional inertia keeping these devices out of mainstream medical use. In his roles as director of cardiovascular health innovation and co-director of the preventive cardiology clinic, he tries to figure out how to get more of his heart patients to use wearable fitness devices, to encourage them to exercise more and eat right.

“The problem is that the current system only reimburses physicians after someone has heart problems,” he says.

Full story: http://goo.gl/hur4Z7
The Importance of Knowing Your Blood Pressure Level in Preventing Hypertension by Lia Steakley

One in three adults in the United States has high blood pressure, also known as hypertension, and less than half of those diagnosed with the condition have it under control, according to data from the Centers for Disease Control and Prevention.

In a recent Be Well Q&A, Sandra Tsai, MD, a clinical assistant professor of medicine and cardiovascular medicine at Stanford Hospital and Clinics, discusses why it’s crucial to get regular blood pressure screenings. She says, “Hypertension is preventable and treatable; therefore, it is imperative that people know their blood pressure level.” When asked what she would like to change about public awareness of hypertension, she said:

I want people to understand the importance of knowing their blood pressure readings and the definition of a normal reading. It is also important for people to know that hypertension often does not produce symptoms. Therefore, we all need to have our blood pressure checked regularly so that if hypertension is occurring, it will be detected early.

There are many things people can do to prevent or alleviate hypertension; thus, if diagnosed, such individuals should talk with their medical provider for help with behavior change and the possible need for anti-hypertensive medication.

Cardiac Arrest in Pregnancy: New Consensus Statement Addresses CPR for Expectant Moms by Erin Digitale

When a pregnant woman’s heart stops, two lives are threatened. Yet few caregivers know how to modify their cardiopulmonary resuscitation technique for the expectant mom and her fetus, and few hospitals are optimally prepared for such an event.

To fill the knowledge gap, the Society for Obstetric Anesthesia and Perinatology commissioned a Stanford-led team of experts from several medical disciplines to write a consensus statement of expert recommendations, publishing in the May issue of Anesthesia & Analgesia, that describes best practices for CPR on a pregnant patient. The new statement is one of many examples of Stanford leadership in helping to save the lives of pregnant women around the world; our experts have also helped to develop widely-adopted protocols for dealing with massive hemorrhage during delivery and for treatment of pre-eclampsia, for example.

I asked two Stanford scientists who helped prepare the statement, lead author Steven Lipman, MD, and senior author Brendan Carvalho, MD, for their perspectives on the challenges of resuscitation in pregnancy. Both are obstetric anesthesiologists at Lucile Packard Children’s Hospital Stanford, where Carvalho is chief of obstetric anesthesia.

“The good news is that cardiac arrest in pregnancy is very rare, and also that rates of survival are higher than for the non-pregnant population,” Lipman said. Only about one in every 20,000 women with access to modern obstetric care experiences cardiac arrest while pregnant. Higher survival among pregnant patients may be partly due, he said, to the fact that many maternal cardiac arrests are witnessed: They tend to occur during labor or delivery, when the woman is already in a hospital and being closely monitored by trained medical staff who can begin CPR right away.

Photo by bethanykphotography (https://www.flickr.com/photos/bethykae/)
Mark Hlatky Receives an American Heart Association Lifetime Achievement Award

The American Heart Association Scientific Council Lifetime Achievement Awards recognize contributions to the fields of cardiovascular disease and stroke over a sustained period. Recipients of these awards exemplify excellence and are representatives of the best in their fields.

In June, Cardiovascular Institute member, Mark Hlatky, MD, Professor and Director of Stanford-Kaiser Cardiovascular Outcomes Research Center, was honored at the Quality of Care and Outcomes Research 2014 scientific conference in Baltimore. He was recognized for his significant long-term contribution to outcomes research and the improvement of cardiovascular care.

Dr. Hlatky’s research focuses on evidence-based medicine and cost-effectiveness analysis. He introduces data collection about economic and quality of life endpoints in several randomized trials, principally trials of therapies for cardiovascular disease (coronary angioplasty, stents and bypass surgery; diabetes management).

“I am interested in determining what ‘works’ in medical care, whether it provides enough value to be worth the money we spend on it, and how to foster the adoption of effective and efficient practices,” Hlatky said.

Mark Hlatky

Considering the Costs of Treatment While Making Clinical Decisions by Paul Costello

“...costs are becoming a real problem for patients...and physicians and their organizations need to acknowledge that.”

-- Paul Heidenreich, MD

The headline of the front page New York Times article caught my attention: “Cost of Treatment May Influence Doctors.” The piece read in part:

Saying they can no longer ignore the rising prices of health care, some of the most influential medical groups in the nation are recommending that doctors weigh the costs, not just the effectiveness of treatments, as they make decisions about patient care.

The shift, little noticed outside the medical establishment but already controversial inside it, suggests that doctors are starting to redefine their roles, from being concerned exclusively about individual patients to exerting influence on how health care dollars are spent.

I discovered that one of Stanford’s cardiologists, Paul Heidenreich, MD, was a co-chair of the policy review that led to new guidelines from the American College of Cardiology and the American Heart Association. I thought it would be interesting to delve deeper in a 1:2:1 podcast with Heidenreich about why, as he told the Times, “we couldn’t go on just ignoring costs.” Did escalating health-care costs that are consuming GDP spur the action? Are these guidelines a threat to individual decision-making between a physician and patient? And, what role do patients have in these decisions? Shouldn’t they be included in potential key life-and-death verdicts?

I was also especially intrigued by a quote from the societies’ paper outlining the changes: “Protecting patients from financial ruin is fundamental to the precept of ‘do not harm.’” Hmm...a new take on the Hippocratic Oath that I’ve never considered.

For podcast: http://goo.gl/tg8V43

For New York Times article: http://goo.gl/UgAcBo

Stanford Cardiovascular Institute

2013-2014 Report

Download: http://goo.gl/4zj3aw

Stanford Magazine

Special Report: Mysteries of the Heart

Download: http://goo.gl/kkNl4m
**New Assistant Director for Cardiovascular Institute**

Ingrid Ibarra, PhD, recently joined the Stanford Cardiovascular Institute as Assistant Director. Dr. Ibarra earned a BS degree in Biochemistry and minored in Philosophy from Stony Brook University in New York. She received a PhD in Genetics, cloning small RNAs from stem cells and developing genetic tools for sensing microRNA activity at Cold Spring Harbor with Greg Hannon, PhD.

In 2011, Dr. Ibarra joined Stanford School of Medicine to work on stem cell migration with Irv Weissman, MD, Director of the Stanford Stem Cell Biology and Regenerative Medicine Institute.

The Stanford Cardiovascular Institute was founded 10 years ago in 2004 and now has a membership comprised of approximately 500 researchers, physicians, and students. Dr. Ibarra will play a key role in growing the Cardiovascular Institute and implementing strategies that foster interdisciplinary research and impact the next generation of cardiovascular innovations.

**A New Era for Stem Cells in Cardiac Medicine by Krista Conger**

Henry Ford was lauded for his use of the assembly line, which allowed the rapid, reliable and uniform production of over 15 million Model-T automobiles. By codifying each step of production and using identical, interchangeable parts, he brought car ownership within reach of the average American and changed the face of our country.

Now Stanford cardiologist Joseph Wu, MD, PhD, and Instructor Paul Burridge, PhD, have done something similar with stem cells. They’ve devised a way to create large numbers of heart muscle cells called cardiomyocytes from stem cells without using human or animal-derived products, which can vary in composition and concentration among batches. Their technique was published in Nature Methods.

Wu, who is the director of the Stanford Cardiovascular Institute, explained to me in an e-mail: “Due to their chemically defined nature, this system is highly reproducible, massively scalable and substantially reduces costs to allow the production of billions of cardiomyocytes matching a specific patient’s heart phenotype.”

Chemically defined cell culture means that scientists know exactly what (and how much) is in the liquid in which the cells are grown.

The researchers found they were able to produce about 100 cardiomyocytes for every one stem cell by following a systematic series of steps and using a growing medium that contained just three well-defined components. They showed the technique worked on 11 different batches of induced pluripotent stem cells. The cardiomyocytes were more than 95 percent pure, making it easier to get large numbers of cells to study disease processes or to test the effects of compounds during drug development.

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**Jonathan Fox appointed CVI Consulting Professor**

The Stanford Cardiovascular Institute has appointed Jonathan Fox, MD, PhD, as a consulting professor.

Dr. Fox received his BA (Biology), PhD (Pathology), and MD degrees from the University of Chicago. He completed postgraduate training in internal medicine and cardiology at Duke University, where he worked in the laboratory of Dr Judith Swain, studying myocyte cell biology and growth factor signal transduction. Following his postgraduate training, Dr. Fox was appointed Assistant Professor of Medicine (Cardiology) at the University of Pennsylvania. There he combined his interest in atherosclerosis with his work in myocyte cell biology to craft an independent research program in vascular biology, focusing on the role of growth factors, cellular signaling, and programmed cell death in atherogenesis.

In 1998, Dr. Fox was recruited to SmithKline Beecham Pharmaceuticals’ Clinical Pharmacology and Experimental Medicine group. From there he has gone on to work at Merck Research Laboratories; and AstraZeneca, where he served as Vice President, Clinical Development.

In January, 2013 Dr. Fox was appointed Chief Medical Officer at MyoKardia, a Bay Area biotechnology company developing novel therapeutics targeting genetic cardiomyopathies.

He looks forward to bringing his wide range of expertise to his role as consulting faculty at the CVI.

"This technique solves an important hurdle for the use of iPS-derived heart cells. In order to fully realize the potential of these cells in drug screening and cell therapy, it’s necessary to be able to reliably generate large numbers at low cost."

-- Joseph C. Wu, MD, PhD
Cristina M. Alvira, MD, Assistant Professor of Pediatrics (Critical Care), received a National Institute of Health (NIH) award in May for Novel Molecular Mechanisms Regulating Postnatal Pulmonary Angiogenesis.

Maria Grazia Roncarolo, PhD, former scientific director of the San Raffaele Scientific Institute in Milan, Italy, joined the Stanford School of Medicine as Professor of Pediatrics. She will lead efforts to translate scientific discoveries in regenerative medicine into novel patient therapies, including treatments based on stem cells and gene therapy.

Daniel Bernstein, MD, a Alfred Woodley Salter and Mabel Smith Salter Endowed Professor in Pediatrics, was awarded a grant from Children’s Cardiomyopathy Foundation for iPSC-Derived Cardiomyocytes in Left Ventricular Non-Compaction Cardiomyopathy last March. For more: [http://goo.gl/aBMtpQ](http://goo.gl/aBMtpQ)

Nicholas Leeper

Thomas Quertermous, MD, the William G. Irwin Professor in Cardiovascular Medicine, received a National Institute of Health award to study identification of causal coronary heart disease variation in smooth muscle cells.

Marcia L. Stefanick, PhD, Professor (Research) of Medicine (Stanford Prevention Research Center) and of Obstetrics and Gynecology received a grant from California Pacific Medical Center Research Institute for Determination of Skeletal Muscle Mass by Creatine Dilution.

Sean M. Wu, MD, PhD, received the 2014 David Lawrence Stein Award from the American Heart Association Western Region Affiliate. The award is given in recognition of his grant, “Transcription Factor Interplay at the Nkx2.5 Cardiac Enhancer,” which the AHA scored the highest among the hundreds it receives from the Western Region Affiliate for consideration each year.

Marcia L. Stefanick

Ronald Dalman, MD, the Dr. Walter C. Chidester Professor of Surgery and Chief of the Division of Vascular Surgery, has joined the editorial board of Arteriosclerosis, Thrombosis, and Vascular Biology (ATVB). ATVB has an impact factor of 6.3, ranking #4 in all journals for peripheral vascular disease, and #5 in hematology journals.
Karim Sallam, MD, an Instructor in Cardiology, is leading the Stanford Cardiovascular Institute Cardiac iPSC biobank effort. The goal is to collect, generate, and catalog 1,000 iPSC lines from a variety of cardiovascular diseases.

Fan Yang, PhD, Assistant Professor of Bioengineering and Orthopaedic Surgery was awarded a National Science Foundation award for a project entitled ‘Engineering Three-dimensional Stem Cell Niche with Independently Tunable Biochemical and Mechanical Properties.’

Stanford Cardiovascular Seed Grants
Deadline: August 1, 2014
$15,000 - $40,000
Applications: http://goo.gl/PGZtmj

To learn more about how you can support the Stanford Cardiovascular Institute please contact Joseph Wu (Director of CVI) or Cathy Hutton (Senior Associate Director, Medical Center Development).

http://medicalgiving.stanford.edu

6th Annual NHLBI Progenitor Cell Biology Consortium Meeting
September 29-30, 2014
Li Ka Shing Center for Learning & Knowledge
Stanford University
Sponsored by the NIH, the Stanford Cardiovascular Institute, the Stanford Institute for Stem Cell Biology and Regenerative Medicine, and the Stanford Vera Moulton Wall Center for Pulmonary Vascular Disease

Campaign for Stanford Medicine
March: 101 publications


**To test or not to test, that is the question.** Hlatky MA. *Circ Cardiovasc Qual Outcomes*. 2014 Mar 1; 7(2): 207-8.


For the complete list of April publications visit: http://cvi.stanford.edu/research/publications/apr14pubs.html


Faculty Funding Opportunities

**DoD Congressionally Direct Medical Research Program**
- **Amount:** $200,000 up to 18 months
- **Deadline:** July 16, 2014
- **Link:** DoD Award Discovery Award

**Cardiovascular Institute**
- **Amount:** $15,000-40,000 for 1 year
- **Deadline:** August 1, 2014
- **Link:** CVI Seed Grant

American Heart Association

**Beginning Grant-in-Aid**
- **Amount:** $140,000 over 2 years
- **Deadline:** July 23, 2014
- **Link:** AHA Beginning-Grant-in-Aid

**Innovative Research Grant**
- **Amount:** $75,000 over 2 years
- **Deadline:** July 24, 2014
- **Link:** AHA Innovative Grant

**Established Investigator Award**
- **Amount:** $400,000 over 5 years
- **Deadline:** July 24, 2014
- **Link:** AHA Established Investigator Award

**Postdoctoral Fellowship**
- **Amount:** $100,000 over 2 years
- **Deadline:** July 23, 2014
- **Link:** AHA Postdoctoral

**National Scientist Development Grant**
- **Amount:** $308,000 over 4 years
- **Deadline:** July 24, 2014
- **Link:** AHA Scientist-Development-Grant

**Ruth L. Kirschstein National Research Service Award**
- **Deadline:** August 8, 2014
- **Link:** PA-14-149

Postdoctoral Funding Opportunities

**American Heart Association**

**Mentored Clinical and Population Research**
- **Amount:** $140,000 - $154,000 over 2 years
- **Deadline:** July 23, 2014 (Western); July 24, 2014 (National)
- **Link:** AHA Mentored-Clinical-and-Population-Research-Award

**Postdoctoral Fellowship**
- **Amount:** $100,000 over 2 years
- **Deadline:** July 23, 2014
- **Link:** AHA Postdoctoral

**National Institute of Health**

**Ruth L. Kirschstein National Research Service Award**
- **Deadline:** August 8, 2014
- **Link:** PA-14-149

**Walter V. & Idun Berry Postdoctoral Fellowship**
- **Amount:** $55,000 for 1 year
- **Deadline:** July 14, 2014
- **Link:** Berry Fellowship

**Translational Research Applied Medicine**
- **Amount:** $5,000 - $30,000 for 1 year
- **Deadline:** July 15, 2014
- **Link:** TRAM Pilot Grant

**Katherine McCormick Committee to Support Women in Academic Medicine**
- **Amount:** $35,000 for 1 year
- **Deadline:** July 7, 2014
- **Link:** McCormick Fellowship

"Cardiovascular Disease" is now searchable in Stanford’s Research Management Group’s Funding Information resource webpage: [http://med.stanford.edu/rmg/funding/](http://med.stanford.edu/rmg/funding/).
### 2014-2015 CVI Frontiers in Cardiovascular Science

**12 noon - 1 p.m., Tuesdays, Starting Sept. 9, 2014, Li Ka Shing Center**

*Public is Welcome. For information please e-mail preston@stanford.edu*

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<td>Stanford, Director Cardiac Electrophysiology VA Palo Alto</td>
<td>President and Medical Director, Texas Heart Institute</td>
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<td>Junichi Sadoshima, MD</td>
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<td>Professor, Cell Biology &amp; Molecular Medicine, Rutgers U.</td>
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### Cardiovascular Conferences

**AHA Basic Cardiovascular Sciences (BCVS)**

*July 14-17, 2014*

Las Vegas, NV

Link: [http://goo.gl/tl5fV2](http://goo.gl/tl5fV2)

**Cold Spring Harbor Asia: Disease Modeling & Drug Discovery**

*August 25-29, 2014*

Suzhou, China

Link: [http://goo.gl/4Gnw7Y](http://goo.gl/4Gnw7Y)

**European Society of Cardiology (ESC) Congress**

*August 30-September 3, 2014*

Barcelona, Spain

Link: [http://goo.gl/FmHZVL](http://goo.gl/FmHZVL)

**Heart Failure Society of America Annual Scientific Meeting**

*September 14-17, 2014*

Las Vegas, NV

Link: [http://goo.gl/SehanB](http://goo.gl/SehanB)

**Stanford’s 3rd Transcatheter Heart Valve Summit**

*September 20, 2014*

Francis C. Arrillaga Alumni Center, Stanford
Joseph C. Wu, MD, PhD
Director, Stanford Cardiovascular Institute
Professor, Dept. of Medicine (Cardiovascular) and Radiology

Robert A. Harrington, MD
Arthur L. Bloomfield Professor of Medicine
Chair, Dept. of Medicine

Joseph Wu

Ronald Dalman, MD
Walter C. and Elsa R. Chidester Professor of Surgery
Chief, Division of Vascular Surgery

Dominik Fleischmann, MD
Professor, Dept. of Radiology
Chief, Cardiovascular Imaging

Kenneth Mahaffey, MD
Professor, Dept. of Medicine
Vice Chair of Medicine for Clinical Research

Mark Nicolls, MD
Associate Professor, Dept. of Medicine
Chief, Pulmonary and Critical Care Medicine

Tom Quertermous, MD
William G. Irwin Professor of Medicine
Co-Chief (Research), Division of Cardiovascular Medicine

Marlene Rabinovitch, MD
Dwight and Vera Dunlevie Professor in Pediatric Cardiology

Stephen J. Roth MD, MPH
Professor and Chief, Pediatric Cardiology
Director, Children’s Heart Center

Michael Snyder, PhD
Professor and Chair, Dept. of Genetics
Director, Stanford Center for Genomics and Personalized Medicine

Y. Joseph Woo, MD
Norman E. Shumway Professor in Cardiothoracic Surgery
Chair Dept. of Cardiothoracic Surgery

Alan Yeung, MD
Li Ka Shing Professor of Medicine
Co-Chief (Clinical), Division of Cardiovascular Medicine

Paul Yock, MD
Martha Meier Weiland Professor of Bioengineering and Medicine; and Professor, by courtesy, of Mechanical Engineering
Director of Biodesign
You are Invited to Attend the 2014 Stanford Cardiovascular Institute Annual Retreat

Tuesday, Dec. 2, 2014

Keynote Speaker: Douglas L. Mann, MD
Chief, Cardiovascular Division
Washington University School of Medicine

REGISTER: http://goo.gl/yoH7bP