A Letter from CVI Director Joseph C. Wu

Stanford Cardiovascular Institute (CVI) was established in 2004 to bring together students, scientists, engineers, and some of the brightest cardiologists and cardiac surgeons in the field. Together, the members of the Cardiovascular Institute embody a valuable collaborative spirit and an open-minded philosophy that have driven innovation and yielded incredible biomedical advances.

2021 was a challenging year in many ways, as the COVID-19 pandemic continued to create unprecedented challenges and we adjusted towards the “new normal”. It has forced us to learn and adapt in all facets of our life, and we have learned how to pursue science under new and changing circumstances. In the midst of the trials and adversity we have faced there is also great opportunity. Over the past year, CVI members have published over 2,000 articles in leading scientific journals. This report will highlight the innovation, accomplishments, and progress from our members from our almost 900 members that took place over 2021.

CVI facilitates an active exchange of ideas across disciplines and training levels. To achieve this we foster a diverse and inclusive environment. Our Frontiers of Cardiovascular Science seminar series features international leaders in the field, and we also host an annual Stanford Drug Discovery Symposium that attracts diverse leaders in academia, industry, and government. We have moved into the new Biomedical Innovations Building, designed to be a hub for cardiovascular scientists to work side-by-side and actively collaborate. We are continuing to lead important conversations within and outside the cardiovascular community at Stanford to promote fruitful collaborations across all facets of science.

The core strength of CVI comes from our talented students and postdoctoral and clinical fellows. Their training and career development are a top priority for the Institute, and we are fortunate to support numerous fellows on NIH training grants. In 2021, CVI trainees enthusiastically participated in a hybrid in-person and virtual Early Career Research Symposium.

As an academic institution, we are committed to ensure the professional growth and the development of scientific curiosity among all of our trainees. To that end, we appreciate greatly the generous endowment of the Dorothy Dee and Marjorie Helene Boring Trust, which supports Stanford medical students dedicated to cardiovascular research, and the Victor J. Dzau Distinguished Lecture in Cardiovascular Medicine dedicated to Dr. Dzau’s pioneering work in cardiovascular medicine. In partnership with the Maternal and Child Health Research Institute and the Steven M. Gootter Foundation, the CVI awarded three seed grants to launch the most creative and impactful projects that are in line with the Cardiovascular Institute’s innovative spirit. We were also extremely fortunate to receive a generous endowment from Joan and Stanford I. Weill to provide support for faculty selected as CVI Weill Scholars, based on the merits of their research and academic scholarship.

As the Cardiovascular Institute Director, I am tremendously proud of the transformative advances in knowledge and novel approaches to cardiovascular disease therapy that our members and collaborators have been able to achieve and look forward to continuing our success in 2022.
A Letter from Dean Lloyd B. Minor

The Stanford Cardiovascular Institute had another remarkable year. The institute—despite the continued challenges of the COVID-19 pandemic—exceeded its own high standards of excellence and innovation to fulfill its mission to improve cardiovascular health and develop the leaders of tomorrow.

I want to thank Joseph C. Wu, MD, PhD, the Simon H. Stertzer, MD, Professor of Cardiovascular Medicine and of Radiology, for his visionary leadership. CVI’s preeminence is fueled by Dr. Wu’s focus on interdisciplinary collaboration that brings together a diverse, talented team of surgeons, scientists, clinicians, engineers, fellows, and students.

CVI’s profound impact is demonstrated daily through world-class patient care, cutting-edge research, and rigorous education. Here are just a few highlights from this past year:

• Institute members addressed COVID-19’s continued public health threat with research focused on pre-symptomatic detection using wearables, testing the safety of mRNA-based vaccines, and better understanding the disparities in COVID-19 outcomes in Black and Hispanic populations.

• CVI researchers, recognizing the inequities of cardiovascular treatment, studied how to improve health care for minority groups.

• CVI continues to advance precision medicine through cutting-edge collaborative genomics research, studies on genetic profiling, and innovations in drug development.

• CVI will launch a landmark first-in-human, regenerative medicine clinical trial to see if stem cells will improve function in people with damaged hearts.

CVI is an innovation engine and its continued focus on collaboration is a major factor. This mindset brought together more than 7,000 people from industry and academia for the Institute’s virtual 5th Annual Drug Discovery Symposium to share insights, ideas, and recent discoveries. Another 100 early-career investigators participated in the Early Career Research Symposium to share findings and promote career development.

I am also very proud of CVI’s undergraduate summer program, which this year expanded to host 28 students for an intense 10-week virtual program. More than 80% of the students are from groups underrepresented in medicine, a hopeful number as we push to diversify doctors’ offices and research labs.

I am excited to see what the Stanford Cardiovascular Institute will accomplish in 2022 as it continues to lead the field of cardiovascular medicine.
CVI Scientists Share Cutting Edge Scientific and Medical Discoveries

Over the past year, CVI scientists have published over 2,000 articles in leading scientific journals. CVI science is wide-ranging, covering topics as disparate as 3D Printing of Microgel Scaffolds to a Worldwide Survey of COVID-19-Associated Arrhythmias. CVI researcher output has remained continuous throughout the year. A subset of the high caliber publications CVI members work is shared in, including Circulation, Nature Communications, and the Journal of the American College of Cardiology, is listed below.

Some of the ground-breaking studies that were published by CVI scientists in 2021 include: studies on how to improve health care for minority groups, new treatments for heart failure, the mechanisms underlying pulmonary arterial hypertension, treatment innovations for abdominal aortic aneurysms, the problems with pharmacogenetics, better MRI methods, the relationship between COVID-19 and allergies, and ways to increase access to heart transplants.
Virtual Frontiers Seminar Series Shares Knowledge Across the World

In 2021, CVI’s flagship seminar series Frontiers in Cardiovascular Science hosted 39 phenomenal national and international speakers, who shared their research with over 1,300 virtual attendees. All Frontiers seminars are open to the public and CVI maintains a digital library of all of their past seminars that is publicly available.

Inaugural

VICTOR J. DZAU
DISTINGUISHED LECTURE IN CARDIOVASCULAR MEDICINE

On December 8th, 2021, Eugene Braunwald, MD, presented the inaugural Victor J. Dzau Distinguished Lecture in Cardiovascular Medicine. The annual lecture series honors the extensive contributions of Dr. Victor Dzau to the field of cardiovascular medicine.

Dr. Braunwald is the Distinguished Hersey Professor of Medicine at Harvard Medical School, and Chair Emeritus of the Department of Medicine and Founding Chair of the TIMI Study Group at Brigham and Women’s Hospital. To an audience of over 900, Dr. Braunwald presented on “The War Against Heart Failure,” in which he honored the legacy of Dr. Dzau, summarized the history of advances in the field, and highlighted four major paradigm shifts in heart failure treatment including the recent discovery of SGLT2 inhibitors. The presentation was followed by lively Q&A session featuring Dr. Braunwald, Dr. Victor Dzau, and Stanford Cardiovascular Institute Director, Dr. Joseph C. Wu.

Victor J. Dzau, MD, is an internationally acclaimed leader and physician scientist who has performed seminal research in cardiovascular medicine and genetics. His work laid the foundation for the development of the class of lifesaving medications used globally to treat hypertension and heart failure. Dr. Dzau is President of the U.S. National Academy of Medicine (NAM), Vice Chair of the U.S. National Research Council, and Chancellor Emeritus and James B. Duke Distinguished Professor of Medicine at Duke University.

Nominations Open for 2022 Distinguished Lecturer

Find Out More!
In April of 2021, CVI launched a new Strategic Research Development website designed to support CVI researchers at all career stages in their research efforts. This resource provides timelines, template documents, contact information, and links to help investigators prepare their proposals and have the strongest possibility of success.

### CVI Strategic Research Development Support

Strategic research development means providing tailored scientific feedback on individual proposals, supporting navigation of Stanford and funding agency application processes, and helping identify new funding opportunities for researchers. Of the 34 proposals supported the CVI’s Strategic Research Development Office in 2021, 12 (35%) have already been funded, with the majority of proposal outcomes still pending. Strategic research support is geared toward trainees with limited experience writing proposals, new faculty embarking on their first R-level research grants, and research groups seeking to collaborate on large proposals such as NIH program project grants (PPGs) or UM1 cooperative agreements.

**Amanda Chase, PhD**  
Associate Director  
Strategic Research Development

**Yamini Dwarakanath**  
Research Administrator

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<th>CVI Strategic Research Development Support</th>
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<td>Research Grants</td>
<td>Collaborative Grants</td>
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<tr>
<td>Not Funded</td>
<td>Funding Pending</td>
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Applications Supported by CVI Research Development

- Not Funded
- Funding Pending
- Funded
Current Active Research Managed by CVI

Over the past 12 months, CVI investigators have been very successful in maintaining and securing funding for research projects, equipment grants, contracts, career development awards, fellowships and training grants. To date, 25% of grants, career development awards, and fellowships submitted and administered through CVI in 2021 have been awarded, with the outcomes of many proposals still pending. Notably, one of these awards was for the landmark first US clinical trial using stem cells to treat heart failure. CVI members also have several active multi-investigator grants, designed to foster new discoveries through structured collaborative work. In addition, our early career investigators—graduate students, postdocs, residents, and instructors—have been very successful in obtaining fellowship awards for specific research projects and career development awards to propel them into the next stages of their careers as independent investigators.
Education
CVI Recruited 28 Exceptional Students to its 2021 Undergraduate Summer Research Program

In 2021, over 300 students from around the world applied to participate in the CVI Undergraduate Summer Research Program. With funding from an NIH R25 award, an AHA institutional award, an AHA SURE pilot program, and additional support from CVI itself, 28 students were accepted into the program. From June 1st through August 10th they participated in 10 weeks of intense virtual cardiovascular and pulmonary research.

The students not only pursued independent research projects from data analysis to experiments, but, through partnerships with Boston University, Northwestern University, and Vanderbilt University, they also had the opportunity to participate in 90 events—64 of which were hosted by Stanford. The students’ summers culminated in a final symposium presentation during which they shared the new discoveries they made with their research projects.

View Presentations
CVI Undergraduate Summer Research Students Experience Significant Gains in Knowledge, Skills, and Confidence

87% of our students agreed that participation in the program increased their likelihood to pursue a career in STEM. In terms of gains: we compared self-evaluations of students' research skills and confidence before and after they participated in the program. Averaging responses across 46 unique traits for each student, we found a significant increase in students' self-reported assessment of their own skills, knowledge and confidence to pursue science after participation in our program.

The CVI Undergraduate Summer Research Program has helped shape my curiosity and my decision to continue forward with obtaining a higher education. - Aaron Panduro

I got to form a close professional relationship with my mentor and getting this experience has helped me grow much more than I anticipated. I've never done research before but now I can confidently say that I have what it takes to do science. - Chisomaga Ekwueme

I valued the different exposure I had to the awesome, cutting-edge research being done at Stanford through the seminars because it made me even more excited about research and science. - Britney Joy Sison

Rigorous and Reproducible Research at CVI

By collaborating with the Stanford Program on Research Rigor and Reproducibility, CVI was able to pilot a new initiative to instill training in rigorous and reproducible research methods in students enrolled in our undergraduate summer research program. Four research teams, led by CVI early career scientists and staff, worked with 16 students to perform meta-science studies on cardiovascular research publications using open and reproducible methods. In addition, all of the students participated in seminars and workshops on the importance of reproducibility, data sharing, pre-registration, pre-prints, and the peer review process.

Research Projects

| Rigor in the study design of animal models for cardiothoracic surgery research - Led by Danielle Mullis | ▶ |
| Analysis of sex as a biological variable in cardiovascular research - Led by Carlos Vera, PhD | ▶ |
| Evaluation of primary outcome qualities in human randomized controlled trials - Led by Brian Wayda, MD | ▶ |
| Accessibility and Reproducible Research Practices in Cardiovascular Literature - Led by Adrienne Mueller, PhD | ▶ |

I understand the concept of scientific reproducibility

I understand the concept of open science

I am comfortable assessing whether a publication confirms to open or reproducible practices

I am confident in my ability to use open and reproducible methods in my own research

I think that more needs to be done to increase scientific reproducibility

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<th>Agree</th>
<th>Neither Agree nor Disagree/ I don't know</th>
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<td>Disagree</td>
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Bar charts showing the distribution of responses among students.
CVI T32 Postdoctoral and R38 Resident Trainees in 2021

Below are 20 postdoctoral and resident fellows who participated in CVI's four NIH-funded T32 and R38 training programs in 2021.

Tom Alsaigh, MD
Precision Nano-therapies for Atherosclerotic Disease
Lab of Dr. Nicholas Leeper
Started Training

Colwyn Headley, PhD
Mitochondrial Phoenix: The Dysfunction, Transplantation, and Rejuvenation of Mitochondria in Cardiovascular Disease
Lab of Dr. Philip Tsao
Started Training

Krishna Martinez-Singh, MD
The use of FlowMet-R Technology to Predict Wound Healing in Critical Limb Ischemia Patients in a Wound Care Center Setting
Lab of Dr. Venita Chandra
Started Training

Ebrahim Mostafavi, PhD
Development of In Vitro Clinical Trials in a Dish for Cardiovascular Disease modeling and Drug Screening
Lab of Dr. Joseph Wu
Continued Training

Fatemeh Ostadhossein, PhD
Smart Nanoprobes for the Detection of Hypoxic Regions in Ischemia, Teratoma Formation, and Stem Cell Apoptosis
Lab of Dr. Joseph Wu
Completed Training

Sara Ranjbarvaziri, PhD
Investigating the Effect of Altered Cardiac Energetics in Hypertrophic Cardiomyopathy
Lab of Daniel Bernstein
Completed Training

David Staudt, MD, PhD
Using Human Induced Pluripotent Stem Cell Models of Genetic Cardiomyopathies to Elucidate Molecular Contributors to Diastolic Dysfunction
Lab of Dr. Mark Mercola
Completed Training

Ken Tran, MD
Patient Specific Computational Hemodynamic Performance Modelling in Complex EVAR
Lab of Dr. Jason Lee
Completed Training

Rahel Woldeyes, PhD
Visualizing the Structures and Subcellular Organization of Macromolecules Inside Cardiomyocytes Using Cryo-Electron Tomography
Lab of Dr. Wah Chiu
Continued Training

Leila Beach, MD
Novel Risk Factors for Right Ventricular Failure (RVF) Following Left Ventricular Assist Device Implant
Lab of Dr. Matthew Wheeler
Completed Training

Marcella Martin, PhD
Defining the Role of Endothelial Cell Dysfunction in William’s Syndrome Using iPSCs
Lab of Dr. Marlene Rabinovitch
Completed Training

Domenico Mastrodicosa, MD
High-Temporal and Spatial Resolution 4D-CT Angiography in Patients with Aortic Dissection
Lab of Dr. Dominik Fleischmann
Continued Training

Shaneice Mitchell, PhD
Targeting the Mechanisms of Age-related Clonal Hematopoiesis Impact on Cardiovascular Diseases
Lab of Dr. Siddartha Jaiswal
Continued Training

Oluwatomisin "Tomi" Obafemi, MD
High Resolution Mapping of Ventricular Tachycardia Using a Langendorff Model
Lab of Dr. Anson Lee
Started Training

Heyjun Park, PhD
Sleep Optimization May Improve Adverse Glucose Outcomes Among Individuals with Prediabetes or Type 2 Diabetes Who are at Risk for Cardiovascular Diseases / Lab of Dr. Michael Snyder
Continued Training

Katharina Schimmel, PhD
Elucidating the Pathogenesis of Arteriovenous Malformations
Lab of Dr. Edda Spiekerkoetter
Started Training

Jason Szafron, PhD
Understanding Disease Progression in Pediatric Pulmonary Hypertension through Patient-specific Simulations of Vascular Growth and Remodeling
Lab of Dr. Alison Marsden
Started Training

Brian Wayda, MD, MPH
Narrowing the Gap Between Supply and Demand in Heart Transplantation
Lab of Dr. Kiran Khush
Completed Training

Qian Yu, PhD
Mechanisms Underlying CIP4-CaNAβ Signaling in Myocytes
Lab of Dr. Michael Kapiloff
Completed Training

Multi-Disciplinary Training Program in Cardiovascular Imaging
Research Training in Myocardial Biology
Mechanisms and Innovations in Cardiovascular Disease T32 Training Grant
R38 Stanford Integrated Cardiovascular / Pulmonary Residency Research Training Program
CVI Early Career Scientists Establish Epigenetics Series

Starting in June of 2021, CVI postdocs Wilson Wen, PhD, and Lichao Liu, PhD, launched a new seminar series on cardiovascular epigenetics. The series recruits early career scientist speakers from across the nation to share their latest discoveries in the cutting-edge field of epigenetics. The CVI Epigenetics seminars run monthly via Zoom and hosted six events in 2021.

Cardiac Cell Type-Specific Gene Regulatory Programs and Disease Risk Association  
James Hocker, UCSD

A Transcriptional Switch Governs Fibroblast Activation in Heart Disease  
Michael Alexanian, PhD, Gladstone Institute, UCSF

Lysine Myristoylation in Cardiometabolic Disease  
Emma Louise Robinson, PhD, University of Colorado

Spatial Transcriptomics and Epigenome sequencing at Tissue Scale and Cellular Level  
Yanxiang Deng, PhD, Yale University

Interpreting type 1 diabetes risk with genetics and single-cell epigenomics  
Joshua Chiou, PhD, Pfizer

Chromatin topology dynamics in heart development and disease  
Alessandro Bertero, PhD, Università di Torino

CVI Launches Two New Courses on Drug Development

In 2021, four leaders of industry partnered with CVI to establish two courses on the Drug Development process, with an emphasis on cardiovascular applications. MED225, which runs in Spring Quarter, offers an overview of the drug development process: from first concept to the clinical application. MED227, which runs in Fall Quarter, covers key issues in regulation and commercialization. Throughout both terms, the course directors have enlisted leaders from the FDA, industry, and academia to share their insights into the drug development process.

MED225: Drug Development - From a Concept to the Clinic will be offered again in Spring 2022 as a one-credit course, starting March 29th. We hope to see many of you there!
Higher education has the mission to advance human welfare in a rapidly changing world. Institutions that are truly inclusive and embrace and advance diversity everywhere—in every program, every school and every area of operation—will be the most successful. Stanford must become one of those institutions! • Recognizing this, we must clearly articulate why diversity and inclusion are important to us, how these values support the mission of the university, and what goals we have set to advance our commitment to them. • Why is diversity important? Diversity is critical to our research and educational missions. • At its core, a university is devoted to the discovery and transmission of knowledge. The enterprise cannot be limited in its methods and ways of thinking, or confined to one individual’s or a single community’s experiences. To solve complex social problems, to discover the next breakthrough in science, or to reach new heights of artistic expression, we must bring a broad range of ideas and approaches. • At Stanford, we strive to ensure that a diversity of cultures, races and ethnicities, genders, political and religious beliefs, physical and learning differences, sexual orientations and identities is thriving on our campus. Such diversity will inspire new angles of inquiry, new modes of analysis, new discoveries and new solutions. • To advance education, it is essential to be exposed to views and cultures other than one’s own and to have one’s opinions and assumptions challenged. Such engagement expands our horizons, enables understanding across difference, prevents complacency and promotes intellectual breadth. • Our diversity ensures our strength as an intellectual community. In today’s world, diversity represents the key to excellence and achievement. - Provost Persis Drell
Diversity, Equity, and Inclusion in 2021 and 2022

The Stanford Cardiovascular Institute is committed to enacting meaningful change and fostering a more just, equitable, and inclusive community. Our goal is to pursue meaningful practices that support diversity, equity, and inclusion in recruitment, mentorship, and work environments. Below is a brief update on these efforts in 2021 and our vision to expand them in 2022.

EDUCATE

- **Raising Awareness among CVI Steering Committee**
  - CVI’s monthly steering committee meetings now include a dedicated segment about upcoming DEI opportunities.
- **Training for Staff Members**
  - CVI staff participated in workshops and digital courses about psychological safety and being an upstander.
- **Mentorship Training for Summer Undergraduates**
  - Undergraduate student Mentors received additional training in how to support individuals from disparate backgrounds.

SUPPORT

- **Launched MAVENS**
  - MAVENS is a unique program of mentorship and sponsorship designed to bolster the pipeline of women in academic medicine.
- **Expanded Undergraduate Summer Research Program**
  - By adjusting our funding and finding additional dollars, we increased the number of students we support by 25%.
- **Established an Outreach Travel Award**
  - This dedicated award ensures individuals from underrepresented backgrounds have opportunities to present their work.

ENGAGE

- **Leadership Meetings**
  - CVI leadership now meets monthly to discuss progress on DEI objectives.
- **Recruitment of Education and Outreach Support**
  - To help ensure CVI’s DEI objectives will be met, a new administrative support role was created and filled.
- **Cross-Organization Collaboration**
  - CVI started collaborating with DEI representatives in other departments through the Staff JEDI Collective and individual meetings.

EVALUATE

- **Launched Annual CVI Recognition Award**
  - In evaluating existing efforts, we recognized those who have already contributed significantly to support our community.
- **Administered Diversity Engagement Survey**
  - We collected information directly from our members about where they think our culture is thriving, and where it is faltering.
- **Quantified Diversity at CVI**
  - We reviewed the individuals who make up our committees and our members — identifying gaps in representation.

2021

2022

EDUCATE

- **DEI-Focused Research Development Support**
  - CVI’s Research Development team will proactively inform the CVI community about research and career support opportunities available to individuals from underrepresented backgrounds.
- **Training for Faculty Members**
  - Introduce educational community-building activities into CVI steering committee meetings.
- **Create an Onboarding Process for CVI Members**
  - To ensure individuals who join the institute are quickly integrated into the CVI community and know where to seek support.

SUPPORT

- **Expand MAVENS**
  - Provide additional support opportunities to women at CVI through cohort meetings and travel sponsorship.
- **Training Opportunities for URM Undergraduate & MD Students**
  - Work with minority-serving institutions to provide research training to more students from underrepresented backgrounds.
- **Expand CVI Mentorship Program**
  - Encourage more CVI early career scientists to seek mentorship and ensure they have the support they need.

ENGAGE

- **Update Steering and Advisory Committees**
  - Invite individuals from backgrounds currently underrepresented among our leadership to participate in steering CVI.
- **Emphasize DEI in CVI-Supported Research**
  - Adjust the emphasis of our seed grant funding to encourage submissions that address diversity in their study plans.
- **Understand CVI Member Needs through Focus Groups**
  - Learn from CVI members directly about their concerns with CVI currently, and their aspirations for its future.
The mission of the Stanford Cardiovascular Institute’s Mentoring to AdVance womEN in Science (MAVENS) program is to inspire, empower, and support women in academic medicine throughout their career progression in order to create an integrated community of scientists. In 2021, the first cohort of MAVENS completed the program and moved on to high impact new positions in academia and industry. The program provided support, resources and motivation to help them pursue their goals.

June Rhee, MD
Assistant Professor, Department of Medicine, City of Hope National Cancer Center

“MAVENS really helped me to prioritize my academic and personal goals and helped me strategize and execute these goals. MAVENS also helped me to increase my visibility as well as expand my network.”

Seema Dangwal, PhD
Principal scientist, preclinical R&D at Elixir Medical Corp

“Stanford MAVENS program provided me an exceptionally supportive platform to learn and discuss both research and career-oriented matters with two independent mentors at Stanford.

Overall, I feel fortunate and thankful to find mentors with friendship that goes long way and looking forward to welcome new fellows in next year. I strongly recommend all eligible postdocs, instructors and scientists to apply for this program.”

CVI Leadership and Membership

The Stanford Cardiovascular Institute is comprised of almost 900 active members—from undergraduates, to senior research scientists, to professors’ emeritus. Almost half of CVI members are faculty, and representatives from this pool make up CVI’s steering committee and education committee. Ultimate oversight of CVI is provided by the institute’s Director, Professor Joseph C. Wu, MD, PhD, and the institute’s Director of Finance and Administration, Jason Irwin, MBA, and the institute’s mission is strongly guided by its faculty, early career, and staff members.

Monthly steering committee meetings are a forum for CVI leadership to discuss ongoing and future initiatives, and opportunities for collaboration. The CVI Education Committee meets quarterly to evaluate CVI’s educational initiatives, including its postdoctoral, resident, and undergraduate training programs, courses, and additional opportunities to support early career researchers. A subset of CVI administrative staff form a DEI group that meets monthly to identify and implement ways to increase diversity and improve CVI’s culture. In addition, in 2021, CVI formed an Early Career Committee consisting of postdocs, medical students, instructors and residents, to steer CVI’s programs for scientists in the early stages of their careers.
For Outstanding Service to the CVI Community

The annual Stanford Cardiovascular Institute (CVI) Recognition Award recognizes faculty members who continuously strive to improve the institute’s culture and community. With this award, CVI recognizes CVI faculty members whose efforts increase or celebrate the diversity of CVI members, contribute to fair and just practices that ensure CVI members thrive, and/or promote an environment of mutual respect, belonging, and inclusion at CVI. Each year, CVI issues two awards of $3,000 each to CVI-affiliated faculty who have made exceptional contributions to our community.

Vinicio de Jesus Perez, MD
Associate Professor of Medicine (Pulmonary and Critical Care Medicine)
Recognized for his efforts in mentorship, participation and directorship of diversity training grant programs, and in planning new initiatives to strengthen the CVI community.

Ronglih Liao, PhD
Professor of Medicine (Cardiovascular Medicine)
Recognized for her efforts towards promoting the career advancement of early career scientists, especially female and underrepresented minority trainees and junior faculty.

New CVI Staff to support Education, Outreach and Grant Finance

As CVI’s programs and initiatives expand, we have recruited additional staff to help realize our goals. Already an integral member of the Vera Moulton Wall Center at Stanford, Victoria Rodrigues, Graphic Designer and Web Author, started sharing effort with CVI in the Fall of 2021. Victoria will help our programs reach a wider audience. To help support CVI faculty research, Helen Lei joined the Finances team and will help manage many of CVI’s grants, awards, contracts, and accounts. CVI also created a new Education and Outreach Administrator position; filled by Micaela Harris in November of 2021. Micaela will help CVI grow our educational programs and support our current and forthcoming efforts to promote diversity, equity, and inclusion.

Introducing the CVI Early Career Committee

Giving Voice to Scientists at Early Career Stages

In March 2021, CVI assembled a group of medical students, postdocs, residents, and instructors who possess a keen desire to shape the future of the institute. The committee organized the 2021 Early Career Research Symposium, has re-shaped the CVI Early Career Research Roundtable and will be guiding, inspiring, and creating new opportunities for the next generation of cardiovascular scientists.

Through the Cristo Rey Work Study Program, in 2021 CVI also had the opportunity to work with Lizeth Reyes - an amazing 12th grader, who supports our DEI initiatives.
CVI AWARDS OUTSTANDING SCIENCE

CVI Seed Grant Awardees Autumn 2021

Anson Lee, MD
Assistant Professor of Cardiothoracic Surgery
Co-Investigators: Paul Wang, MD; Daniel Ennis, PhD; Sanjiv Narayan, MD, PhD; Oscar Abilez, MD, PhD; Phillip Yang, MD; Udi Nussinovitch, MD, PhD; Meghedi Babakhanian, PhD; Oluwatomisin Obafemi, MD

Understanding Ventricular Tachycardia: A Wholistic Approach Using Porcine and Isolated Perfused Human Heart Models
Research Funded by the Steven M. Gootter Foundation

Virginia Winn, MD, PhD
Associate Professor, Obstetrics and Gynecology
Co-Investigators: Ruth Lathi, MD; Brice Gaudilliére, MD, PhD; Nima Aghaeepour, PhD

Determining Early Maternal Immune Predictors of Preeclampsia
Research Funded by the Stanford Maternal & Child Health Research Institute

Joshua Spin, MD, PhD
Assistant Professor of Medicine
Co-Investigator: Philip Tsao, PhD

Maternal Vaping and Transgenerational Risk of Abdominal Aortic Aneurysm
Research Funded by the Stanford Maternal & Child Health Research Institute

The Steven M. Gootter Foundation is dedicated to saving lives by defeating sudden cardiac death through increased awareness, education and scientific research. We dedicate ourselves to this mission in memory of Steven M. Gootter.

Boring Trust Award 2021

Jessica Herrmann
3rd Year Medical Student
Lab of Mark Skylar-Scott, PhD
Developing a Perfusion Bioreactor to Train a Vascularized Fontan Assist Biopump

Danielle Mullis
2nd Year Medical Student
Lab of Joseph Woo, MD
Intramyocardial Therapy to Induce Angiogenesis in a Transgenic Mouse Model of Coronary Heart Disease

Brian Yu
2nd Year Medical Student
Lab of Joseph C. Wu, MD, PhD
Mechanisms of Autophagy in Diabetic Cardiomyopathy with Human Stem Cells

The Dorothy Dee and Marjorie Helene Boring Trust Award supports Stanford medical students pursuing research solutions that impact how we treat and prevent cardiovascular diseases.
April 19–20, 2021, was the first virtual Stanford Drug Discovery Symposium. As a virtual event, we were able to reach a far broader audience. There were over 5,400 registrants and over 7,400 attendees in to view the talks. Individuals were from the US, Europe, Asia, Australia, North and South America, and Africa, reflecting how our meeting has progressed and gained international recognition over the last five years.

The 45 Speakers, moderators, and panelists represented pharmaceutical and biotech companies, government policy makers, Nobel laureates and academic leaders, scientists, editors from major journals, venture capitalists, and angel investors. They presented their groundbreaking work and perspectives in the field of drug development and provided insights into how the COVID-19 pandemic adjusted how they worked.

The Symposium also honored Drs. Doug Lowy and John Schiller from the National Cancer Institute with the 2021 Lifetime Achievement Award for their work in HPV-associated cancers and the HPV vaccine.
CVI Faculty and Research Topics in 2021

CVI has over 400 faculty members across 76 departments and divisions as well as over 400 early career scientists and research staff. With a broad faculty pool at multiple career stages, in 2021 CVI helped recruit two new faculty, Nazish Sayed, MD, PhD, and Juyong Brian Kim, MD, and launched national searches for three more positions.

CVI research covers an incredible breadth of disciplines from stem cells to adult clinical research; from genomics to health services research.

**CVI Faculty Distribution**

- **Professor**: 175
- **Associate Professor**: 99
- **Assistant Professor**: 80
- **Professor Emeritus**: 40
- **Other Faculty**: 23

**Research Topics**

- Adult Clinical Research
- Molecular Biology
- Outcomes & Prevention
- Imaging
- Heart Failure
- Pediatrics
- Stem Cell
- Genomics & Bioinformatics
- Oncology
- Health Services
- Pulmonary Biology
- Immunology
- Developmental Biology
- Biomaterials
- Transplant
- Vascular Surgery
- Health Disparities
- Digital Health

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**CVI Research Divisions**

- **Medicine**: Cardiovascular Medicine
- **Surgery**: Vascular Surgery
- **Cardiothoracic Surgery**
- **Radiology**
- **Pediatrics**: Cardiology
- **Pathology**
- **Anesthesiology, Perioperative, and Pain Medicine**
- **Biology**
- **Genetics**
- **Electrical Engineering**
- **Distribution of CVI Faculty across Divisions and Departments**

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Stanford Cardiovascular Institute
2021 CVI Early Career Research Symposium: A Hybrid Success 🌟

On November 3rd 2021, CVI hosted the 4th Annual Early Career Symposium as a hybrid event! With over 100 attendees from across the world, the symposium was a huge success.

22 speakers participated in total—both in person and virtually—covering topics ranging from population research, to clinical and translational research, to in vitro and ex vivo research, to “how to get published,” and future careers. Six fantastic early career trainees presented lightning talks including: Kenzo Ichimura, MD, PhD; Neil Manohar Kalwani, MD; Xuan Yu, MD, PhD; Heyjun Park, PhD; Hye Sook Shin; and Narelli Paiva. Hye Sook Shin and Narelli Paiva won awards for Best CVI Early Career Symposium Lightning Talks.

The event was organized by CVI’s Early Career Committee, and spearheaded by A.J. Pedroza, MD; Carlos Vera, PhD; Danielle Mullis; Domenico Mastrodicasa, MD; James Jahng, PhD; Katharina Schimmel, PhD; and Mirwais Wardak, PhD.

The array of speakers was impressive. It was great to have the hybrid format! Really liked seeing people again. Having a symposium during the pandemic is already a great achievement. Speakers were diverse and engaging!

117 TOTAL ATTENDANCE
28 IN-PERSON
89 VIRTUAL

22 TOTAL SPEAKERS
7 IN-PERSON
15 VIRTUAL
The 2021 CVI Early Career Symposium featured six fantastic lightning talks from early career researchers who shared their science with the community. Hye Sook Shin and Narelli de Paiva Narciso were both awarded prizes for their exceptional presentations on hydrogels and cell delivery platforms.

CVI Travel Award Winners Autumn 2021

Kevin Cyr
Medical Student
Lab of Paul Wang
Heart Rhythm Society 2021

Evaluation of the 3-Dimensional Substrate of Ventricular Tachycardia in a Langendorff Perfused Human Heart

Francisco Galdos
MD-PhD Student
Winner of CVI Outreach Travel Award
Lab of Sean Wu
AHA Scientific Session 2021

TBX5-Based Lineage Tracing Identifies a Propensity for Left Ventricular Cardiomyocyte Differentiation of Human Induced Pluripotent Stem Cells Using Biphasic Modulation of WNT Signaling

Chun Liu, PhD
Instructor
Lab of Joseph Wu
AHA Scientific Session 2021

Statins Improve Endothelial Function via Suppression of Epigenetics Driven-EndMT

Yae Hyun Rhee, PhD
Postdoctoral Researcher
Lab of Philip Tsao
AHA Scientific Session 2021

E-cigarette Nicotine Vapor Increases Aortic Stiffness in Mice

Kenzo Ichimura, MD, PhD
Postdoctoral Researcher
Lab of Edda Spiekerkoetter
AHA Scientific Session 2021

Three-Dimensional Deep-Tissue Imaging of the Right Ventricle Reveals Decreased Capillary-Cardiomyocyte Contact Surface in Decompensated Right Heart Failure

Due to COVID-19 related travel restrictions, CVI travel awards were on hiatus until the Fall of 2021. We are excited to once again offer these opportunities for early career researchers to share their work with the broader scientific community.
RESEARCHER PROFILES
Kevin Alexander, MD
Assistant Professor of Medicine - Cardiovascular Medicine

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CURRENT RESEARCH

My research focuses on understanding the molecular mechanisms involved in cardiac amyloidosis, particularly transthyretin amyloidosis. The main goals are to (i) elucidate key determinants of protein misfolding and amyloid formation, (ii) develop biomarkers for early disease detection and monitoring, and (iii) identify novel targets for specific amyloid therapies. To pursue these goals, we use cell- and animal-based models combined with detailed phenotypic profiling of large cardiac amyloid patient cohorts.

Some people want it to happen, some wish it would happen, others make it happen. — Michael Jordan

SELECTED PUBLICATIONS


Christopher Almond, MD
Professor of Pediatrics (Cardiology)
at the Lucile Salter Packard Children’s Hospital
Director, Cardiac Anticoagulation Services, Stanford Children’s Health

EDUCATION/TRAINING

MD University of Connecticut

INTERNSHIP

Boston Children’s Hospital (2000)

RESIDENCY

Boston Children’s Hospital (Combined Residency in Pediatrics) (2002)

FELLOWSHIPS

Boston Children’s Hospital (2005)
Boston Children’s Hospital (2006)

BOARD CERTIFICATION

Pediatrics, American Board of Pediatrics (2002)
Pediatric Cardiology, American Board of Pediatrics (2014)

CURRENT RESEARCH

Dr. Almond’s clinical research efforts focus on improving outcomes for children with end-stage heart failure, specifically in the areas of pediatric ventricular assist devices, cardiac transplantation, medical management of decompensated heart failure, and anticoagulation. He has a special interest is the design of multi-center clinical trials to evaluate promising drugs and devices seeking FDA approval for rare diseases. Dr. Almond served as the national PI for the Berlin Heart EXCOR Pediatric VAD multi-center clinical trial. He currently serves as PI for the TEAMMATE Trial, a randomized clinical trial evaluating Everolimus to prevent long-term complications after pediatric heart transplantation, and the PumpKIN trial, evaluating the Jarvik 2015, a miniaturized continuous flow durable VAD for bridge to heart transplant in children.

We have had a longstanding interest in how to use ventricular assist devices (VAD) in children, and we want to carry that into the future, as well.

SELECTED PUBLICATIONS


Russ Altman’s primary research interests are in the application of computing and informatics technologies to problems relevant to medicine. He is particularly interested in methods for understanding drug action at molecular, cellular, organism, and population levels. His lab studies how human genetic variation impacts drug response (e.g., http://www.pharmgkb.org/). Other work focuses on the analysis of biological molecules to understand the actions, interactions and adverse events of drugs (e.g., http://feature.stanford.edu/). He helps lead an FDA-supported Center of Excellence in Regulatory Science & Innovation.

SELECTED PUBLICATIONS


Shipra Arya, MD
Associate Professor of Surgery (Vascular Surgery)

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CURRENT RESEARCH
Shipra Arya, MD SM FACS is an Associate Professor of Surgery at the Stanford University School of Medicine and section chief of vascular surgery at VA Palo Alto Healthcare System. She has a Master's degree in epidemiology from the Harvard School of Public Health with focus on research methodology and cardiovascular epidemiology. She completed her General Surgery Residency at Creighton University Medical Center followed by a Vascular Surgery Fellowship at University of Michigan. She has been funded by American Heart Association (AHA), NIH/NIA GEMSSTAR grant, VA Palo Alto Center for Innovation and Implementation (Ci2i) and is currently funded by VA HSR&D. The accumulated evidence from her research all points to the fact that frailty is a versatile tool that can be utilized to guide surgical decision making, inform patient consent and design quality improvement initiatives at the patient and hospital level. Her current grant focuses on streamlining frailty evaluation and implementation of patient and system level interventions to improve surgical outcomes and enhance patient centered care.

SELECTED PUBLICATIONS


Euan A. Ashley, BSc, MB ChB, FRCP, DPhil

Roger and Joelle Burnell Chair in Genomics and Precision Health
Associate Dean, School of Medicine
Professor, Medicine - Cardiovascular Medicine; Professor, Genetics; Professor, Biomedical Data Science; Professor (by courtesy), Pathology; Co-Director, Stanford Data Science Initiative; Director, Stanford Clinical Genomics Program; Co-Director, Center for Digital Health
Director, Stanford Cardiopulmonary Exercise Testing Laboratory

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CURRENT RESEARCH

My lab is focused on the application of genomics to medicine. We develop methods for the interpretation of whole genome sequencing data to improve diagnosis of genetic disease and to personalize the practice of medicine. We love big data questions and are obsessed with systems approaches to biology especially analysis of network graphs. The wet bench is where we test causality of key genes and investigate the biology of network modules. It is also the focus of our translational efforts. Therapeutic development is a near term goal, and several of our discoveries are the focus of patents or are being actively pursued by pharmaceutical and biotechnology partners.

If your dreams do not scare you, they are not big enough. — Ellen Johnson Sirleaf

SELECTED PUBLICATIONS


Themistocles (Tim) Assimes, MD, PhD, FAHA

Associate Professor, Medicine - Cardiovascular Medicine
Attending Cardiologist, Palo Alto VA Health Care System
Director, Medical & Population Genomics for Precision Medicine, VA Palo Alto Health Care System
Associate Director, Epidemiology Research and Information Center for Genomics, VA Palo Alto Hospital

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CURRENT RESEARCH

My investigative focus is the design, conduct, analysis, and interpretation of human molecular epidemiology studies of complex cardiovascular disease (CVD) related traits including coronary atherosclerosis and risk factors for coronary atherosclerosis. In addition to performing discovery and validation population genomic studies, we use contemporary genetic studies to gain important insight on the causal and mechanistic nature of associations between purported risk factors and adverse cardiovascular related health outcomes through instrumental variable analyses and genetic risk score association studies of intermediate phenotypes. I am also actively involved in studies assessing the clinical utility of novel genetic markers in isolation or in combination with other biomarkers.

To crack the code of complex cardiovascular traits, we need collaborative networks almost as complicated as the biological networks we are trying to understand. The CVI allows such networks to seed and flourish.

SELECTED PUBLICATIONS


Leah Backhus, MD, MPH, FACS
Associate Professor of Cardiothoracic Surgery (Thoracic Surgery) at the Palo Alto Veterans Affairs Health Care System
Thoracic Track Residency Associate Program Director
Co-Director, Thoracic Surgery Health Services Research

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CURRENT RESEARCH

Leah Backhus trained in general surgery at the University of Southern California and cardiothoracic surgery at the University of California Los Angeles. She practices at Stanford Hospital and is Chief of Thoracic Surgery at the VA Palo Alto. Her surgical practice consists of general thoracic surgery with special emphasis on thoracic oncology and minimally invasive surgical techniques. She is Co-Director of the Thoracic Surgery Clinical Research Program and has independent grant funding with a VA Merit Award through the Veterans Affairs Administration Health Services Research & Development. She also has grant funding as a co-PI on an R01 clinical trial titled, "A Mechanistic Clinical Trial of JAK Inhibition to Prevent Ventilator-induced Diaphragm Dysfunction.". Her current research interests are in imaging surveillance following treatment for lung cancer and cancer survivorship. Outside of Stanford, she is also a member of the National Lung Cancer Roundtable in conjunction with the American Cancer Society; serves as the Chair of the Women and Lung Cancer Task Group; and serves as Chair of the Thoracic Surgery Review Committee for the ACGME.

SELECTED PUBLICATIONS


Hans-Christoph Becker, MD
Professor of Radiology (General Radiology) at the Stanford University Medical Center

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CURRENT RESEARCH
My current research focus is applying radiomics and deep learning algorithms to tumor response assessment with computed tomography, positron emission tomography and magnetic resonance imaging. Together with the 3D lab, I am establishing standardized response assessment for different tumor entities and new targeted and immunotherapies with cross-sectional imaging for patients in clinical trials. From my former work, my area of expertise includes contrast-induced nephropathy, new image reconstruction methods and radiation protection strategies, meta-analysis for the predictive value of cardiac CT, as well as large clinical surveys in the field of radiation exposure habits. My recent publications dealt with the comparison of intravascular ultrasound with computed tomography for the assessment of myocardial coronary artery bridges. My primary clinical focus is cardiovascular and body imaging.

SELECTED PUBLICATIONS

Daniel Bernstein, MD
Associate Dean for Curriculum and Scholarship
Stanford University School of Medicine
Alfred Woodley Salter and Mabel G. Salter Endowed Professor of Pediatrics
(Cardiology) Stanford University
Former Division Chief, Pediatric Cardiology
Former Director, Children’s Heart Center, Lucile Packard Children’s Hospital at Stanford

CURRENT RESEARCH
Our recent work has focused on the mechanism by which mutations in sarcomeric proteins such as myosin lead to the clinical phenotypes of hypertrophic cardiomyopathy (HCM). Utilizing human induced pluripotent stem cell-derived cardiomyocytes, with mutations induced by CRISPR/Cas9 gene editing, we are undertaking a multi-scale approach ranging from structural and function studies on the single myosin molecule, to the individual myofibril, to whole cells and to microengineered tissues. To better understand cardiomyocyte mechano-transduction, we are applying FRET sensors in critical sarcomeric and junctional proteins. We are also studying a large biobank of myocardial samples from patients with HCM, combining transcriptomics and metabolomics with measurements of mitochondrial function to determine the degree to which HCM is a disease of altered cardiac energetics. These studies will allow us to correlate findings from hiPSC-CMs with actual patient samples. Another focus of our lab has been on the molecular mechanisms of RV hypertrophy and its transition to RV failure, and how this differs from LV failure. I am also involved in several clinical/translational projects: a multi-center clinical study to evaluate novel biomarkers for post-transplant lymphoproliferative disorder in pediatric solid organ transplant patients; the Pediatric Cardiac Genomics Consortium, an NIH initiative to sequence 10,000 trios for genes associated with pediatric left ventricular assist device (LVAD) implantation.

SELECTED PUBLICATIONS
Hypertrophic cardiomyopathy: A disease of altered mitochondrial function and metabolism?

Hypertrophic cardiomyopathy β-cardiac myosin mutation (P710R) leads to hypercontractility by disrupting super-relaxed state.

Dach1 extends artery networks and protects against cardiac injury.

β2-adrenergic signaling modulates mitochondrial function and morphology in skeletal muscle in response to aerobic exercise.

Transcriptomic and Functional Analyses of Mitochondrial Dysfunction in Pressure Overload-induced Right Ventricular Failure.
CURRENT RESEARCH

Dr. Blau studies fundamental regulatory mechanisms and therapeutic interventions to enhance stem cell function in muscle regeneration. Our primary focus is on understanding what goes awry in the dedicated stem cells that exist in our muscle tissues with aging and in genetic muscle wasting disorders. For example, we have discovered novel small molecules, niche proteins, and biophysical cues that rejuvenate, expand, and enhance the function of muscle stem cells, crucial for muscle regeneration. We have also determined a new role for telomeres in Duchenne muscular dystrophy, which provides novel insights into the development of heart failure and potential treatments. Capitalizing on cardiomyocytes differentiated from patient-derived induced pluripotent stem cells to model DMD cardiomyopathy, we are elucidating how microenvironmental cues lead to telomere dysfunction in disease and strategies to protect telomeres. To accomplish our research goals, we integrate diverse powerful single cell technologies –CODEX, RNAseq, ATACseq– for studying changes at the protein, genome, and epigenetic levels; advanced imaging techniques and algorithms for tracking cell fate in vitro and in vivo; and engineered biomaterials platforms to model changes in the cellular microenvironment. Our overarching goal is to make a difference in human health.

We dance for laughter, we dance for tears, we dance for madness, we dance for fears, we dance for hopes, we dance for screams, we are the dancers, we create the dreams. — Albert Einstein

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Carlos Bustamante, PhD
Professor of Biomedical Data Science, Genetics, and (by courtesy) Biology

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EDUCATION/TRAINING

PHD Harvard University

HONORS & AWARDS

Sloan Research Fellow in Molecular Biology, Sloan Foundation (2007-2009)
Provost Award for Distinguished Research, Cornell University (2008)

CURRENT RESEARCH

My research focuses on analyzing genome wide patterns of variation within and between species to address fundamental questions in biology, anthropology, and medicine. My group works on a variety of organisms and model systems ranging from humans and other primates to domesticated plant and animals. Much of our research is at the interface of computational biology, mathematical genetics, and evolutionary genomics.

SELECTED PUBLICATIONS


CURRENT RESEARCH

My research involves clinical and translational work in heart rhythm disorders in children and adults with congenital heart disease. My primary area of interest is in novel methods of signal analysis and approaches to ablation in children with SVT. I am also involved in efforts to evaluate arrhythmias in adults with congenital heart disease, multi-center collaborations involving the evaluation of children with WPW, and collaborations on device therapies in children and adults with heart disease and cardiomyopathies.

I truly love what I do. It is a privilege to care for my patients and to work with a tremendously bright and motivated group of caregivers and scholars here at Stanford.

SELECTED PUBLICATIONS


CURRENT RESEARCH

Our research laboratory focuses on understanding the mechanics of the cardiovascular system, especially with respect to interactions between medical devices and the dynamic cardiovascular environment. We use medical imaging, 3D geometric modeling, and custom deformation quantification techniques to investigate disease processes and medical device performance. We are interested in the dynamics of the heart, aorta, and peripheral vasculature, and are always seeking ways to apply our research to current and emerging therapies. While our research pursuits seek to add to the fundamental understanding of cardiovascular biomechanics, all of our projects are directly related to improving medical device design, evaluation, regulation, and their use in clinical practice.

We study how the heart and blood vessels move.

SELECTED PUBLICATIONS


Glenn Chertow, MD
Professor of Medicine (Nephrology) and, by courtesy, of Health Research and Policy (Epidemiology)

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CURRENT RESEARCH
Dr. Chertow’s research interests are focused on clinical epidemiology, health services research, and clinical trials in acute and chronic kidney disease. In addition to his own research program, he devotes considerable effort in collaborative research and in mentoring junior faculty, fellows, residents and other trainees.

You miss 100% of the shots you don’t take.
— Wayne Gretzky

SELECTED PUBLICATIONS


Gerald Crabtree, MD

Department of Pathology Professor in Experimental Pathology and Professor of Developmental Biology

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CURRENT RESEARCH

We are interested in the role of chromatin regulation in development and human cancer. Recent studies have shown that over 20% of all human cancers have mutations in the subunits of an ATP-dependent chromatin regulatory complex we discovered several years ago. The genes behave as tumor suppressors and sometimes as oncogenes. We hope to understand the fundamental mechanisms used by these complex to prevent cancer.

These same chromatin remodeling complexes are frequently mutated in a variety of human neurologic diseases, reflecting their roles in the development of the nervous system. It appears that these specialized roles in the nervous system are due to the use of unique neural specific assemblies in the developing human and mouse brain. We hope to understand their fundamental mechanism of action through biochemical and genetic approaches in combination with genome-wide analysis and genome sequencing studies.

Finally, we are developing new ways of making conditional alleles of mammalian genes using synthetic ligands that we hope will bring about a new fusion of biochemical and genetic approaches to understanding and controlling fundamental biologic processes. Recently we have developed an effective way of both assaying and modifying chromatin regulation in living cells.

SELECTED PUBLICATIONS


Our research focuses on developing biophysical and chemical tools to probe fundamental questions in biology. We bring together state-of-the-art nanotechnology, physical science, engineering, and molecular and cell biology, to advance current understandings of biological processes in neurons and cardiomyocytes. Currently, there are two major research directions: (1) Developing nanoscale tools to probe electric activities and cellular processes at the cell-material interface. In this area, we have developed nanoscale electric probes for measuring intracellular action potentials in electrogenic cells, as well as structural probes and optical probes with high sensitivity and subcellular localization. (2) Employing optical, magnetic, and optogenetic tools to understand nerve growth factor (NGF) signaling in neurons. By adapting a variety of microscopy, optogenetic, nanotechnology and biochemical tools, we aim for a deeper understanding of NGF signaling in normal neurons and neurodegenerative diseases.

Life is like riding a bicycle. To keep your balance, you must keep moving. – Albert Einstein

SELECTED PUBLICATIONS


Ronald L. Dalman, MD
Walter C. and Elsa R. Chidester Professor
Stanford Medicine Associate Dean for Market Development

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CURRENT RESEARCH
Stanford Vascular Surgery is recognized worldwide for expertise in aortic aneurysm disease. My laboratory continues to focus on understanding aneurysm pathophysiology, as well as developing innovative treatment, screening and access to care strategies in abdominal aortic aneurysm (AAA) disease management.

We are on the threshold of understanding, and thus eliminating, the threat of premature death from aortic aneurysm disease worldwide.

SELECTED PUBLICATIONS


Rajesh Dash, MD, PhD
Assistant Professor, Medicine – Cardiovascular Medicine
Medical and Scientific Director, Stanford South Asian Translational Heart Initiative (SSATHI)
Co-Director, Falk Cardiovascular MRI Facility

EDUCATION/TRAINING
MD University of Cincinnati
PHD University of Cincinnati
MEDICINE RESIDENCY
University of Washington Medical Center
CARDIOLOGY FELLOWSHIP
UCSF

BOARD CERTIFICATION
Cardiovascular Medicine, ABIM
Echocardiography, NBE
Nuclear Cardiology, CBNC

CLINICAL FOCUS
Non-Invasive Cardiac Imaging
Preventive Cardiology

HONORS & AWARDS
Best Poster Award, American College of Cardiology (ACC) Scientific Sessions (2013)
CVI Seed Grant (2012)
Finalist, Jeremiah Stamler Distinguished Young Investigator Award, Northwestern University (2012)
Melvin Judkins Young Investigator Award, American Heart Association (AHA) Scientific Sessions (2009)
AHA Cardiovascular Radiology and Intervention Travel Award (2009)
Finalist, Society of Cardiovascular Magnetic Resonance (SCMR) Young Investigator Award (2008)

CURRENT RESEARCH
My research focuses on the prediction of coronary and cardiovascular disease in high risk patient populations, using population health and molecular imaging, as well as digital health technologies to achieve better preventive outcomes. I am Medical and Scientific Director of the Stanford South Asian Translational Heart Initiative (SSATHI). Our mission is to detect, treat, and prevent the onset of coronary and cardiometabolic diseases in young Asians. We study this problem at the cellular and physiological levels, and validate our discoveries with partners in India. Within SSATHI, I launched CardioClick, a team-based video visit platform for patient visits that include physician visits, lifestyle intervention, and clinical research study conduction. CardioClick has attracted industry clinical sponsorship to test technologies designed for patient engagement and outcome improvement. This telemedicine platform is now being scaled across cardiovascular medicine and SHC. In addition, I study cell signaling in the heart and have developed molecular imaging probes that track to injured heart tissue or transplanted stem cells, such that we can visualize these injury or survival signals in real-time, non-invasively. In this capacity I am Co-Director of the Falk Cardiovascular MRI Facility. I am applying these imaging strategies in select high-risk patients.

SELECTED PUBLICATIONS


Everyone has a plan until they get hit in the face.
— Mike Tyson
Mark M. Davis, PhD
Burt and Marion Avery Family Professor
Professor, Microbiology and Immunology
Investigator, Howard Hughes Medical Institute
Director, Stanford Institute for Immunity, Transplantation and Infection (ITI)

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CURRENT RESEARCH
My laboratory is interested in the molecular basis of T and B lymphocyte recognition, as well understanding the human immune system and its relationship to health and disease. These later efforts have employed systems biology approaches to understand vaccine responses, twin studies to understand the relative influence of environment versus genetics, and T cell repertoire studies to understand self vs non-self capabilities and the origin of memory T cell responses. By identifying markers that could tell us how a particular person’s immune system is functioning, we could both understand immune system-related and infectious diseases better and formulate new and more efficacious interventions.

By identifying markers that could tell us how a particular person’s immune system is functioning, we could both understand immune system-related and infectious diseases better and formulate new and more efficacious interventions.

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Anne Dubin, MD
Professor of Pediatrics (Pediatric Cardiology) at the Lucile Salter Packard Children’s Hospital
Interim Division Chief for Pediatric Cardiology

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CURRENT RESEARCH

I am most interested in the diagnosis and treatment of arrhythmia in pediatric heart failure, especially the use of resynchronization therapy in the pediatric and congenital heart population.

It’s more than just the technology; it is our caring staff, colleagues, and modern facilities that make the difference for every patient.

SELECTED PUBLICATIONS


EDUCATION/TRAINING

MD University of Rochester School of Medicine and Dentistry (1988)
INTERNSHIP Columbia Presbyterian Medical Center NY (1989)
RESIDENCY Columbia Presbyterian Medical Center NY (1991)
FELLOWSHIP Children’s Hospital of Philadelphia PA (1992)
Yale - New Haven Hospital CT (1995)

BOARD CERTIFICATION:
Pediatric Cardiology, American Board of Pediatric Cardiology (1998)
International Board of Heart Rhythm Examiners Pediatric Electrophysiology (2015)
American Board of Internal Medicine Adult Congenital Heart Disease (2015)

CLINICAL FOCUS
Pediatric Electrophysiology
The goal of our laboratory is to determine how molecular-scale information encodes the shape and physical properties of cells, tissues, and whole organisms. To do so, we use a combination of sophisticated microscopy, single-molecule biophysics, and theoretical modeling to explore how information propagates upwards across biological length scales. Specific questions we are currently investigating include: 1) How do molecular-scale asymmetries encoded in individual proteins give rise to the emergent physical properties of the cell; and 2) How do cells coordinate their actions to shape organs and tissues? In helping to answer these general questions we hope to understand the physical principles that underlie the construction of complex, multicellular life. We anticipate that this knowledge will be highly relevant to the development of stem-cell-based therapies and to engineering complex, three-dimensional tissues in the laboratory.

SELECTED PUBLICATIONS


Vinicio A. de Jesus Perez, MD, FAHA, FCCP, ATSF

Associate Professor of Medicine with Tenure - Division of Pulmonary, Allergy and Critical Care Medicine
Co-Director, Stanford Translational Investigator Program
Co-Chair, DOM Diversity and Inclusion Committee
Chair of 3CPR Scientific & Clinical Education Lifelong Learning Committee
Chair, AHA COC Diversity Committee
Chair, International Pulmonary Vascular Diseases Consortium (iPVD)
Vice-chair, 3CPR Scientific & Clinical Education Lifelong Learning Committee

EDUCATION/TRAINING
MD University of Puerto Rico
MEDICINE RESIDENCY
Massachusetts General Hospital
PULMONARY DISEASES FELLOWSHIP
University of Colorado
Stanford University
PULMONARY VASCULAR FELLOWSHIP
Stanford University
BOARD CERTIFICATION
Internal Medicine, ABIM
Pulmonary Diseases, ABIM
Critical Care Medicine, ABIM

CLINICAL FOCUS
Pulmonary Hypertension
Scleroderma Related Lung Diseases
Drug Induced Pulmonary Hypertension
Pulmonary Fibrosis

HONORS & AWARDS
American Society of Clinical Investigation (ASCI) membership
Pulmonary Hypertension Association Award for Outstanding K08
Be Heard Rare Challenge Disease International Award
FELLOW, American College of Chest Physicians
FELLOW, American Heart Association
FELLOW, American Thoracic Society Keystone Symposia Fellowship
American Society of Clinical Invest. Young Physician Scientist Award
ATS Pulmonary Circulation Assembly Early Career award

EDITORIAL BOARD
American Journal of Respiratory and Critical Care Medicine, Pulmonary Circulation, Circulation Research, AJP Lung Cell Molecular Biology, PLoS One

CURRENT RESEARCH
My lab focuses on understanding the genetic, cellular and molecular mechanisms involved in the pathogenesis of pulmonary arterial hypertension (PAH). We are interested in understanding how pulmonary arteries respond to injury and identify novel genetic modifiers whose dysfunction can trigger small vessel loss and vascular remodeling in PAH patients. In particular, we are currently focused on exploring how the Wnt signaling pathways regulate the behavior of pulmonary artery endothelial cells (PAECs), smooth muscle cells (PASMCs) and pericytes in response to injury and whether mutations related to these pathways can affect signaling via other pathways relevant to PAH resulting in development of clinical disease. The overarching goal of our work is to identify potential biomarkers and drug targets that can be used in the development of novel diagnostic and treatment approaches to offer patients afflicted with this devastating disease.

SELECTED PUBLICATIONS

Targeted proteomics of right heart adaptation to pulmonary arterial hypertension. Myriam Amsallem, Andrew Sweatt, Jennifer Arthur, Julien Guihane, Maria Ghigna, Marlene Rabinovitch, Ramon Ramirez, VINICIO A. DE JESUS PEREZ, Edda Spiekerkoetter, Olaf Mercier, Francois Hadda and Roham T. Zamanian. ERJ. (2020)


The Cardiac Magnetic Resonance (CMR) Group develops translational cardiac and cardiovascular MRI techniques to study cardiovascular physiology and improve clinical care for pediatric and adult patients. Current NIH R01 research projects focus on: 1) characterizing several cardiac MRI biomarkers to detect the cardiomyopathy associated with Duchenne Muscular Dystrophy; 2) developing MRI methods and a computational modeling framework to estimate changes in passive ventricular stiffness in patients with Heart Failure with Preserved Ejection Fraction (HFpEF); and identifying MRI-based biomarkers of atrial fibrosis. Our group is also very interested in further developing MRI methods to explore cardiac structure, function, flow, and remodeling with particular emphasis on MRI pulse sequence and gradient waveform design. One central aim of this effort is to increase the quantitative accuracy and reduce the image acquisition times for CMR exams.

The good life is one inspired by love and guided by knowledge. — Bertrand Russell

CURRENT RESEARCH

SELECTED PUBLICATIONS


Myofiber strain in healthy humans using DENSE and cDTI. K Moulin, P Croisille, M Viallon, IA Verzhbinski, LE Perotti, DB Ennis. Magnetic Resonance in Medicine 86 (1), 277-292

On the impact of vessel wall stiffness on quantitative flow dynamics in a synthetic model of the thoracic aorta. J Zimmermann, M Loecher, FO Kolawole, K Bäumler, K Gifford, SA Dual. Scientific reports 11 (1), 1-14

Using synthetic data generation to train a cardiac motion tag tracking neural network. M Loecher, LE Perotti, DB Ennis. Medical Image Analysis 74, 102223.
RESEARCHER PROFILES

William Fearon, MD
Professor of Medicine - Cardiovascular Medicine
Director, Interventional Cardiology

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CURRENT RESEARCH

My research group focuses on the invasive assessment of coronary physiology. In particular, we use coronary wire-based methods to evaluate which coronary artery narrowings are responsible for myocardial ischemia and warrant stenting. We have helped to perform multicenter, international clinical trials examining the role of fractional flow reserve in guiding percutaneous coronary intervention in various patient populations. Through NIH sponsored research, we have also applied these wire-based methods to understand better coronary microvascular function and its role in patient outcomes. For example, in collaboration with other members of the Cardiovascular Institute, we are investigating the effect of PCSK9 inhibition early after cardiac transplantation on coronary physiology and endothelial function.

The saying 'Don't judge a book by its cover' applies to coronary angiography. By invasively assessing coronary physiology, we have learned how misleading the angiogram can be.

SELECTED PUBLICATIONS


Jeffrey A. Feinstein, MD, MPH
Dunlevie Family Professor of Pulmonary Vascular Disease, and Professor, by courtesy, of Bioengineering
Director, Vera Moulton Wall Center

CURRENT RESEARCH
Research interests include (1) computer simulation and modeling of cardiovascular physiology with specific attention paid to congenital heart disease and its treatment, (2) the evaluation and treatment of pulmonary hypertension/pulmonary vascular diseases, and (3) development and testing of medical devices/therapies for the treatment of congenital heart disease and pulmonary vascular diseases.

SELECTED PUBLICATIONS
Michael Fischbein, MD, PhD
Associate Professor of Cardiothoracic Surgery (Adult Cardiac Surgery)
Director of Thoracic Aortic Surgery
Program Director, Department of Cardiothoracic Surgery

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CURRENT RESEARCH
Our group is interested in the molecular and genetic mechanisms of aortic aneurysm/dissection development, and the molecular mechanisms of aneurysm formation in Marfan Syndrome. Clinical research interests include thoracic aortic diseases (aneurysms, dissections).

SELECTED PUBLICATIONS
RESEARCHER PROFILES

Peter J. Fitzgerald, MD, PhD, FACC
Professor of Medicine (Cardiovascular Medicine) Emeritus

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CURRENT RESEARCH
My laboratory includes 17 postdoctoral fellows and graduate engineering students focusing on state-of-the-art technologies in Cardiovascular Medicine. I have led or participated in over 150 clinical trials and published over 450 manuscripts/chapters. In addition, I head the Stanford/Asia MedTech innovation program. I have been principle/founder of eighteen medical device companies in the San Francisco Bay Area; twelve of these start-ups have transitioned to large medical device companies. I serve on several boards of directors and have advised dozens of medical device startups as well as multinational healthcare companies in the design and development of new diagnostic and therapeutic devices in the cardiovascular arena.

Technology in medicine is very important, and is ultimately going to be important for patients.

SELECTED PUBLICATIONS


Dominik Fleischmann, MD
Professor, Radiology
Chief, Cardiovascular Imaging
Director of CT, Stanford HealthCare
Medical Director, Stanford 3DQ Lab

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CURRENT RESEARCH
My research area broadly covers cardiovascular imaging, ranging from technical optimization of image acquisition for improving temporal and spatial resolution, to the application of novel imaging technologies for detecting, staging and treatment planning of cardiovascular diseases, post-processing and modelling, and individual risk stratification based on data extracted from high-resolution imaging.

I have a strong clinical and research interest in acute aortic diseases, where my lab develops novel clinically applicable tools to measure and monitor patients with aortic aneurysms and dissections. We are the primary site of a multicenter international effort to improve treatment decisions for patients with so-called uncomplicated type B aortic dissection.

Currently we only use a tiny fraction of the wealth of information contained in modern multidimensional imaging data. This is the time to exploit these data.

A picture says more than a thousand words; now imagine what three-, four- and more dimensional visualization can do.

SELECTED PUBLICATIONS


Victor Froelicher, MD
Professor Emeritus, Medicine - Cardiovascular Medicine
Professor (by courtesy), Orthopedics
Consultant, Stanford Sports Cardiology Clinic
VAPAHSC Cardiologist Consultant

CURRENT RESEARCH
My research and clinical interests include cardiovascular screening of athletes of all ages, non-invasive electrocardiography (rest and ambulatory), ECG patches, atrial fibrillation, and automated arrhythmia analysis.

SELECTED PUBLICATIONS

Impact of the Distance From the Chest Wall to the Heart on Surface ECG Voltage in Athletes. Hedman, K., Patti, A., Moneghetti, K. J., Hsu, D., Christle, J. W., Ashley, E., Hadley, D., Haddad, F., Froelicher, V. BMJ Open Sport & Exercise Medicine, 2020; 6 (1): e000696.


Christopher Gardner, PhD
Rehnborg Farquhar Professor

**CURRENT RESEARCH**
I have been involved in more than a dozen human intervention trials involving more than 2,000 participants. These have examined the potential health benefits of garlic, soy, antioxidants, fish oil, ginkgo biloba, vegetarian diets, and weight loss diets. My current research involves diet interventions exploring the impact on the microbiome and immune function/inflammation. In the past few years my long-term research interests have shifted to include a line of inquiry that falls more under the umbrella of food systems research. This shift came from the realization and appreciation that focusing on “health” as a motivator can drastically limit the potential impact for change. This led me to seek out colleagues at Stanford in the fields of business, law, education, earth sciences, medicine, and many disciplines from humanities and sciences. I was recently funded (2021) to create a Plant-Based Diet Initiative. I am currently in the process of building on the idea that Stanford is uniquely positioned geographically, culturally, and academically, to address national and global crises in obesity and diabetes that are directly related to problems with our food systems. My current nutrition and food research involves institutional food settings of the Culinary Institute of America and have many colleagues that are chefs striving to elevate the unapologetic deliciousness of food, while also addressing human and environmental health. My long-term goal is to contribute to and accelerate positive changes in the food environment and social norms.

The river delights to lift us free, if only we dare let go. Our true work is this voyage, this adventure.
— Richard Bach

**SELECTED PUBLICATIONS**
Francois Haddad, MD
Clinical Associate Professor, Medicine (Cardiovascular)
Director, Stanford CVI Biomarker and Phenotypic Core Laboratory

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CURRENT RESEARCH
My research focuses on precision cardiovascular health. Our laboratory focuses on (1) identifying the most useful imaging and circulating biomarkers to guide management of cardiovascular health and disease; (2) on elucidating the mechanisms of heart failure with preserved ejection fraction and metabolic cardiomyopathy; (3) on developing novel therapeutics for right heart failure and (4) on cardio-immunology. Our laboratory focuses on applying precision imaging, exercise testing and biomarker to facilitate translational studies in heart failure, pulmonary hypertension, diabetes mellitus and stem cell therapy.

Our mission is to contribute to precision cardiovascular health through comprehensive physiological phenotyping and a focused approach to biomarker discovery. We are developing new imaging and biomarker platforms as well as new computational approaches to biomarker discovery.

SELECTED PUBLICATIONS


Frank Hanley MD
Lawrence Crowley, MD Endowed Professor in Child Health
Cardiothoracic Surgery

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CURRENT RESEARCH
Dr. Hanley’s research and clinical work focuses on the development of interventional techniques for fetal and neonatal treatment of congenital heart disease, pulmonary, vascular physiology, and the neurologic impact of open-heart surgery. He developed and pioneered the unifocalization procedure, in which a single procedure is used to repair a complex and life-threatening congenital heart defect rather than several staged open-heart surgeries as performed by other surgeons. Currently, Lucile Packard Children’s Hospital is a worldwide referral site for patients requiring these procedures. Hanley is also actively involved in exploring new approaches for the surgical repair of pediatric heart disease and is developing evidence-based guidelines for clinical care.

SELECTED PUBLICATIONS


Robert A. Harrington, MD
Arthur L. Bloomfield Professor of Medicine
Chair, Department of Medicine, Stanford University School of Medicine

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CURRENT RESEARCH
My research focuses on redefining the care of patients with acute ischemic heart disease while building local, national and international collaborations for the efficient conduct of innovative clinical research and trying to better understand and improve upon the methodology of clinical trials.

Society needs academic centers to step up and figure out how we are going to deliver high-quality, equitable health care while also advancing science and educating the next generation of clinical leaders.

SELECTED PUBLICATIONS


Paul A. Heidenreich, MD, MS
Professor and Vice-Chair for Quality, Department of Medicine
Professor (by courtesy), Health Research and Policy
Chief of Medicine, VA Palo Alto Health Care System

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CURRENT RESEARCH
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. I am the Director of Echocardiography, VA Palo Alto Health Care System and a Research Associate of Primary Care and Outcomes Research Center.

Both heart failure and atrial fibrillation impose an important economic and health burden on western societies that is only going to worsen as their populations age.

SELECTED PUBLICATIONS


Sarah Heilshorn, PhD
Lee Otterson Faculty Scholar
Associate Professor, Materials Science and Engineering
Associate Professor (by courtesy), Chemical Engineering
Associate Professor (by courtesy), Bioengineering

CURRENT RESEARCH
I combine my diverse training in engineering, chemistry, and biology to design new materials that mimic those found in our own bodies for applications in tissue engineering and regenerative medicine. Current topics of investigation include the design of injectable materials to improve stem cell transplantation, protein engineered materials for regenerative medicine scaffolds, and peptide-based self-assembly materials for enhanced drug delivery.

I have advised PhD students from six different academic programs at Stanford: chemistry, chemical engineering, bio engineering, materials science, mechanical engineering, and MD/PhD.

SELECTED PUBLICATIONS
CURRENT RESEARCH

My research focus is on the application of novel computational and bioengineering methods towards understanding and treating heart failure. My research group spans the disciplines of cellular and molecular biology, protein engineering, machine learning, and fluid mechanics. Our current projects include the development of a novel precision engineered chemokine platform to treat heart failure, and the application of single cell transcriptomics to understand the effects of chemokines in myocardial recovery. Additionally, we are developing a custom machine learning pipeline to predict outcomes from pre-operative echocardiograms alone, and we are exploring the use of computational fluid dynamics to understand how changes in blood flow influences outcomes in our patients.

SELECTED PUBLICATIONS


Mark Hlatky, MD
Professor, Medicine - Primary Care and Outcomes Research
Professor, Medicine - Cardiovascular Medicine

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CURRENT RESEARCH

My major interests are in cardiovascular health services research, outcomes research, evidence-based medicine, and cost-effectiveness analysis. I introduced 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). Currently, I am leading the EPOCH (Effect of Preeclampsia on Cardiovascular Health) study.

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.

SELECTED PUBLICATIONS


Yasuhiro Honda, MD, FACC, FAHA
Clinical Professor, Medicine - Cardiovascular Medicine
Director, Stanford Cardiovascular Core Analysis Laboratory (CCAL)

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CURRENT RESEARCH
My laboratory is recognized worldwide as a leading centralized resource of image analysis in the conduct of research studies and clinical trials in the field of cardiovascular medicine. Specifically, we have served as a core laboratory for over 145 national or international multi-center trials of new medical devices or pharmacological treatments, utilizing advanced cardiovascular imaging techniques, such as intravascular ultrasound (IVUS), catheter-based optical coherence tomography (OCT) / frequency domain imaging (OFDI), and intravascular near-infrared spectroscopy (NIRS). The data provided from my laboratory have contributed not only to the FDA’s approval process of new treatment technologies, but also academically to our understanding of cardiovascular disease by generating over 420 scientific articles published in peer-reviewed journals.

Advances in diagnostic technologies will enable us to better understand pathophysiology and will pave the way for new treatment strategies for our patients.

SELECTED PUBLICATIONS


My research laboratory aims to quantify the chemical and biophysical interactions between cells and extracellular matrix (ECM) proteins that regulate cell fate specification into cardiovascular lineages. Using high-throughput ECM-microarrays, tunable hydrogels, and spatially patterned nanofibrillar scaffolds, we are studying how the ECM influences lineage commitment processes such as differentiation, transdifferentiation, and nuclear reprogramming. The fundamental insights of cell-ECM interactions are applied towards translational applications with respect to improving the survival and regenerative capacity of transplanted cells, as well as for engineering vascularized tissues. We are also collaborating with industry partners to develop biomaterials-based approaches for treatment of critical limb ischemia and volumetric muscle loss and in small and large animal models.

I believe that a fully functional tissue-engineered heart can be realized in my lifetime.
Sharon Hunt, MD
Professor Emeritus, Medicine - Cardiovascular Medicine
Medical Director, Post-Heart Transplant Programs

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CURRENT RESEARCH

Dr. Hunt is a pioneering figure in the field of cardiology and has received numerous awards, including the Lifetime Achievement Award from the International Society for Heart and Lung Transplantation. Her research and clinical work focus on advancing long-term postoperative care for heart transplant recipients. She enjoys both taking care of patients and the opportunity to mentor cardiology fellows at Stanford.

The holy grail of immune tolerance remains beyond our reach at this time, but has the potential to completely alter the heart transplant landscape.

SELECTED PUBLICATIONS


John P. A. Ioannidis, MD, DSc
Professor, Medicine - Stanford Prevention Research Center
Professor, Epidemiology and Population Health
Professor (by courtesy), Statistics
Professor (by courtesy), Biomedical Data Science
Co-Director, Meta-Research Innovation Center at Stanford (METRICS)

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CURRENT RESEARCH
I have worked in the fields of evidence-based medicine, clinical and molecular epidemiology, human genome epidemiology, statistical methods and mathematical modeling, predictive and personalized medicine and health, and the sociology of science. I have a strong interest in large-scale evidence (in particular randomized trials and meta-analyses) and empirical evaluation of bias in biomedical research. I am interested in understanding how to improve research practices and in the interdisciplinary enhancement of existing research methods for study design and analysis in biomedicine and beyond.

I am privileged to have learned and to continue to learn from interactions with students and scientists from all over the world and to be constantly reminded that I know next to nothing.

SELECTED PUBLICATIONS

A Standardized Citation Metrics Author Database Annotated for Scientific Field. Ioannidis, JP., Baas, J., Klavans, R., Boyack, K. W. PLoS Biology, 2019; 17 (8): e3000384.


Ioannis Karakikes, PhD
Assistant Professor (Research) - Cardiothoracic Surgery

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CURRENT RESEARCH
The Karakikes Lab aims to uncover fundamental new insights into the molecular mechanisms and functional consequences of pathogenic mutations associated with familial cardiovascular diseases.

The overarching goal of our studies is to improve our understanding of the pathogenesis of familial cardiomyopathies, such as Hypertrophic Cardiomyopathy (HCM) and Dilated Cardiomyopathy (DCM). We utilize isogenic human induced pluripotent stem cells (iPSCs) as a platform for disease modeling to gain insights on how rare mutations affect the cardiomyocyte biology. By establishing a better understanding of the biology of the disease, our studies represent a first definitive step in elucidating the genotype-phenotype associations in HCM and DCM toward applying a precision medicine approach to the treatment of genetic cardiomyopathies.

SELECTED PUBLICATIONS


Dr. Kapiloff is currently involved in full-time basic science and translational research. His laboratory studies the basic molecular mechanisms underlying the response of the retinal ganglion cell and cardiac myocyte to disease. The longstanding interest of his laboratory is the role in intracellular signal transduction of multimolecular complexes organized by scaffold proteins. Recently, his lab has been involved in the translation of these concepts into new therapies, including the development of new AAV gene therapy biologics for the prevention and treatment of heart failure and for neuroprotection in the eye.

As we acquire a more profound understanding of the molecular underpinnings of the function of our hearts, new therapies will emerge that will provide new hope for diseases that we only assume will take so many of our loved ones away from us.

**SELECTED PUBLICATIONS**


Kiran Kaur Khush, MD
Professor, Medicine - Cardiovascular Medicine

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CURRENT RESEARCH

As Director of Heart Transplant Research in the Division of Cardiovascular Medicine, my research focuses on the evaluation and selection of donors for heart transplantation; the pathogenesis of post-transplant complications, including acute rejection and cardiac allograft vasculopathy; and non-invasive diagnosis of post-transplant complications. I serve as Associate Director of the International Society for Heart and Lung Transplantation (ISHLT) Thoracic Transplant Registry and as the heart transplant lead for the ISHLT 2020 annual scientific sessions. I am Associate Editor for the American Journal of Transplantation and am on the editorial boards of the Journal of Heart and Lung Transplantation and Circulation Heart Failure. I am also the Program Director of the Advanced Heart Failure and Transplant Cardiology fellowship at Stanford.

SELECTED PUBLICATIONS


Joshua W. Knowles, MD, PhD, FAHA, FACC
Assistant Professor, Medicine - Cardiovascular Medicine

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CURRENT RESEARCH
Dr. Knowles is a physician-scientist whose overall research theme has been the genetic basis of cardiovascular disease across the continuum from Discovery, to the development of Model Systems, to the Translation of these findings both into the clinic and the Public Health aspect of genetics. His discovery and basic translational efforts center on understanding the genetic basis cardiovascular disease using GWAS studies coupled with exploration in model systems. His clinical translational focus is on Familial Hypercholesterolemia (FH) and he is the volunteer Chief Research Advisor of the FH Foundation (FHF) which is a patient-led organization dedicated to increasing awareness of FH, identifying and treating patients with FH and screening family members to prevent deleterious outcomes. He helped lead the FHF efforts to establish a national patient registry (CASCADE FH), apply for an ICD10 code for FH and is now using cutting-edge “big-data” approaches to identify previously undiagnosed FH patients in electronic medical records (FIND FH). He has published over 100 papers with research projects currently funded by the National Institutes of Health, the American Heart Association, the American Diabetes Association and the Doris Duke Charitable Foundation.

Stanford is contributing at all levels to using the tools of human genetics to improve human health.

SELECTED PUBLICATIONS


Brian Kobilka, MD
Helene Irwin Fagan Chair in Cardiology
Professor, Molecular and Cellular Physiology
Professor, Medicine - Cardiovascular Medicine
Professor (by courtesy), Chemical and Systems Biology

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CURRENT RESEARCH

The goal of my lab is to characterize the structure and mechanism of activation of G protein coupled receptors (GPCRs). GPCRs are the largest group of cellular receptors for hormones and neurotransmitters in the 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 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 approaches for the more efficient and economical development of safer and more effective therapeutics targeting these receptors.

It has been a great privilege to be part of the Stanford community, which provides a unique environment for interdisciplinary collaborations, and attracts the most talented and innovative students and fellows.

SELECTED PUBLICATIONS


Fredric Kraemer, MD
Stanford University Professor in Endocrinology

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CURRENT RESEARCH

Our research interests are in the general area of cellular lipid and lipoprotein metabolism. The work is aimed primarily at understanding the mechanisms regulating cholesterol and triglyceride accumulation in cells. We utilize a variety of techniques from cell biology, biochemistry, and molecular biology. Current research projects focus on the trafficking of cholesterol for steroid hormone synthesis, uptake and mobilization of fatty acids by cells and interplay between adipose cell and bone metabolism.

SELECTED PUBLICATIONS


CURRENT RESEARCH

My laboratory uses genetic, genomic, and biochemical approaches to map the development of the lung and identify stem and progenitor cells and the molecular pathways that control them. We are also mapping the neural circuit and the genetic and molecular basis of breathing. We are interested in understanding the normal processes and how they go awry in devastating human diseases such as lung cancer, pulmonary fibrosis, pulmonary hypertension and Sudden Infant Death Syndrome. I am an Investigator at the Howard Hughes Medical Institute and the Executive Director of the Vera Moulton Wall Center for Pulmonary Vascular Disease.

The tube is a fundamental unit of organ design. Understanding how tubes form and are maintained could unlock the secrets of many pulmonary and cardiovascular diseases and suggest new ways of treating them.

SELECTED PUBLICATIONS


Ellen Kuhl, PhD
Walter B Reinhold Professor in the School of Engineering
Robert Bosch Chair of Mechanical Engineering
Professor of Mechanical Engineering, and, by courtesy, Bioengineering

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CURRENT RESEARCH
Kuhl is the Walter B. Reinhold Professor in the School of Engineering and Robert Bosch Chair of Mechanical Engineering at Stanford University. She is a Professor of Mechanical Engineering and, by courtesy, Bioengineering. She received her PhD from the University of Stuttgart in 2000 and her Habilitation from the University of Kaiserslautern in 2004. Her area of expertise is Living Matter Physics, the design of theoretical and computational models to simulate and predict the behavior of living systems. Ellen has published more than 200 peer-reviewed journal articles and edited two books; she is an active reviewer for more than 50 journals at the interface of engineering and medicine and an editorial board member of seven international journals in her field. She is a founding member of the Living Heart Project, a translational research initiative to revolutionize cardiovascular science through realistic simulation with 400 participants from research, industry, and medicine from 24 countries. Ellen is the current Chair of the US National Committee on Biomechanics and a Member-Elect of the World Council of Biomechanics. She is a Fellow of the American Society of Mechanical Engineers and of the American Institute for Medical and Biological Engineering. She received the National Science Foundation Career Award in 2010, was selected as Midwest Mechanics Seminar Speaker in 2014, and received the Humboldt Research Award in 2016 and the ASME Ted Belytschko Applied Mechanics Award in 2021. Ellen is an All American triathlete, a multiple Boston, Chicago, and New York marathon runner, and a Kona Ironman World Championship finisher.

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Calvin Kuo, MD, PhD

Maureen Lyles D’Ambrogio Professor, Medicine - Hematology
Professor, by courtesy, of Chemical and Systems Biology
Co-Lead, Cancer Biology Program, Stanford Cancer Institute
Vice Chair, Department of Medicine

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CURRENT RESEARCH

A major focus of my laboratory is the definition of molecular mechanisms of central nervous system angiogenesis and blood-brain barrier regulation, using knockout mouse and adenoviral approaches. In particular, we have generated conditional floxed alleles for the orphan G-protein coupled receptor GPR124 expressed in brain endothelial cells, revealing embryonic lethality from highly specific developmental CNS angiogenesis phenotypes, and allowing testing of essential requirements of this receptor during adulthood and diseases such as stroke or brain tumors. We are interested in developing novel pharmacologic modulators of blood-brain barrier permeability. We also study the endothelial-expressed miR-126/Egfl7 locus using floxed mouse alleles. Additional parts of the lab work in stem cell biology and 3D organoid culture of diverse human organs. This has led to a strong interest in lung stem cell biology and regenerative medicine.

If we knew what we were doing it wouldn't be called research, would it? — Albert Einstein

SELECTED PUBLICATIONS


Anson Lee, MD
Assistant Professor of Cardiothoracic Surgery (Adult Cardiac Surgery)

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CURRENT RESEARCH

My lab is working to advance the understanding of the mechanisms of cardiac arrhythmias and to apply that understanding to develop potential therapies to treat atrial fibrillation and other disorders of cardiac rhythm. We have investigations at the genomic level, whole organ tissue level, and clinical studies in humans. We are developing new high resolution mapping tools to characterize atrial fibrillation, and are using cell culture to examine arrhythmias at the cellular level. Utilizing the knowledge from these investigations, we are also developing minimally invasive surgical techniques to treat arrhythmia.

We have to do better. If our success rates with coronary artery disease were as bad as our results with atrial fibrillation, we would all be out of business.

SELECTED PUBLICATIONS

David Lee, MD
Associate Professor of Medicine (Cardiovascular Medicine)

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CURRENT RESEARCH
My current research is largely focused on developing new technology for interventional cardiology. I helped develop catheter-based renal denervation as a treatment for hypertension, and my current studies have focused on RDN as primary therapy alone or in combination with medications. My other projects include a novel set of devices for mitral valve interventions and a large-bore vascular closure device.

SELECTED PUBLICATIONS


My clinical research interests focus on developing and refining endovascular techniques to treat complex aortic pathology related to aneurysms and dissections, particularly as Stanford’s local principal investigator for numerous endograft trials, and having also accumulated one of the largest series of fenestrated and snorkel/chimney procedures for juxtarenal aortic aneurysms in the country. As a surgical educator and former Robert Wood Johnson Faculty Physician Scholar, my lab has demonstrated that endovascular simulation for students and trainees translates to increased learner interest, more efficient surgical training, and improved operative performance. We are currently collaborating with multiple institutions designing national standards for technical skills assessment. Our lab most recently has been collaborating through the CVI on computational flow modeling to help best predict which strategy of endograft might be best suited for particular anatomy. I maintain an active busy practice also with a niche interest in athletic vascular compressive disorders. And finally, I recently assumed the Division Chief Role for our Vascular Surgery Group, and am committed to continued excellence in our division from a clinical care, research, and education standpoint.

Don't bet against technology - continued device innovation and technical improvements will provide patients with much less invasive ways to cure their vascular diseases.

**SELECTED PUBLICATIONS**


As much as half of an individual’s lifetime risk for cardiovascular disease is genetic in nature. My laboratory is focused on defining and understanding the heritable factors which account for this risk. Specifically, we employ agnostic, genome-wide approaches to prioritize candidates for molecular investigation. Currently, our main focus is on a process known as “efferocytosis” (Latin: to carry the dead to the grave) and developing novel translational therapies which can stimulate phagocytic removal of apoptotic debris from the necrotic core of the atherosclerotic plaque.

In questions of science the authority of a thousand is not worth the humble reasoning of a single individual.

— Galileo Galilei

SELECTED PUBLICATIONS


CURRENT RESEARCH

My laboratory studies how thrombin, the key enzyme in the coagulation cascade, interacts with its various substrates to regulate hemostasis, inflammation, and innate immunity. Thrombin interacts with the endothelial cell cofactor thrombomodulin to activate protein C and procarboxypeptidase B (pCPB). Activated CPB inactivates a number of proinflammatory mediators and regulates the proinflammatory activities of thrombin in a homeostatic fashion.

Our long-term goal is to define the molecular links important in the crosstalk between hemostasis, thrombosis, inflammation and innate immunity, thereby developing clinically useful diagnostic and therapeutic reagents.

SELECTED PUBLICATIONS


CURRENT RESEARCH

Our research interests are to explore and create new instrumentation and signal processing algorithm concepts for in vivo imaging of molecular signatures of disease in living subjects. These novel cameras efficiently image emissions from molecular contrast agents to probe disease biology in tissues residing deep within the body using measurements made from outside the body. The technology goals are to advance the sensitivity and spatial, spectral, and/or temporal resolutions, to create new camera geometries for special biomedical applications, to understand the entire imaging process comprising the subject tissues, radiation transport, and imaging system, and to provide the best available image quality and quantitative accuracy. The ultimate goal is to introduce these new imaging tools into studies of molecular mechanisms and treatments of disease in living subjects.

It is better to light a candle than to curse the darkness — attributed to William L. Watkinson

SELECTED PUBLICATIONS


Dr. Lewis is an internationally recognized clinical expert in the field of advanced heart failure, heart transplantation, and mechanical circulatory support. He has an interest in preventing the development of and progression of heart failure by investigating novel strategies and therapies for treating these co-morbid illnesses. He also performs quality of life research to better understand how to improve these outcomes and include them into medical decision making. His work has included understanding the biological and social factors that influence patient reported outcomes and progression of disease from risk factors (e.g., diabetes, chronic kidney disease and hypertension) to heart failure. He has been involved in numerous clinical trials across the spectrum of cardiovascular diseases that aim to improve patient outcomes and quality of life. These include several innovative approaches to prevent the progression of disease, reduce the rate of readmission following heart failure hospitalization, improve patient understanding prior to surgical interventions, and improve the clinical usefulness of quality of life assessments. Over a decade ago, Dr. Lewis initiated a patient questionnaire on symptoms and concerns that became a routine part of clinical care. He also is leading efforts to better understand and reduce health inequities. He holds leadership positions in national organizations, including Chair of Scientific Publishing Committee and Council on Clinical Cardiology in the AHA.
Our laboratory has played an international leading role in the study of amyloid light chain (AL) cardiomyopathy, a rare and fatal form of cardiovascular disease. We have described the underlying pathophysiologic basis for amyloid cardiomyopathy and found that the circulating amyloidogenic light chain proteins that characterize this disease directly result in a specific cardiotoxic response. Consequently, our research work has redefined AL cardiomyopathy and has raised new treatment approaches. In line with our goal of revealing novel therapeutic strategies for patients with cardiovascular disease, our efforts have also focused on characterizing and harnessing endogenous cardiac regenerative mechanisms. Our group initially demonstrated the therapeutic potential of exogenous primitive muscle cells delivered to the injured heart. This work was among the earliest milestones in the field and served as the basis for an international trial of cell-based therapy. We aim to reveal the molecular mechanisms regulating the endogenous regenerative capacity of the heart and to harness such repair mechanisms for the treatment of cardiovascular disease.

If we knew what it was we were doing, it would not be called research, would it?
—Albert Einstein

SELECTED PUBLICATIONS


Bryant Lin, MD, MEng
Clinical Associate Professor, Department of Medicine, Division of Primary Care and Population Health
Co-Director, Center for Asian Health Research and Education
Director, Medical Humanities and Arts

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CURRENT RESEARCH
Bryant Lin, MD, MEng is a primary care physician, educator and researcher. The cornerstone of Dr. Lin’s work is keeping medicine focused on humans - patients, providers, families and trainees - and not lost in technology and algorithms. His research and educational interests span (1) Developing and testing novel medical technologies, (2) Improving the health of Asian populations with Precision and Population Health, and (3) Increasing expression and interconnections in the Health Community with the Humanities and Arts. He serves as the Training Director for the Joe and Linda Chlapaty DECIDE Center which has created a novel shared decision-making tool for atrial fibrillation anti-coagulation and is an investigator in several active clinical trials in Diabetes and Atrial Fibrillation. Three years ago, he co-founded and currently co-directs, with Dr. Latha Palaniappan, the Center for Asian Health Research and Education (CARE) which aims to improve the health of Asians everywhere. As part of his role as Director of Medical Humanities and Arts, Dr. Lin has an active interest in storytelling and film-making. He co-directs an undergraduate seminar, MED 53Q “Storytelling in Medicine”, with Dr. Lauren Edwards and is working with a group of students on a documentary on end-of-life care at a Japanese-American Senior Home in the Bay Area.

SELECTED PUBLICATIONS


Michael Longaker, MD

Deane P. and Louise Mitchell Professor in the School of Medicine and Professor (by courtesy) of Bioengineering and Materials Science and Engineering

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CURRENT RESEARCH

Michael Longaker’s extensive research experience includes the cellular and molecular biology of extracellular matrix with specific applications to the differences between fetal and post-natal wound healing, the biology of keloids and hypertrophic scars, the cellular and molecular events in craniofacial development and stem cell biology. In addition, his research investigates craniofacial development and skeletal stem cell biology. He has a unique understanding of wound healing, fetal wound healing research, developmental biology, tissue engineering, and stem cell biology.

The harder I work, the luckier I get.
— Thomas Jefferson

SELECTED PUBLICATIONS


George Lui, MD

Clinical Associate Professor, Medicine (Cardiovascular Medicine) and Pediatrics (Cardiology)
Medical Director, Adult Congenital Heart Program

I am currently working with the Centers for Disease Control and Prevention on the Surveillance of Congenital Heart Defects Among Children, Adolescents and Adults. The goal of this project is to build on existing infrastructure for population-based CHDs surveillance to (i) estimate congenital heart defect prevalence in individuals ages 1-45, (ii) examine age-specific mortality, (iii) improve understanding of healthcare utilization, comorbidities and outcome, (iv) improve understanding of racial/ethnic and socioeconomic patterns in healthcare use, and (v) validate billing codes for congenital heart defects in healthcare claims data.

There are more than a million U.S. adults living with congenital heart disease. I hope that we can enhance the quality of care and longevity for these individuals through our clinical expertise, education, and research.

SELECTED PUBLICATIONS


Michael Ma, MD
Assistant Professor
Department of Cardiothoracic Surgery
Department of Pediatric Cardiac Surgery
Surgical Director, Complex Biventricular Reconstruction
Surgical Director, Pediatric Advanced Cardiac Therapies

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Current Research
My lab is dedicated to improving outcomes for children born with complex heart disease, by melding clinical surgical expertise with novel techniques in bio and mechanical engineering. Just as virtual computer-based simulation, prototyping, and failure analysis have delivered innovation in other disciplines, our team studies congenital heart defects and their surgical treatments using computational fluid dynamics and ex-vivo biomechanical simulations to inform large animal experiments that can lead to clinically meaningful discoveries for these patients.

My academic and clinical endeavors are motivated by the palpable hope (and fear) that parents impart when they entrust their child with complex heart disease to our care.

Selected Publications
John W. MacArthur, MD
Assistant Professor
Department of Cardiothoracic Surgery
Surgical Director, Lung Transplantation

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PROFILE profiles.stanford.edu/john-macarthur
LAB cve.stanford.edu
INSTAGRAM jwmacarthur

CURRENT RESEARCH
My research focus is on the application of novel cell based and bioengineering methods towards understanding and treating ischemic heart disease and heart failure.

SELECTED PUBLICATIONS


Merritt Maduke, PhD
Associate Professor of Molecular and Cellular Physiology

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WEBSITE https://med.stanford.edu/maduke.html

CURRENT RESEARCH
Ion transit across cell membranes is central to cardiovascular function. The Maduke laboratory studies the molecular mechanisms of the proteins that catalyze ion transit – ion channels and transporters. We use a combination of biophysical methods to investigate protein structure and dynamics, electrophysiological analyses to measure function, and chemical design (in collaboration with the Du Bois laboratory) to develop small-molecule tools. We also apply our expertise in ion channels towards understanding the mechanism by which ultrasound modulates neural activity. Finally, we are working on an interdisciplinary preclinical project (Chiu, Dror, Smith, and Pao labs) to evaluate the CLC-Ka chloride channel as a therapeutic target for treating pathologic water retention (hyponatremia).

Nothing will work if you don’t.
— Maya Angelou.

SELECTED PUBLICATIONS


A major theme in our group is to define metrics of immune competence in various settings, including cancer immunotherapy, organ transplantation, allergy, and chronic viral infection. We use CyTOF mass cytometry, often in combination with other technologies, to broadly survey immune features at the cellular level, then examine links between features or groups of features and clinical outcome. A long-term goal is to create an assay of global immune competence that could predict risk for various immune-related outcomes in both healthy individuals and in disease.

It’s hard to tell the poison from the cure; harder still to know the reason why. — Sting

SELECTED PUBLICATIONS


My primary research focus is the design and conduct of multicenter clinical trials and analyses of important clinical cardiac issues using large patient databases. My research has focused on the evaluation of pharmaceutical agents for the treatment of acute coronary syndromes, atrial fibrillation, hyperlipidemia, and diabetes mellitus. I am also interested in evaluation of digital and mobile technologies and the integration of these technologies in clinical evaluation and care. I am the founder and director of the Stanford Center for Clinical Research an academic research organization to support clinical research. I am the Vice Chair of Clinical Research in the Department of Medicine.

We need to bring the key stakeholders together—academia, industry, regulatory agencies and other important bodies—to do research more efficiently.

SELECTED PUBLICATIONS


My research is devoted to the application of evidence-based medicine for the prevention and treatment of coronary artery disease. I am Co-Chair of the ISCHEMIA and ISCHEMIA-CKD trials, large international NIH/NHLBI-funded trials that compared the effectiveness of conservative versus invasive management of patients with stable coronary disease and at least moderate ischemia on stress testing, with or without advanced chronic kidney disease. My current work includes the long-term follow-up of the ISCHEMIA trial participants, using Project Baseline to find new signals that indicate the onset or progression of coronary artery disease, using an artificial intelligence deep-learning algorithm to identify incidental coronary artery calcium on routine chest CT scans so that patients and their physicians can be notified to implement preventive interventions, and conducting a trial of remote patient monitoring and health coaching to manage uncontrolled hypertension.

SELECTED PUBLICATIONS


Alison Marsden, PhD
Professor of Pediatrics (Cardiology) and of Bioengineering and (by courtesy) of Mechanical Engineering

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LAB cbcl.stanford.edu

CURRENT RESEARCH

Alison Marsden is Professor and Wall Center scholar in the departments of Pediatrics, Bioengineering, and, by courtesy, Mechanical Engineering at Stanford University. From 2007-2015 she was a faculty member in the Mechanical and Aerospace Engineering Department at the University of California San Diego. She graduated with a bachelor's degree in Mechanical Engineering from Princeton University in 1998, and a PhD in Mechanical Engineering from Stanford in 2005. She was a postdoctoral fellow at Stanford University in Bioengineering and Pediatric Cardiology from 2005-07. She was the recipient of a Burroughs Wellcome Fund Career Award at the Scientific Interface (2007), an NSF CAREER award (2011), received the UCSD graduate student association faculty mentor award (2014) and MAE department teaching award (2015). She is a fellow of the Biomedical Engineering Society, the American Physics Society, the American Institute for Medical and Biological Engineering, and the Society for Industrial and Applied Mathematics. She has published over 140 peer reviewed journal papers, and has received funding from the NSF, NIH, DoD, and several private foundations. She serves on the editorial boards of several journals including PLOS Computational Biology, Scientific Reports, Current Opinion in Biomedical Engineering, and Cardiovascular Engineering and Technology. She is on the advisory board for the Burroughs Wellcome Fund. Her work focuses on the development of numerical methods for cardiovascular blood flow simulation, medical device design, optimization to large-scale fluid mechanics simulations, and application of engineering tools to impact patient care in cardiovascular surgery and congenital heart disease.

Failure is closer to success than inaction.
— Earl Bakken

SELECTED PUBLICATIONS


Nicholas Melosh, PhD
Associate Professor of Material Science and Engineering and of Photon Science

Email nmelosh@stanford.edu
Profile med.stanford.edu/profiles/nicholas-melosh

Current Research
The focus of my research is engineering cell access and dynamic bio-electronic interfaces. I am very interested in how to design new structures that will seamlessly integrate with biological systems to address problems in molecular delivery, iPSC development, cell sampling, and electrical recording. This involves both fundamental work such as to deeply understand how lipid membranes interact with inorganic surfaces, electrokinetic phenomena in biologically relevant solutions, and applying this knowledge into new device designs. Examples of this include “nanostraw” drug delivery platforms for direct delivery or extraction of material through the cell wall using a biomimetic gap-junction made using nanoscale semiconductor processing techniques. We also engineer materials and structures for electrical interfaces and highly parallel stimulation and recording. For instance, we have created inorganic electrodes that mimic the hydrophobic banding of natural transmembrane proteins, allowing them to ‘fuse’ into the cell wall, providing a tight electrical junction for solid-state patch clamping. In addition to significant efforts at engineering surfaces at the molecular level, we also work on ‘bridge’ projects that span between engineering and biological/clinical needs.

One of the most exciting developments over the past ten years is the merging of engineered devices and biological problems to make clinical impacts.

Selected Publications


Doff McElhinney, MD
Professor of Cardiothoracic Surgery (Pediatric Cardiac Surgery) and of Pediatrics (Cardiology)

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PROFILE med.stanford.edu/profiles/doff-mcelhinney

CURRENT RESEARCH
My interests are in outcomes research, transcatheter device therapy for congenital heart disease, and collaborative translational investigation related to the pathophysiology, evaluation, and management of pediatric and adult congenital heart disease. I am Director of the Lucile Packard Children’s Hospital Stanford Heart Center, Program for Clinical and Translational Research.

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Mark Mercola, PhD
Professor of Medicine, Cardiovascular Medicine

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PHONE 650-721-3281

CURRENT RESEARCH

Our goal is to discover new therapeutic targets and therapeutics for heart failure, and to remove the adverse cardiac effects of oncology drugs. Over the past two decades, our studies laid the groundwork for the efficient production of heart cells from pluripotent stem cells, and for automated, high throughput screening of genes, proteins and small molecules for the ability to ameliorate disease symptoms. Our current pipeline starts with cardiomyopathy and arrhythmia models generated using patient and genome edited iPSCs and uses them in screens to find new therapeutic targets and develop novel therapeutic strategies. The most advanced projects are now in preclinical, large animal testing.

There is so much we can do now to understand the human condition that would have been unimaginable only a few years ago—in many ways we live in the best of times.

SELECTED PUBLICATIONS


EDUCATION/TRAINING

PHD UCLA
BA UCLA

HONORS & AWARDS

American Cancer Society Postdoctoral Fellowship (1986)
Basil O’Connor Award, March of Dimes Birth Defects Foundation (1991)
Established Investigator Award, American Heart Association (1997)
National Institutes of Health MERIT Award (2007)
D. Craig Miller, MD
Thelma and Henry Doelger Professor in Cardiovascular Surgery
Department of Cardiothoracic Surgery

EMAIL dcm@stanford.edu
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CURRENT RESEARCH

Cardiac and heart valve disease with experimental laboratory large animal projects focused on the investigation of left ventricular and cardiac mechanics, bioenergetics, and LV and mitral valve physiology and pathophysiology. Current thrust is aimed at understanding the mitral valve and subvalvular mitral apparatus and transmural LV wall strains, thickening, and myolaminar fiber-sheet mechanics.

Clinical research interests include thoracic aortic diseases (aortic dissection, aneurysm) and cardiac valvular disease, including surgical treatment, endovascular thoracic aortic stent-graft repair, mitral valve repair, and valve-sparing aortic root replacement.

Those who cannot remember the past are condemned to repeat it.
— George Santayana (1863-1952)

SELECTED PUBLICATIONS


Daria Mochly-Rosen, PhD
George D. Smith Professor of Translational Medicine
Professor, Chemical and Systems Biology
Co-director, SPARK - Stanford’s Translational Research Program
President and Founder, SPARK GLOBAL

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WEB sparkmed.stanford.edu and sparkglobal.io/

CURRENT RESEARCH

Our basic research focuses on elucidating molecular events that contribute to heart diseases, generating tools to interfere with these pathologies and the translation of them into drug leads. We have used both rationally designed peptides and small molecules to regulate key signaling events and metabolism in the myocardium. Our research has led to several clinical trials using drugs that were developed in our laboratory at Stanford. My passion for translational research led me to create and co-direct SPARK that helps scores of inventors at Stanford move their early research discoveries to clinical trials and/or to licensing for drug development. I am the Founder and Co-director of SPARK - Stanford’s Translational Research Program and the Founder and President of SPARK GLOBAL, a network of translational scientists without borders, now in ~70 institutes on six continents.

I believe that it is our social responsibility to ensure that basic and clinical discoveries are translated into products that benefit patients. By providing the knowhow and the tools, together with industry experts we are making it happen.

SELECTED PUBLICATIONS


Jonathan Myers, PhD
Clinical Professor, Medicine - Cardiovascular Medicine
Research Coordinator, Exercise Physiology Lab, VA Palo Alto Health Care System

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WEB cardiology.org

CURRENT RESEARCH
Our research group focuses on clinical applications of exercise testing and training in patients with cardiovascular disease. We coordinate several national and international data bases designed to address cardiopulmonary exercise test, clinical, and lifestyle factors and their association with health outcomes. We provide collaborators with the means to use exercise as a medium to study mechanisms of disease and improve outcomes. Current projects include the effects of training on peripheral vascular disease, renal failure, gene expression, coronary disease, and mild cognitive impairment.

If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health. — Hippocrates

SELECTED PUBLICATIONS


Kari Nadeau, MD, PhD
Naddisy Foundation Professor of Medicine and Pediatrics
Senior Fellow at the Woods Institute
Fellow, CIGH, and Professor, by courtesy, of Otolaryngology and of Epidemiology and Population Health
Director Sean N Parker Center for Allergy and Asthma Research at Stanford University

CURRENT RESEARCH
She and her team are focused in areas of vaccine allergies, asthma, cardiovascular disease, global climate change and health by studying air pollution and wildfire exposures, particularly in underserved areas. As one of the globe’s foremost experts in adult and pediatric allergy, immunology, and asthma, her research is laying the groundwork for a variety of potential future therapies to prevent and cure allergies and asthma. Her lab has joined the global effort to treat patients with COVID-19 and to understand the effects of SARS-CoV-2 on the immune system, including those with cancer, autoimmune disease, and with allergic disease, such as food allergy, allergic asthma, and atopic dermatitis. Her team has experience and expertise in cell cultures, cellular assays, immunophenotyping, proteomics, and metabolomics. They have currently biobanked plasma and immune cells from over 500 patients with COVID-19 and Dr. Nadeau is one of the leaders of the Stanford COVID-19 Biobank so there is synergy and sharing of all samples. She has successfully worked with global leaders, NIH, FDA, EPA, and policy makers to apply scientific evidence towards making sustained impacts in human and planetary health. She has worked with community outreach, underserved populations, and actively engage in community-based participation. She has overseen over 40 clinical trials and cohort studies in air pollution, immunology, asthma, allergy, and COVID 19, and have overseen 4 birth cohorts and 2 pregnancy cohorts and enrolled over 6,000 patients in longitudinal studies. She was part of the Children’s Environmental Health Studies through the NIEHS and EPA. Her accomplishments to date include over 320 peer-reviewed publications: her laboratory has published over 12 peer-reviewed manuscripts per year, many in high-impact journals.

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Sanjiv Narayan, MD, MSc
Professor of Medicine (Cardiovascular Medicine)

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LAB https://narayanlab.stanford.edu

CURRENT RESEARCH

I direct an NIH-funded translational laboratory which applies bioengineering and computational approaches to better understand heart rhythm disorders and develop novel therapies to treat patients. We developed the first computational systems to map atrial fibrillation and ventricular fibrillation to identify localized driver mechanisms as personalized targets for therapy. The accuracy of mapping has been confirmed by optical mapping of human atria, and this is now an active field of research and device innovation. We also apply computational and machine learning tools to better understand and treat life-threatening ventricular arrhythmias. Some of these discoveries have been spun-off into commercial entities. We are dedicated to mentorship, and at least one trainee in our lab has won a grant or research prize each year since 2003.

Our mantra is bedside-to-bench-to-bedside research integrating bioengineering and computational methods with sound physiological understanding.

SELECTED PUBLICATIONS


EDUCATION/TRAINING

MSc U. of Birmingham, England (1990)

AWARDS/GRANTS

PI of R01 HL149134 "Machine Learning of Atrial fibrillation"
PI of R01 HL83359 "Machine Learning of Atrial fibrillation"
Co-PI of R01 HL122384 "Patient-Directed Computational Analysis of AF"
Mark R. Nicolls, MD

Professor, Medicine - Division of Pulmonary, Allergy and Critical Care Medicine
Chief, Division of Pulmonary, Allergy and Critical Care Medicine
Director, Lung Immunology
Endowed Chair: The Stanford Professor of Pulmonary and Critical Care Medicine

CURRENT RESEARCH

I specialize in the treatment of lung transplant patients. I have practiced pulmonary and critical care medicine for 20 years. We focus on how the immune system contributes to vascular injury leading to a variety of diseases and pathology with a special focus on lung transplantation, pulmonary hypertension, COPD, and lymphedema.

SELECTED PUBLICATIONS


Koen Nieman, MD, PhD
Associate Professor of Medicine (Cardiovascular Medicine) and Radiology (CV Imaging)

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PROFILE med.stanford.edu/profiles/koen-nieman

CURRENT RESEARCH
Dr. Nieman is a cardiologist and associate professor in the departments of cardiovascular medicine and radiology. He investigates advanced cardiac imaging techniques, and current research interest include stress myocardial perfusion CT, CT-based fractional flow reserve, machine-learning approaches to disease differentiation, imaging-guided decision making and the clinical value of cardiac CT in ischemic heart disease. Dr. Nieman was born in the Netherlands, obtained his medical degree at the Radboud University in Nijmegen (1998), and completed his cardiology training at the Erasmus University Medical Center in Rotterdam (2008). His research in cardiac CT at the Erasmus University resulted in a PhD degree in 2003. In 2004 he performed an imaging fellowship at the Massachusetts General Hospital (Harvard Medical School) in Boston, MA. Dr. Nieman became faculty at Erasmus (cardiology/radiology) in 2008 and was scientific director of cardiac CT and MRI and clinical director of the intensive cardiac care unit until he joined Stanford in 2016.

SELECTED PUBLICATIONS


Patricia K. Nguyen, MD
Assistant Professor, Medicine - Cardiovascular Medicine

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CURRENT RESEARCH

Dr. Nguyen is a cardiologist and assistant professor in the Division of Cardiovascular Medicine at Stanford University. She is also Director of Advanced Imaging and Co-Director of the Cardiac Rehabilitation Program at the VA Palo Alto Medical center. She graduated from Johns Hopkins Medical School and finished her internal medicine residency at New York Presbyterian Hospital. She then completed her fellowship in cardiovascular medicine and advanced imaging at Stanford University. Her laboratory focuses on developing better diagnostic and therapeutic strategies for the management of coronary artery disease. Her research projects include studies evaluating how stem cells can be applied for treatment of coronary heart disease, how the adaptive immune system contributes to atherosclerosis, and how exercise improves cardiovascular health.

[Humans] love to wonder, and that is the seed of science... — Ralph Waldo Emerson

SELECTED PUBLICATIONS


My lab utilizes human induced pluripotent stem cells to evaluate the impact of anesthetics on both cardiovascular function and cardiac development. The current opioid crisis directed our attention to the function of GPCR within the cardiovascular system and the impact of chronic opioid receptor stimulation on the three different opioid receptors expressed within cardiovascular tissue. Utilizing single molecular tracking techniques and high throughput screening methods, we try to understand how chronic opioid administration affects cardiac function and receptor distribution within cardiomyocytes and endothelial cells. The longterm goal is to understand the impact of chronic receptor stimulation on the individual receptor function and its interplay with other cell membrane components in patient specific cells and tissue. Peripartum administration of opioids has become a common problem in the US. Therefore, we are investigating the role of endogenous and exogenous opioids on cardiac development. The role of opioid receptors within the developing heart is barely understood. My lab utilizes 2D and 3D cell models, as well as in vivo experiments to determine how chronic opioid administration affects cardiomyocyte and endothelial cell differentiation and their cell interaction during early stages of heart development. Our efforts will help to elucidate the fundamental role opioids play within the cardiovascular system.

It always seems impossible until it’s done.
- Nelson Mandela.

**SELECTED PUBLICATIONS**


Latha Palaniappan, MD, MS
Professor of Medicine - General Medical Disciplines

EMAIL lathap@stanford.edu
PROFILE med.stanford.edu/profiles/latha-palaniappan

CURRENT RESEARCH

My work focuses on the study of diverse populations, chronic disease, and prevention. My group specifically seeks to address the gap in knowledge of health in Asian subgroups and other understudied racial/ethnic minorities (PACS 5R01DK081371, CASPER R01HL126172, and CAUSES R01MD007012). I co-founded (with Dr. Bryant Lin) the Center for Asian Health Research and Education (CARE) at Stanford in 2018. My current work examines the clinical effectiveness of structured physical activity programs for diabetes management (Initiate and Maintain Physical Activity in Clinics - IMPACT, 5R18DK096394), as well as best exercise regimens for normal-weight diabetics (Strength Training Regimen for Normal Weight Diabetics - STRONG-D, 2R01DK081371). I implement evidence based genetic and pharmacogenetic testing in Primary Care Clinics as the Scientific Director of Precision Genomics and Pharmacogenomics in Primary Care. I am the faculty lead of the Precision Health Biobank at Stanford, a population based biobank designed to accelerate genetic and other -omics discovery.

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Marco V. Perez, MD
Associate Professor, Medicine - Cardiovascular Medicine

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PROFILE med.stanford.edu/profiles/marco-perez
WEB familyheart.stanford.edu

CURRENT RESEARCH

Dr. Marco Perez’s research goal is to better understand the fundamental causes of cardiovascular disease through the study of genetics and epidemiology. His group studies the genetic variations and environmental exposures that are associated with conditions such as atrial fibrillation and heart failure. He has led the studies of atrial fibrillation in Women’s Health Initiative, one of the largest nation-wide population-based cohorts. He is currently conducting a large study monitoring for silent or asymptomatic atrial fibrillation in women from the WHI randomized to exercise intervention, and is co-PI in the Apple Heart Study, a clinical trial using the Apple Watch to screen for atrial fibrillation. He is interested in understanding the paradox that atrial fibrillation is less common in African Americans and Hispanics, despite a greater burden of risk factors such as hypertension. As director of the Stanford Inherited Arrhythmia Clinic, he evaluates families with rare inherited arrhythmias associated with sudden death such as Long QT and Brugada Syndromes and explores their links with novel genes. He is particularly interested in studying the genetic causes of very early onset atrial fibrillation. He also studies how best to use the electrocardiogram to identify patients at risk for atrial fibrillation and athletes at risk for life-threatening arrhythmias due to conditions such as hypertrophic cardiomyopathy. His genetic studies have led to the discovery of promising novel therapeutic targets that his group is now studying at a functional level.

SELECTED PUBLICATIONS


Sedentary Behavior and Atrial Fibrillation in the Objective Physical Activity and Cardiovascular Health (OPACH) Study. Brian C. Boursiquot, MD, MS, John Bellettiere, PhD, MPH, Michael J. LaMonte, PhD, MPH, Andrea Z. LaCroix, PhD, MPH, Marco V. Perez, MD. J Am Heart Assoc, 2022 (in press).

EDUCATION/TRAINING

MD Harvard University
RESIDENCY & INTERNSHIP
Massachusetts General Hospital
FELLOWSHIP Stanford University
BOARD CERTIFICATION
American Board of Internal Medicine (ABIM), Cardiovascular Disease,
HONORS & AWARDS
NIH/NHLBI 1R01HL136390-01 (PI)
Apple Heart Study, Apple Inc. (Co-PI)
NIH/NHLBI HHSN268201100003C (Co-I)
Weston Havens Foundation Grant (PI)
Ada Poon, PhD
Associate Professor, Electrical Engineering

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CURRENT RESEARCH

Our research focuses on providing theoretical foundations and engineering innovations for realizing microelectronics that seamlessly integrate with the body. Such systems will allow precise recording or perturbation of physiological processes for advancing basic scientific discovery, and restoring or augmenting biological functions for clinical applications. Although microelectronics can be made extremely small, existing methods for powering them involve large batteries or energy harvesting modules. The size of these powering components severely constrains the integration of microelectronics in living systems. The main thrust of our research aims to address these obstacles through fundamental understanding of power transfer physics with advances in low-power integrated circuits in order to demonstrate the injection of fully operational sensors, electrodes, light sources, and other electronics deep inside the body. An array of these tiny probes enables measurement or perturbation of physiological parameters in previously inaccessible locations and over long time periods.

Angels can fly because they take themselves lightly. — G.K. Chesterton

SELECTED PUBLICATIONS


Richard Popp, MD
Professor of Medicine (Emeritus)

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CURRENT RESEARCH

Richard Popp is Professor of Medicine (Emeritus 2005) at Stanford University. Dr. Popp is a clinical Cardiologist who focused his research on development of all forms of ultrasound with more than 300 scientific publications. Dr. Popp was Senior Associate Dean for Academic Affairs at Stanford from 1995-2000. He continues to teach in the Stanford Biodesign Innovation Program. He was Chair the Conflict of Interest Committee at the Medical School from 2000 to 2018. Dr. Popp was President of the American College of Cardiology, the American Society of Echocardiography and the Association of University Cardiologists. He is the previous Chairman of the American Board of Internal Medicine's Cardiovascular Diseases Subspecialty Board. He has received several special recognitions including The Rambam Award in Israel in 2012, the Gold Medal of the European Society of Cardiology in 2016 and the Albion Walter Hewlett Award of Stanford University in 2017. Dr. Popp was an H-P fellow and Principal Medical Consultant to Hewlett-Packard Laboratories and Agilent Labs for many years. He was an advisor and consultant to Acuson, ATL, H-P Medical Ultrasound Division and Varian.

SELECTED PUBLICATIONS


Stephen Quake, PhD
Lee Otterson Professor in the School of Engineering and Professor of Bioengineering, Applied Physics, and (by courtesy), of Physics

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PROFILE med.stanford.edu/profiles/stephen-quake
DIVISION cvmedicine.stanford.edu
LAB quakelab.stanford.edu

CURRENT RESEARCH
Professor Quake’s interests lie at the nexus of physics, biology and biotechnology. His group pioneered the development of Microfluidic Large Scale Integration (mLSI), demonstrating the first integrated microfluidic devices with thousands of mechanical valves. This technology is helping to pave the way for large scale automation of biology at the nanoliter scale, and he and his students have been exploring applications of lab-on-a-chip technology in functional genomics, genetic analysis, and structural biology. Professor Quake is also active in the field of single molecule biophysics.

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Thomas Quertermous, MD
William G. Irwin Professor in Cardiovascular Medicine

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PROFILE  med.stanford.edu/profiles/thomas-quertermous
DIVISION  cvmedicine.stanford.edu
LAB  quertermous.stanford.edu

CURRENT RESEARCH

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.

When not working on disease genes, I enjoy listening to blues music.

SELECTED PUBLICATIONS


Marlene Rabinovitch, MD

Endowed Chair, Dwight and Vera Dunlevie Professorship in Pediatric Cardiology Director, Basic Science and Engineering Initiative, Stanford Children’s Health Betty Irene Moore Children’s Heart Center

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LAB med.stanford.edu/labs/rabinovitchbland

CURRENT RESEARCH

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. We focus on inflammation and autoimmunity in PAH. CyToF and multiple high throughput approaches are applied in immunophenotyping patients and experimental models of PAH. In addition, we investigate the use of induced pluripotent stem cells to understand the genetic and epigenetic factors that cause PAH. We recently discovered molecular pathways downstream of bone morphogenetic protein receptor (BMPR)2 explaining how activation of this receptor protects EC from apoptosis preventing obliteration and loss of pre-capillary arteries and attenuates proliferation of SMC and fibroblasts. Using human cells and genetically modified mice, we elucidate interactions between BMPR2 signaling and PPARγ mediated gene regulation. We relate mutant BMPR2 to heightened GM-CSF mediated macrophage recruitment, and PPARγ to DNA damage/repair mechanisms and preservation of mitochondrial function.

The patient with pulmonary hypertension still mystifies even the most astute of physicians.

SELECTED PUBLICATIONS


Jayakumar Rajadas, PhD

Founding Faculty Director, Advanced Drug Delivery and Regenerative Biomaterials Laboratory (ADDReB) Stanford CVI
Assistant Professor, Division of Pulmonary, Allergy, and Critical Care
Assistant Director, Cardiovascular Pharmacology, Stanford CVI
Adjunct Full Professor, UCSF

EDUCATION/TRAINING

PHD Indian Institute of Technology

HONORS & AWARDS

YOUNG INVESTIGATOR AWARDS
Young Scientist Award in Chemistry, Council of Scientific and Industrial Research, India
TANSA Award, Government of Tamil Nadu, India

VISITING SCIENTIST
CNRS - National Centre for Scientific Research, France; ETH Zurich;
National Institute on Aging (NIA)

NIH CONSULTING PROFESSOR
Department of Chemical Engineering, Stanford University

VISITING PROFESSOR (STANFORD UNIVERSITY)
Department of Biological Sciences;
Department of Chemical Engineering;
Department of Psychiatry

STEERING COMMITTEE MEMBER
Stanford Cardiovascular Institute

FORMER FOUNDING CHAIR (INDIA)
Bioorganic and Neurochemistry Laboratory, CLRI, Council of Scientific and Industrial Research

ADJUNCT FULL PROFESSOR (UCSF)
Department of Bioengineering and Therapeutic Sciences
School of Pharmacy, University of California San Francisco

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LAB bioadd.stanford.edu

CURRENT RESEARCH

As the founding Director of the Advanced Drug Delivery and Regenerative Biomaterials Laboratory of Stanford Cardiovascular Institute, I have developed a wide spectrum of research projects ranging from small molecular design to smart drug delivery materials. My 32 years of research focuses on the application of biophysical techniques to development of drug delivery systems. I have been studying how protein aggregation in cardiomyocytes and neurons affects their functions. I have shown that misfolded protein accumulation is involved in the dysregulation of calcium homeostasis and cellular function. My lab colleagues and I have discovered therapeutic and neuro immune modulating effects of aA,B crystallin and later tested clinically. My lab has discovered the therapeutic effect of Disulfiram and Azilocillin for treatment of persistent Lyme disease, an unmet medical condition. For the past few years, we have been working on developing tissue organoids to study the drug efficacy. We recently observed glioblastoma organoids are electrically active, and they respond to neurotransmitter receptor-modulating drugs.

Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less. -Marie Curie

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Kristy Red-Horse, PhD
Associate Professor of Biology and the Institute of Stem Cell Biology and Regenerative Medicine
Investigator, Howard Hughes Medical Institute

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PROFILE med.stanford.edu/profiles/kristy-red-horse
LAB redhorselab.stanford.edu/

CURRENT RESEARCH

My laboratory studies how coronary vessels of the heart develop during embryogenesis and how they regenerate following cardiac injury. The unifying theme among all of our projects is to study coronary development and regeneration at cellular resolution within the context of the intact organ. Our long-term goal is to contribute knowledge towards the advancement of clinical treatments for cardiovascular disease.

SELECTED PUBLICATIONS


Endothelial Cells Respond to the Direction of Mechanical Stimuli Through SMAD Signaling to Regulate Coronary Artery Size. Aruna Poduri, Andrew H Chang, Brian Raftrey, Mike Man, Kristy Red-Horse. Development, Sep 15;144(18):3241-3252.


EDUCATION/TRAINING

PHD University of California, San Francisco
POSTDOCTORAL TRAINING
Genentech, Inc.
POSTDOCTORAL TRAINING
Stanford University

HONORS & AWARDS

Searle Scholar 2013-2016
New York Stem Cell Foundation Robertson Investigator 2015-2020
RESEARCHER PROFILES

Stanley G. Rockson, MD

Allan and Tina Neill Professor of Lymphatic Research and Medicine Chief of Consultative Cardiology
Director, Stanford Center for Lymphatic and Venous Disorders

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CENTER stanfordhospital.org/cardiovascularhealth/lymphaticvenous

I have devoted the last fifteen years of my career to the clinical and translational investigation of lymphatic vascular disease. More specifically, my laboratory and clinical research team focus on: biomarker identification and validation in lymphatic vascular disease; applications of therapeutic lymphangiogenesis; drug therapies for acquired lymphedema; and pharmacologic prevention of cancer-induced lymphedema. Having studied and characterized lymphatic vascular disease in small animal models, we are increasingly attempting to apply these insights to the human clinical problem of lymphedema. In 1995, I co-founded, and currently direct, the Stanford Center for Lymphatic and Venous Disorders, a specialized center for the diagnostic evaluation and focused therapy of lymphedema and allied diseases.

"I agree with Woody Allen: 'I don't want to achieve immortality through my work. I want to achieve it by not dying.'"

SELECTED PUBLICATIONS


David Rosenthal, MD
Professor of Pediatrics (Pediatric Cardiology)

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CURRENT RESEARCH
As director of the PACT program for pediatric heart failure and transplantation at Lucile Packard Children’s Hospital and Stanford University, I am primarily interested in improving clinical care for children with heart failure and heart transplantation. This includes improving survival and functional outcomes of children treated with mechanical circulatory support; and improved utilization of heart donors. We are actively involved in the creation of a national learning network to share, develop and disseminate best practices in this field as a way of complementing traditional research activities.

SELECTED PUBLICATIONS


Elsie Gyang Ross, MD
Assistant Professor of Surgery, Division of Vascular Surgery and Medicine, Biomedical Informatics Research

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CURRENT RESEARCH
Artificial intelligence and machine learning to identify patients at risk for, or already affected by, PAD through analysis of unstructured electronic health records.

Big data and advanced analytics will help physicians and surgeons deliver higher quality care to the right patients at the right time. My goal is to ensure that we develop the right tools for our vascular patients and remain on the cutting edge of the data science revolution.

SELECTED PUBLICATIONS


Stephen J. Roth, MD, MPH
Professor, Pediatrics
Interim Chief Quality Officer and the Christopher G. Dawes Endowed Director of Quality at Lucile Packard Children’s Hospital and Stanford Children’s Health
Interim Associate Dean of Maternal and Child Health (Quality and Safety) at the School of Medicine

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DEPARTMENT pedcard.stanford.edu

CURRENT RESEARCH
My clinical and translational research interests focus on improving the outcomes of newborns, infants, and children following cardiopulmonary bypass surgery for congenital heart defects. Mortality for these patients is fortunately now low, but morbidity related to prolonged ICU stay persists and can have a lifelong impact on neurologic development and functional outcomes.

It is estimated that there are now 2 million people living in the United States with congenital heart disease. More than half of these individuals are now adults. This represents both great success in treating congenital heart disease in children as well as a major challenge for cardiovascular health care providers and the institutions caring for adult survivors.

SELECTED PUBLICATIONS
CURRENT RESEARCH

Our research focuses on improving diagnosis, risk stratification and treatment of cardiomyopathy disorders by leveraging clinical data and transnational models of disease. Through improved understanding of genotype-specific mechanisms of disease and better fidelity in defining phenotype, my lab aims to improve care for cardiomyopathy patients. We are currently examining arrhythmic features of cardiomyopathy and cardiomyopathy-arrhythmia overlap syndromes and using patient-specific induced pluripotent stem cell derived cardiomyocytes to augment risk stratification and therapy for those patients. In parallel we utilize multicellular cardiac models to improve our understanding of mechanisms of cardiac graft dysfunction in transplanted hearts.

Talent wins games, but teamwork and intelligence win championships. — Michael Jordan

SELECTED PUBLICATIONS


Nazish Sayed, MD, PhD
Assistant Professor
Stanford Cardiovascular Institute
Division of Vascular Surgery, Department of Surgery
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CURRENT RESEARCH

We investigate the underlying mechanisms of heart disease through the lens of the vasculature. My lab’s research is focused on the development of novel technologies that drive innovation in regenerative medicine, disease modeling, and drug testing in vascular biology. By employing the human induced pluripotent stem cell (iPSC) technology my lab aims to understand the role of the endothelium in the development of cardiac diseases, including those due to inherited genetic variants or environmental insults (such as type 2 diabetes) or exposure to cardiotoxic drugs (cardio-oncology). We have established an endothelial regeneration program, where we leverage the innate immune system to regenerate endothelial cells from scar-forming fibroblasts.

Do not judge me by my success, judge me by how many times I fell down and got back up again.
- Nelson Mandela.

SELECTED PUBLICATIONS


Current Research

My main research continues to be in the field of echocardiography. Several areas of research are currently being pursued: 1) Coronary artery myocardial bridge; anatomic, physiologic and hemodynamic assessment. Clinical manifestations and treatment. 2) Exercise/stress echocardiography. 3) Echocardiographic evaluation of Cardiac structures and function.

Our team wants to spread the word, to educate the medical community that myocardial bridge is a real thing.

Selected Publications


Nigam Shah, MD
Professor, Department of Medicine and Biomedical Data Science
Associate Dean for Research

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CURRENT RESEARCH
We analyze multiple types of health data (EHR, Claims, Wearables, Weblogs, and Patient blogs), to answer clinical questions, generate insights, and build predictive models for the learning health system. We answer clinical questions to enable better medical decisions using EHR and Claims data, via a bedside consult service that enables the use of aggregate patient data at the point of care. We make predictions that allow taking mitigating actions. We characterize the fairness and examine the ethical implications of using machine learning in clinical care. We have built models for predicting future increases in cost, identifying slow healing wounds, missed diagnoses of depression and for improving palliative care.

Our goal is to find ways to bring AI into clinical use safely, ethically and cost-effectively.

SELECTED PUBLICATIONS


Yasuhiro Shudo, MD, PhD
Clinical Associate Professor, Department of Cardiothoracic Surgery

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CURRENT RESEARCH
My laboratory focuses on tissue engineered stem cell sheet biology for the end-stage heart failure, as a heart failure surgeon and clinician-researcher. In addition, our projects include bioengineering, biomechanical, and biostatistical approaches to treat heart failure. We hope our proposed research can be successfully translated to the clinical arena to impact progression to heart failure.

Developing new ideas based on study of the past.

SELECTED PUBLICATIONS


Michael Snyder, PhD

Stanford W. Ascherman, MD, FACS, Professor in Genetics
Chair, Department of Genetics
Director, Center for Genomics and Personalized Medicine

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CURRENT RESEARCH

Precision health relies on the ability to assess disease risk at an individual level. We detect early preclinical conditions and initiate preventive strategies to better manage health and make health-related discoveries, to identify relevant molecular pathways associated with standard clinical measures, and to assess the impact of personalized longitudinal big data on a understanding health and early detection of disease.

I'm a believer in the future—genomics will move medicine from 'diagnose and treat' to 'predict and prevent'.

SELECTED PUBLICATIONS

REAL-TIME ALERTING SYSTEM FOR COVID-19 AND OTHER STRESS EVENTS USING WEARABLE DATA.

Longitudinal Multi-omics of Host-microbe Dynamics in Prediabetes.

A Longitudinal Big Data Approach for Precision Health.

Smooth Muscle Contact Drives Endothelial Regeneration by BMPR2-Notch1 Mediated Metabolic and Epigenetic Changes.
RESEARCHER PROFILES

Edda Spiekerkoetter, MD
Associate Professor of Medicine, Pulmonary and Critical Care Medicine
Director, Stanford Hereditary Hemorrhagic Telangiectasia (HHT) Center of Excellence

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LAB med.stanford.edu/spiekerkoetterlab.html

CURRENT RESEARCH
My research focuses on the importance of the Bone Morphogenetic Protein Receptor 2 (BMPR2) signaling pathway in pulmonary vascular disease with a focus on pulmonary arterial hypertension (PAH) and hereditary hemorrhagic telangiectasia (HHT) as well as right ventricular (RV) adaptation to an increased afterload. In 2000, two independent groups discovered mutations in the BMPR2 pathway as the genetic basis for pulmonary arterial hypertension (PAH). Over the past years more mutations, either directly involved in the BMPR2 pathway (ENDOGLIN, ALK1, SMAD9) or indirectly linked to the BMPR2 pathway (CAVEOLIN-1), were discovered, emphasizing the central role of BMPR2 signaling in familial PAH. Furthermore, reduced BMPR2 expression and signaling is a feature of other sporadic or idiopathic forms of PAH. Hypothesizing that increasing BMPR2 signaling might improve PAH, we performed a High-Throughput Screen of FDA approved drugs and identified the immunosuppressive drug FK506 (Tacrolimus) as the main BMPR2 activator. FK506 rescued endothelial dysfunction in PAH, prevented and reversed PH in rodent models of experimental PH (JCI 2013) and reduced the degree of RV cardiac fibrosis. This discovery has led to the compassionate use of the compound in end-stage PAH patients (AJRCCM 2015) as well as a phase II clinical trial to test the safety, tolerability and efficacy of low-dose FK506 in PAH at Stanford (ERJ 2017). A second repurposed drug, Enzastaurin, that reverses experimental PAH by increasing BMPR2 expression through the novel BMPR2 modifier gene FHIT (Fragile Histidine Triad) is ready to be tested clinically. Furthermore, my lab is interested in the molecular and histological events that govern RV failure and recovery using the PA banding and de-banding mouse model that we recently developed as well as the role of the BMPR2 pathway in pulmonary arteriovenous malformations in HHT.


SELECTED PUBLICATIONS


Joshua M. Spin, MD, PhD
Clinical Assistant Professor, Medicine – Cardiovascular Medicine
Attending, Stanford Marfan Center
Staff Cardiologist, VAPAHCS – Research Scientist, PAVIR

CURRENT RESEARCH
My laboratory research focuses on investigations of vascular disease mechanisms, particularly fundamental issues related to the biology of vascular smooth muscle cells, atherosclerosis, and thoracic and abdominal aortic aneurysm, and in identifying translational therapeutic applications. These studies have included examination of gene patterns and pathways that characterize atherogenesis, and attempts to clarify differentiation and phenotypic switching in vascular SMCs. Current projects seek to understand the possible roles of microRNAs in the pathophysiology and treatment of aortic aneurysm, and recently we have begun delving into the vascular disease risks associated with nicotine and e-cigarettes. Our most recent work suggests that nicotine exposure may lead to increases in aneurysm development risk across generations via epigenetic mechanisms.

SELECTED PUBLICATIONS

Non-coding RNAs in aneurysmal aortopathy. Spin JM, Li DY, Maegdefessel L, Taso PS. Vascl Pharm, 2018


CURRENT RESEARCH

Our general research interest is the structure and function of molecular motors in vitro and in vivo, with emphasis on understanding the molecular basis of muscle contraction. Our major areas of specific interest are the molecular basis of energy transduction that leads to ATP-driven myosin movement on actin, the roles of the myosin family of molecular motors in eukaryotic cells, the regulation of actin and myosin interaction and their assembly states, and the biochemistry and regulation of the attachment of molecular motors to their corresponding cargo.

The detailed understanding we have developed of how myosin transduces the chemical energy of ATP hydrolysis into mechanical movement has led us to our current focus on human hypertrophic cardiomyopathy (HCM) caused by missense mutations in human β-cardiac myosin. Our goal is to elucidate the molecular basis of hypercontractility seen clinically resulting from HCM mutations. We postulated that a majority of HCM mutations shift β-cardiac myosin heads from a sequestered off-state to an active on-state for interaction with actin, resulting in the hypercontractility seen clinically. This is different from earlier prevailing views, and is the basis of all of our current research. We now have extensive evidence for this hypothesis using a combination of the various high-resolution technologies we have developed over the years as well as new approaches. Our work is now providing possible paths forward for therapeutic intervention for cardiomyopathy patients.

SELECTED PUBLICATIONS


Marcia L. Stefanick, PhD
Professor, Medicine - Stanford Prevention Research Center
Professor, Obstetrics and Gynecology

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CURRENT RESEARCH
My research focuses on chronic disease prevention—heart disease, cancer, and osteoporosis—and aging, in both women and men. As Stanford’s principal investigator (PI) of the multi-ethnic Women’s Health Initiative (WHI), I conducted large randomized controlled trials (RCT) of diet, menopausal hormone therapy, and calcium & vitamin D supplementation designed to evaluate population-based strategies to prevent heart disease, stroke, cancer, fractures and dementia, and I mentor Stanford Medicine junior and senior faculty and fellows on WHI analyses. I am currently PI of the large WHI Strong & Healthy (WHISH) RCT testing the hypothesis that physical activity reduces major cardiovascular events in older women; and PI of the Osteoporotic Fractures in Men (Mr OS) Study of bone and muscle loss (sarcopenia) and physical function in older men. I am also founding Director of the Stanford Women’s Health and Sex Differences in Medicine (WHSDM, “wisdom”) Center which funds research and provides an educational program on sex and gender health issues.

Menopausal hormone therapy should not be used to prevent cardiovascular disease in women; the focus should be on lifestyle, i.e., physical activity and weight control.

SELECTED PUBLICATIONS


Elif Seda Selamet Tierney, MD
Associate Professor of Pediatrics (Cardiology)
Director of Pediatric Vascular Research Laboratory
Director of Research, Non-Invasive Imaging
Lucile Packard Children’s Hospital at Stanford University

CURRENT RESEARCH
I am a pediatric cardiologist specialized in echocardiography and a clinician-scientist with an area of expertise in non-invasive vascular testing and tele-lifestyle interventions in children. I have received grants from the NIH/NHLBI, American Heart Association, the Marfan Foundation, the Child Health Research Institute at Stanford, and the Cardiovascular Institute at Stanford to explore non-invasive assessment of vascular health of at-risk children focusing on Kawasaki Disease and Marfan Syndrome and the role of telehealth in interventions to improve cardiac and vascular health in children with heart conditions. In continuation of my work at Boston Children’s Hospital, I have established a Pediatric Vascular Research Laboratory. Through our Laboratory, I serve as a specialist in non-invasive vascular measures and provide technical and data capture support to research teams locally and outside my institution. My interest in vascular health led to investigating interventions to improve cardiovascular health of children and adolescents at risk. Since the most common challenge in these interventions is adherence and attrition due to distance, school, or work, I tapped into the telehealth world. With this effort, in two pilot studies, one in obese adolescents and another in pediatric heart transplant patients, our team demonstrated excellent adherence rates in an exercise and program via live video-conferencing and significant improvement in exercise capacity and endothelial function. Currently I am conducting a randomized clinical trial to study the impact of exercise delivered via live video-conferencing in single ventricle patients. My long-term goal is to make this active focus on heart-healthy lifestyle part of routine clinical practice by making it easily accessible, feasible, and sustainable. In addition, for almost a decade I have been actively involved in the Pediatric Heart Network with leading roles in multi-center protocols which gave me the experience to leverage my efforts to the national arena.

SELECTED PUBLICATIONS


EDUCATION/TRAINING
MD Istanbul University CMF Medicine, Istanbul, Turkey
INTERNSHIP/RESIDENCY in Pediatrics SUNY Stony Brook, NY
FELLOWSHIP in Pediatric Cardiology Columbia University, NY
ADVANCED FELLOWSHIP in Pediatric Cardiology/Imaging Columbia University, NY
FACULTY Instructor in Pediatrics, Pediatric Cardiology, Harvard Medical School
Assistant Professor in Pediatrics, Pediatric Cardiology, Harvard Medical School

HONORS & AWARDS
Resident Research Award, Suffolk County Pediatric Society, NY
Fellow, American Society of Echocardiography
American College of Cardiology
National Scientist Development Award, American Heart Association
Outstanding Research Award, American Heart Association, International Kawasaki Disease
Spectrum Child Health Research Institute Grant Support Award
Cardiovascular Institute Grant Award
Grant in Aid, American Heart Association- Western States Affiliate
National Marfan Fdn Faculty Grant
CHRI Faculty Scholar Award
Jennifer A. Tremmel, MD, MS
Assistant Professor, Medicine - Cardiovascular Medicine
Clinical Director, Women’s Heart Health at Stanford

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CLINIC  stanfordhospital.org/cardiovascularhealth/womenHeartHealth

CURRENT RESEARCH
As the Clinical Director of the Women’s Heart Health at Stanford, I support several ongoing research studies focusing on women and sex differences in cardiovascular disease. We are studying patients who have chest pain, but normal appearing coronary arteries on angiography to understand sex differences in vascular function abnormalities, such as endothelial dysfunction, microvascular disease, and myocardial bridging. We are also investigating the best therapies for such patients, and have found that mindfulness-based stress reduction may reduce chest pain episodes. In addition, we are investigating the role of insomnia treatment for improving cardiac risk factors, trying to find ways of getting more women to cardiac rehab, and testing interventions to improve the cardiac health of women around the time of pregnancy.

The study of sex differences isn’t just about the study of women. It’s about taking a more careful look at both women and men.

SELECTED PUBLICATIONS
Sandra Tsai, MD, MPH
Clinical Associate Professor, Medicine
Primary Care, Population Health, and Cardiovascular Institute

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CURRENT RESEARCH
My research focuses on the development of behavioral modification strategies to improve cardiovascular health in pregnant women at risk for blood pressure complications, such as preeclampsia. We are interested in understanding how improvements in cardiovascular risk factors during pregnancy may affect rates of pregnancy complications and future cardiovascular risk. We collaborate with the Stanford Department of Obstetrics to care for women who either start pregnancy obese or gain too much weight during pregnancy.

SELECTED PUBLICATIONS


Philip S. Tsao, PhD
Professor, Medicine - Cardiovascular Medicine
Associate Chief of Staff for Precision Medicine, VAPAHCS
Director, VA Epidemiology Research and Information Center for Genomics at VAPAHCS

CURRENT RESEARCH

My laboratory’s primary interests are in understanding the molecular underpinnings of vascular disease as well as assessing disease risk. We use a wide range of biochemical, molecular, and physiological techniques to make primary observations in cell systems as well as preclinical models. Furthermore, we continue to extend our findings to human subjects in order to confirm their clinical applicability. Current research projects include the role of microRNAs in regulating atherosclerosis and abdominal aortic aneurysm disease and identification of biomarkers (genetic and protein) for risk assessment. I am Director of the VA Palo Alto Epidemiology Research and Information Center (ERIC) for Genomics as well as Co-Principal Investigator of the VA’s national Million Veteran Program.

The Stanford Cardiovascular Institute is a place where clinicians and basic scientists can seamlessly collaborate on important clinical issues.

SELECTED PUBLICATIONS


Mintu P. Turakhia, MD, MAS
Professor, Medicine - Cardiovascular Medicine
Co-Founder and Director, Stanford Center for Digital Health
Chief, Cardiac Electrophysiology at the VA Palo Alto Health Care System

CURRENT RESEARCH
I am a cardiac electrophysiologist, outcomes researcher, and clinical trialist. The goal of my research is to improve the outcomes of the treatment of heart rhythm disorders, with a focus on atrial fibrillation (AF), which affects 5 million Americans and can cause stroke and heart failure. By using large administrative, medical record, registry, and implantable device data, my group takes a “Big Data” approach to fill evidence gaps in understanding quality of care, predicting AF-related complications, and comparing effectiveness of treatment strategies. This has led to important contributions in health services and outcomes research that have reshaped professional society guidelines and clinical practice.

More recently, we have extended our work to answer questions regarding atrial fibrillation screening, medication adherence, and digitally-enabled treatment strategies. Dr. Marco Perez and I are co-PIs of the Apple Heart Study, a fully digital and virtual end-to-end study to evaluate whether smartwatches can effectively and accurately identify atrial fibrillation. This work has allowed a large team at Stanford to develop the infrastructure for pragmatic studies using smartphone applications and wearable sensors and devices.

Atrial fibrillation is one of the most commonly treated conditions in all of health care. Yet, it is astonishing how little we understand the disease, how to best treat it, and who is at highest risk for complications.

SELECTED PUBLICATIONS


Paul J. Utz, MD

Professor of Medicine
Associate Dean for Medical Student Research, Stanford School of Medicine
Director Emeritus, Stanford Medical Scientist Training Program
Faculty Director and Founder, Stanford Institutes of Medical Research (SIMR)
Associate Director of Education, Institute for Immunity, Transplantation and Infection (ITI), Division of Immunology & Rheumatology
Vice Chair of RECOVER Committee on Immunology and Hematology

CURRENT RESEARCH

My lab actively collaborates with many investigators on the Stanford campus, and across the world to disseminate and implement newly-invented technologies. We study autoimmune diseases, including systemic lupus erythematosus, rheumatoid arthritis, scleroderma, myositis, primary biliary cirrhosis, Sjögren’s disease, type 1 diabetes, vasculitis, multiple sclerosis, and mixed connective tissue disease. In addition to better understanding the pathogenic mechanisms involved in autoimmunity, we are developing bench-to-bedside technologies for immune diseases. Our group made several breakthrough inventions, such as protein arrays, peptide arrays, HIT, lysate arrays, Intel arrays, and EpiTOF. Additionally, I am Director of the Leadership Center of Francis Collins’ $41M Accelerating Medicines Partnership in RA/SLE initiative.

I am Founder and Program Director for the Stanford Institutes of Medicine Research (SIMR) Program for high school students, which has hosted ~900 students in labs over 20 years. I also developed the Stanford EXPLORE Lecture Series. This program covers the basic science fundamentals represented by various research areas at Stanford Medicine. In 2018, I was appointed Stanford Associate Dean for Medical Student Research to promote physician investigator development across the physician-scientist career continuum. I will continue to provide high-level oversight of SIMR and the MSTP while focusing on new efforts to create programs such as a new Physician Scientist Career Development Program and Berg Scholars Program for MD students to build careers as investigators and leaders.

SELECTED PUBLICATIONS


My research centers on the development of innovative approaches to the treatment of arrhythmias, including catheter ablation techniques, implantable devices, and less invasive treatments. My clinical research includes atrial fibrillation, ventricular tachycardia, supraventricular arrhythmias and implantable devices. I have collaborations with Bioengineering, Mechanical Engineering, and Electrical Engineering. I am the Center Director for the AHA Strategically Focused Research Network Joe and Linda Chlapty DECIDE Grant for Shared Decision Making in Atrial Fibrillation Stroke Prevention. I am the project director of the AHA Health Technologies and Innovation Strategically Focused Research Network. Some goals of my research program are to create: 1) a more effective methods of catheter ablation, 2) more reliable implantable pacemakers and leads, 3) a combined surgical-catheter approach to ablation, 4) noninvasive methods of ablation, 5) new solutions to prevent sudden cardiac death.

Advances in engineering, biology, chemistry, computer science, material science, and physics will result in major developments in arrhythmia therapy and device innovation. We are poised to make significant contributions in this area.

SELECTED PUBLICATIONS


Irving Weissman, MD

Virginia and DK Ludwig Professor for Clinical Investigation in Cancer Research
Professor, Developmental Biology and Pathology
Professor (by courtesy), Biology and Neurosurgery
Director, Institute for Stem Cell Biology and Regenerative Medicine
Director, Stanford Ludwig Center for Cancer Stem Cell Research and Medicine

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CURRENT RESEARCH

My laboratory studies stem cell biology and regenerative medicine. We are particularly interested in hematopoiesis, hematopoietic stem cells (HSCs), leukemia, and the clonal events leading from HSC to leukemia. Our research encompasses the phylogeny and developmental biology of blood-forming cells and immune systems. My laboratory was the first to identify and isolate the blood-forming hematopoietic stem cell (HSC) from mice, and we have defined, by lineage analysis, the stages of development between the stem cells and mature progeny. We also discovered the human HSC, a human brain-forming stem cell population, mouse skeletal muscle stem cells, and an osteochondral stem cell in mice. Another research focus of my laboratory is cancer stem cell biology. In recent years, we have studied the potential of CD47 (a molecule on the surface of cancer stem cells that protects them by providing a ‘don’t eat me’ signal to phagocytic cells of the innate immune system) as a cancer therapeutic, and identifying cancer stem cells from a variety of blood and solid cancers.

In every aspect of stem cell and progenitor cell biology, and it's applications to regenerative medicine, I believe it must start with purification, purification, and purification; substituting impure or unsubstantiated cell populations will in the end only confuse the scientist and the clinical trialist.

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Cornelia M. Weyand, MD, PhD
Professor, Medicine - Immunology and Rheumatology
Chief, Division of Immunology and Rheumatology
Director, Center for Translational Medicine

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CURRENT RESEARCH

My laboratory examines autoimmune and autoinflammatory disease, with emphasis on immune defects in vasculitis, coronary artery disease and rheumatoid arthritis. The heart of this work is to develop new strategies to suppress unwanted inflammation and to boost beneficial immune responses. We have approached this goal by defining and characterizing immune defects on a mechanistic level and by bed-to-bench and bench-to-bed translation. In large vessel vasculitis, we have defined mechanisms that protect the vessel wall from inflammatory attack and have characterized how the immune privilege of the vessel wall breaks down to enable vasculitis. Vasculitogenic T cells aberrantly express the oncogene NOTCH1, and vasa vasorum endothelial cells express the NOTCH ligand Jagged1. Also, deficiency of the immuno-inhibitory PD1/PD-L1 checkpoint causes unleashing of auto-aggressive T cells. Rheumatoid arthritis is an autoimmune disease associated with high cardiovascular risk. A molecular hallmark of the disease is the metabolic reprogramming of T cells and macrophages. We have assigned defects in bioenergetic regulation to mistrafficking of intracellular proteins, lysosomal dysfunction and insufficient mitochondrial DNA repair. We have described that loss-of-function of DNA repair molecules leads to telomeric instability, abnormal cell cycle progression and premature aging of the immune system. Immuno-aging results in the co-existence of immune failure with uncontrolled inflammation. Our current studies explore how defined tissue niches instruct tissue-dwelling immune cells to sustain inflammation, how the DNA repair machinery controls the immune aging process and how bioenergetic strategies determine cellular behavior.

The immune system is everywhere. All diseases have their roots in the immune system.

SELECTED PUBLICATIONS


Ronald Witteles, MD

Professor, Medicine - Cardiovascular Medicine
Co-Director, Stanford Amyloid Center
Program Director, Internal Medicine Residency Training Program
Co-Director, Stanford Multidisciplinary Sarcoidosis Program
Associate Editor, JACC: CardioOncology

CURRENT RESEARCH

My research focuses on three primary areas: amyloidosis, cardiac complications of cancer therapy, and sarcoidosis. As Co-Director of one of the world's largest amyloid centers, I collaborate with partners throughout the campus on clinical trials, epidemiologic research, and laboratory-based research dedicated to a better understanding of and better treatments for cardiac amyloidosis. In the area of cardiac complications of cancer therapy ("Cardio-Oncology"), I collaborate with partners in Hematology and Medical Oncology to investigate optimal screening and treatment of cancer-therapy associated cardiac disease, and I serve as Associate Editor for the country’s leading Cardio-Oncology journal, JACC: CardioOncology. In the area of sarcoidosis, I serve as Co-Director for and lead the cardiology program for the Stanford Multidisciplinary Sarcoidosis Program, investigating novel diagnostic and treatment options.

My career goal is to pursue excellence in and integration of the three cornerstones of academic medicine—clinical care, scholarship, and education.

SELECTED PUBLICATIONS


My research focus is the development of novel genetic, molecular and cellular strategies for treating myocardial ischemia and heart failure. We are investigating new paths to myocardial repair through angiogenesis, stem cells and tissue engineering. We are conducting biomechanical engineering studies of heart valve operations. 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.

Innovative pioneering cardiovascular surgeons Shumway, Reitz, and Robbins built and led the Stanford program to preeminence. It is truly a privilege to become a part of this amazingly prestigious, high-powered academic institution.

SELECTED PUBLICATIONS


Joseph C. Wu, MD, PhD
Director, Stanford Cardiovascular Institute
Simon H. Stertzer, MD, Professor of Medicine & Radiology

CURRENT RESEARCH

My lab focuses on patient-specific and disease-specific induced pluripotent stem cells (iPSCs). The main goals are to (i) understand basic cardiovascular disease mechanisms, (ii) accelerate drug discovery and screening, (iii) develop the "clinical trial in a dish" concept, and (iv) implement precision cardiovascular medicine for disease prevention and treatment of patients. We use a combination of advanced genomics, stem cells, cellular & molecular biology, physiological testing, and molecular imaging technologies to better understand molecular and pathophysiological processes.

The missions of the Stanford CVI are to deliver excellence in clinical care, world-class education, and cutting-edge research that will improve the medical care and quality of life of our patients.

SELECTED PUBLICATIONS


Sean M. Wu, MD, PhD

Joan and Sanford I. Weill Scholar
Associate Professor of Medicine (Cardiovascular Medicine) and Associate Professor (by courtesy), Pediatrics

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CURRENT RESEARCH

My research laboratory seeks to identify mechanisms responsible for human congenital heart disease, the most common cause of still-births in the U.S. and one of the major contributors to morbidity and mortality in infants and toddlers. We believe that by understanding the mechanisms regulating growth and differentiation of heart precursor cells during early embryonic development we can then apply these principles to understand the pathogenesis of adult onset heart diseases such as heart failure and arrhythmia where re-activation of early embryonic developmental program plays a central role. We currently use both genetically-modified mice as our living model to understand the biology of heart development as well as human iPS cells as a test-tube model to study the process of heart cell formation. In addition, we have actively published studies using single cell multi-omic strategies such as single cell RNAseq to address the mechanism of disease onset and develop new treatments using engineered 3D tissues.

SELECTED PUBLICATIONS


RESEARCHER PROFILES

Fan Yang, PhD
Associate Professor of Orthopedic Surgery and of Bioengineering

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CURRENT RESEARCH
A bioengineer by training, I work at the interface of biomaterials, stem cell biology, engineering, and medicine. Using an interdisciplinary approach, my research seeks: (1) to decipher how interactive microenvironmental cues (cell-matrix or cell-cell interactions) regulate cell fate during normal tissue development and during disease progression (cancer), and (2) to develop novel biomaterials and stem cell-based therapeutics to improve tissue regeneration. Using biomaterials-mediated approaches, my lab employs two strategies to engineer stem cells: from the “outside in” via novel scaffold design and from the “inside out” via non-viral gene delivery. In the first strategy, we engineer injectable hydrogels using a “lego-building” approach in order to independently tune cell-niche properties including biochemical, mechanical, and topographical cues. These biomaterials are useful for elucidating the mechanisms of multifactorial cell-niche interactions, and for enabling desirable cell fates and tissue regeneration with particular functions. In the second strategy, we harness the ability of stem cells to home to diseases sites and their ability to enhance tissue regeneration via paracrine signaling. We further modulate the paracrine signaling of stem cells using biodegradable polymeric nanoparticle-mediated non-viral gene delivery, which is safer than conventional viral vectors. Using relevant animal models, we have demonstrated the potential applications of such stem cell- and biomaterials-based strategies for treating musculoskeletal diseases, cardiovascular diseases, and cancer.

SELECTED PUBLICATIONS


Phillip C. Yang, MD
Professor, Medicine - Cardiovascular Medicine
Director, Cardiovascular Stem Cell Laboratory
Director, Cardiothoracic MRI Program

ELECTED RESIDENTS & INTERNSHIP
Yale University

CARDIOLOGY FELLOWSHIP
Stanford University

ADVANCED CARDIOLOGY IMAGING FELLOWSHIP
Stanford University

BOARD CERTIFICATION
Cardiovascular Disease, ABIM
Echocardiography, Level III, ASE
Cardiac MRI, Level III, SCMR

CLINICAL FOCUS
General Cardiology
Cardiovascular Imaging
Cardiovascular Molecular and Cellular Therapy
Cardiovascular Regeneration

HONORS & AWARDS
Young Investigator Award, American College of Cardiology (ACC)
Burroughs Wellcome Scholar
NIH Career Development Award
NIH Career Enhancement Award in Stem Cell Research
Co-Chair, AHA Cardiovascular Stem Cell Writing Group

PRINCIPAL INVESTIGATOR
AHA Collaborative Sciences Award; CIRM Discovery Research Grant; NIH Patient-Oriented Research Grant in Cell Therapy; Stanford Innovative Medicine Accelerator Grant; Stanford SPARK Grant; BioCardia CardiAmp Trial and Department of Defense DCM-II Trial

RESEARCH

Our research interest focuses on the fundamental molecular and cellular processes of myocardial regeneration and restoration. We employ novel in vivo multi-modality molecular and cellular imaging technology to translate basic discovery in stem cell biology. Autologous iPSCs are considered a potential landmark solution. Translational effort of this revolutionary biology is investigated through the secretomes generated from patient- and disease-specific iPSC-cardiovascular cells and their molecular cargo to implement precision medicine. Through AHA, CIRM, NIH, and Stanford-sponsored research grants, the translational potential and clinical implementation of this innovative therapeutic approach are investigated.

Success consists of going from failure to failure without loss of enthusiasm. — Winston Churchill

SELECTED PUBLICATIONS


Alan C. Yeung, MD
Li Ka Shing Professor of Medicine (Cardiology)
Medical Director, Cardiovascular Health, Stanford Medicine

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CURRENT RESEARCH

My current research extends beyond stents and devices, focusing on interventions that could lead to long term health in all our cardiac patients. We are exploring this through mobile health as well as big data. I remain interested in device development such as percutaneous valves, new bioabsorbable stents and new ways to treat hypertension using renal denervation techniques. I am the Medical Director of Cardiovascular Health at Stanford Medicine and Chief (Clinical) of Division of Cardiovascular Medicine and Former Director of Interventional Cardiology.

Imagine a day when the interests of patients, physicians and the health care system are all aligned: to enhance the health of our patients physically and mentally.

SELECTED PUBLICATIONS


Paul Yock, MD
Martha Meier Weiland Professor of Medicine, Emeritus
Professor, Bioengineering
Professor, Medicine - Cardiovascular Medicine
Acting Faculty Director, Stanford Byers Center for Biodesign

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CURRENT RESEARCH
I am the founder and director emeritus of the Byers Center for Biodesign, a multidisciplinary training and support program for physicians and engineers with the ambition and talent to become health technology innovators. The Center has educational/training programs at multiple levels including a postgraduate fellowship, multiple graduate and undergraduate classes and a faculty training program. In addition, Biodesign administers seed grant programs and a mentoring system for faculty and students who seek to translate health technology innovations into patient care.

SELECTED PUBLICATIONS


Roham Zamanian, MD, FCCP
Associate Professor - Med Center Line, Medicine - Pulmonary & Critical Care Medicine
Director, Stanford Adult Pulmonary Hypertension Program
Vera Moulton Wall Center for Pulmonary Vascular Disease

CURRENT RESEARCH

My research is focused on the development of risk prediction and leading-edge phenotyping strategies for patients with pulmonary arterial hypertension (PAH), as well as the translation of basic laboratory discoveries into clinical therapeutics at bedside. Over the past 5 years, I have been involved in the design, implementation, analysis, and reporting of phase 1 and phase 2 proof of concept PAH clinical trials.

My heroes are the ones who survived doing it wrong, who made mistakes, but recovered from them.
— Bono, U2.

SELECTED PUBLICATIONS


CURRENT RESEARCH

Current research in the Zare lab explores wide-ranging questions in physical and analytical chemistry, from the study of elementary chemical reactions to chemical analysis of extraterrestrial materials. The major focus of these efforts is chemical analysis on the nanoscale. The team has devised tools and techniques to examine molecules in extremely tiny volumes – the volumes characteristic of what is found in heterogeneous structures in mineral samples or in the contents of cells and subcellular compartments. Group members have also made contributions to understanding chemical reactions in microdroplets.

SELECTED PUBLICATIONS


Stark-induced Adiabatic Raman Passage Examined Through the Preparation of D(2) (v=2, j=0) and D(2) (v=2, j=2, m = 0). Perreault WE, Mukherjee N, Zare RN. J Chem Phys. 2019 Jun 21;150(23):234201.


Selective Synthesis in Microdroplets of 2-Phenyl-2,3-dihydrophthalazine-1,4-dione From Phenyl Hydrazine With Phthalic Anhydride or Phthalic Acid. Gao D, Jin F, Yan X, Zare RN. Chemistry. 2019 Jan 28;25(6):1466-1471.

