

**The George and Angelina Kostas Research Center  
for Cardiovascular Nanomedicine Symposium**

and

8th Annual NIH PCTC

# **CARDIOVASCULAR BIOENGINEERING** Symposium

**May 22-25, 2024**

**Houston Methodist Research Institute**

6670 Bertner, 2<sup>nd</sup> Floor  
John F. Bookout Auditorium (R2-306)  
Houston, TX 77030



8th Annual NIH PCTC

# CARDIOVASCULAR BIOENGINEERING SYMPOSIUM

In partnership with The George and Angelina Kostas Research Center  
for Cardiovascular Nanomedicine Symposium

**WEDNESDAY, MAY 22, 2024** | 7:30 a.m. – 6:30 p.m.

Houston Methodist Research Institute

6670 Bertner, 2<sup>nd</sup> Floor, John F. Bookout Auditorium (R2-306)

## AGENDA

7:30 - 8:15 a.m. **Registration and Breakfast Reception**

8:15 - 8:45 a.m. **Welcome Remarks**



### John P. Cooke, MD, PhD

Joseph C. Walter and Carole Walter Looke Presidential Distinguished Chair  
Professor and Chair, Department of Cardiovascular Sciences  
Director, Center for Cardiovascular Regeneration  
Medical Director, Center for RNA Therapeutics  
Chief Translational Officer, Houston Methodist Academic Institute



### Jianyi (Jay) Zhang, MD, PhD, FAHA

Chair, Department of Biomedical Engineering  
T. Michael and Gillian Goodrich Endowed Chair of Engineering Leadership  
Professor of Medicine, Engineering  
School of Medicine, School of Engineering  
The University of Alabama at Birmingham



### Roderic I. Pettigrew, MD, PhD

CEO, Engineering Health (EnHealth)  
Robert A. Welch Professor of Medicine  
Texas A&M University  
Inaugural/Executive Dean, School of Engineering Medicine (EnMed)  
Texas A&M and Houston Methodist Hospital



### Denis Buxton, PhD

Associate Division Director  
National Institutes of Health  
National Heart Lung and Blood Institute



### Michael L. Terrin, MDCM, MPH

Professor, Epidemiology and Public Health  
University of Maryland School of Medicine  
PI, NHLBI Progenitor Cell Biology Consortium Administrative Coordinating Center  
PI, NHLBI Progenitor Cell Translational Consortium Administrative Coordinating Center  
National Institutes of Health, National Heart, Lung, and Blood Institute

# WEDNESDAY, MAY 22, 2024

## SESSION 1: Keynote Speakers

8:45 – 9:15 a.m. **The Martha and D. Gibson Walton Lecture in Translational Research**  
**Victor J. Dzau, MD**  
President, U.S. National Academy of Medicine  
Vice Chair, U.S. National Research Council  
Chancellor Emeritus and James B. Duke Distinguished Professor of Medicine, Duke University

9:15 – 9:45 a.m. **Engineering Human Cardiovascular Tissues for Medical Impact**  
**Gordana Vunjak-Novakovic, PhD**  
University Professor and Mikati Foundation Professor of Biomedical Engineering and Medical Sciences  
Columbia University

9:45 a.m. **Coffee Break**

## SESSION 2: Bioengineered Translational Model Systems

Session Chair: **Francisco Altamirano, PhD**

9:55 a.m. **Engineering 3D Microvasculature for Disease Modeling**  
**Ying Zheng, PhD**  
Associate Professor, Bioengineering, University of Washington

10:20 a.m. **Artificial Intelligence-Enabled Vascularized Biological Systems**  
**Abhishek Jain, PhD**  
Associate Professor, Biomedical Engineering, Affiliated Faculty, Medical Physiology  
Texas A&M University

10:45 a.m. **Multi-laminar Tissue Constructs to Evaluate Aortic Valve Pathophysiology**  
**K. Jane Grande-Allen, PhD**  
Isabel C. Cameron Professor of Bioengineering, Rice University

11:10 a.m. **Vascularized Tumor Microenvironments for Drug Testing**  
**Christopher C. W. Hughes, PhD**  
Chancellor's Professor, Molecular Biology and Biochemistry School of Biological Sciences  
Professor, Biomedical Engineering, Henry Samueli School of Engineering, University of California, Irvine

11:35 a.m. **Nanopatterns for Vascular Regeneration**  
**Ngan Huang, PhD**  
Associate Professor, Cardiothoracic Surgery, Stanford University

Noon – 1 p.m. **Lunch Break**

Noon – 2 p.m. **Satellite Symposium NovoNordisk**

1 – 2 p.m. **Junior Faculty and Trainee Symposium: Research Highlights**  
Moderators: **Anahita Mojiri, PhD** and **Li Lai, PhD**  
Talks selected from meritorious abstracts (10 min. presentation, 5 min. discussion)

1 p.m. **Presentation 1**

1:15 p.m. **Presentation 2**

1:30 p.m. **Presentation 3**

1:45 p.m. **Presentation 4**

## SESSION 3: Cardiovascular Physiology and Bioengineering in Space

Moderator: **Alessandro Grattoni, PhD**

2 p.m. **Overview of the Opportunities for Discovery in Space**  
**Dorit Donoviel, PhD**  
Director, Translational Research Institute for Space Health  
Director, The National Space Biomedical Research Institute  
Associate Professor, Center for Space Medicine, Baylor College of Medicine

2:25 p.m. **Challenges of the Cardiovascular System in Space**  
**Jennifer Fogarty, PhD**  
Chief Scientist, Translational Research Institute for Space Health  
Assistant Professor, Center for Space Medicine  
Baylor College of Medicine

2:50 p.m. **Exosomes in Space and Cardiovascular Risk**  
**David Goukassian, MD, PhD**  
Professor, Medicine, Cardiovascular Research Institute  
Icahn School of Medicine, Mount Sinai

3:15 p.m. **Regenerative Medicine Using Space**  
**Alessandro Grattoni, PhD**  
Chair, Department of Nanomedicine, Houston Methodist Research Institute  
Professor of Nanomedicine, Houston Methodist Academic Institute

3:40 p.m. **Funding Bioengineering in Space**  
**Lisa Carnell, PhD**  
Division Director, NASA Biological and Physical Sciences Division

4:05 – 6:30 p.m. **Poster Presentations**  
Refreshments Served  
Beverages and Appetizers

7:30 – 10 p.m. **Faculty Dinner for Speakers and Moderators**

Non-Speakers and Moderators will be provided in their registration packets the names, addresses and phone numbers for nearby restaurants and transportation information.

# THURSDAY, MAY 23, 2024

7:30 – 8:30 a.m. **Breakfast Reception**

## SESSION 4: Biomaterials for CV Regeneration

Session Chair: **Abhishek Jain, PhD**

8:30 a.m. **Bioprinting a Human Heart**  
**Mark Skylar-Scott, PhD**

Assistant Professor, Bioengineering, Basic Science and Engineering Initiatives  
Betty Irene Moore Children’s Heart Center, Stanford Medicine

8:55 a.m. **Regenerating Lymphatic Vessels and Valves**  
**Feng Zhao, PhD**

Associate Professor, Department of Biomedical Engineering, Texas A&M University

9:20 a.m. **Reconstructing Organotypic Vasculature from Human iPSCs**  
**Mingxia Gu, MD, PhD**

Assistant Professor, UC Department of Pediatrics  
Cincinnati Children’s Hospital Medical Center

9:45 a.m. **Imaging Atherosclerosis**  
**Laura Marcu, PhD**

Director, NIH-NIBIB National Center for Interventional Biophotonics Technologies  
Professor, Biomedical Engineering and Neurological Surgery, University of California, Davis

10:10 a.m. **Coffee Break**

## SESSION 5: Computational Modeling & Simulations for Cardiovascular Architecture and Regeneration

Session Chairs: **Guangyu Wang, PhD** and **Longhou Fang, PhD**

10:25 a.m. **Stem Cells, Genomics, and Clinical Trial in Dish**  
**Joeseeph C. Wu, MD, PhD**

Director, Stanford Cardiovascular Institute  
Simon H. Stertz, MD, Professor of Cardiovascular Medicine & Radiology

10:50 a.m. **Molecular Control of Cardiac Regeneration: Insights from Evolution**  
**Guo Huang, PhD**

Associate Professor, Cardiovascular Research Institute, University of California  
Department of Physiology, Cardiovascular Research Institute, University of California San Francisco

11:15 a.m. **Engineering the microvasculature**  
**Shayn M. Peirce-Cottler, PhD**

Professor and Chairman, Department of Biomedical Engineering, University of Virginia

11:40 a.m. **Unraveling Gene Regulatory Networks in Cardiovascular Disease**  
**Christina V. Theodoris, MD, PhD**

Assistant Professor, Gladstone Institute of Cardiovascular Disease and  
Gladstone Institute of Data Science and Biotechnology, University of California San Francisco

12:05 p.m. **RNA Velocity and RNA Landscape: Insights into the Etiology and Novel Therapeutic Avenues for Heart Failure**  
**Guangyu Wang, PhD**

Assistant Professor, Cardiovascular Sciences, Houston Methodist

12:30 p.m. **Computational Modeling & Simulations for Cardiovascular Architecture and Regeneration**  
**Ken Chen, PhD**

Professor, Bioinformatics and Computational Biology  
The University of Texas MD Anderson Cancer Center

12:55 – 2:30 p.m. **Lunch Break**

## Luncheon Seminars: Dunn and Fondren Conference Halls

1 – 1:25 p.m. **Meet The FDA - Strengthening Regulatory Science to Advance Medical Countermeasure Development**

**Tracy MacGill, PhD, CAPT, USPHS**

Director, MCM Regulatory Science, Office of Counterterrorism and Emerging Threats,  
Office of the Chief Scientist, Office of the Commissioner  
U.S. Food and Drug Administration

1:25 – 1:50 p.m. **Meet The Dean**

**Roderic I. Pettigrew, MD, PhD**

Inaugural Dean of the School of Engineering Medicine  
Texas A&M University in collaboration with Houston Methodist  
Training a diverse and innovative generation of “Physicianeers”

1:50 – 2:15 p.m. **HumanN Symposium**

**The Role of Nitric Oxide in Cardiovascular Regeneration**  
**John P. Cooke, MD, PhD**

Joseph C. Walter and Carole Walter Looke Presidential Distinguished Chair  
Professor and Chair, Department of Cardiovascular Sciences  
Director, Center for Cardiovascular Regeneration  
Medical Director, Center for RNA Therapeutics  
Chief Translational Officer, Houston Methodist Academic Institute

## SESSION 6: Metabolite, Epigenetics, and Cardiovascular Regeneration

Session Chair: **Reza Ardehali, MD, PhD**

2:15 p.m. **Cells and Cell-Products for Myocardial Repair in Large Animal Models**  
**Jay Zhang, MD, PhD, FAHA**

Chair/Professor, Biomedical Engineering, The University of Alabama at Birmingham

2:40 p.m. **The Role of Hippo Signaling in Cardiac Repair**  
**James Martin, MD, PhD**

Vivian L. Smith Chair in Regenerative Medicine  
Vice Chair and Professor, Molecular Physiology and Biophysics  
Baylor College of Medicine

3:05 p.m. **Protein Translation Control in Cardiac Hypertrophy**  
**Yibin Wang, PhD**

Professor, Medicine, Duke University, Duke NUS: Medical School, Singapore

3:30 p.m. **HFpEF: Metabolism and Meta-inflammation**  
**Joseph A. Hill, MD, PhD**

Professor of Internal Medicine and Molecular Biology  
Director, Harry S. Moss Heart Center  
University of Texas Southwestern Medical Center

# THURSDAY, MAY 23, 2024

## SESSION 7: Update on Clinical Trials

Session Chair: **Jianyi (Jay) Zhang, MD, PhD**

3:55 p.m.

### **The POSEIDON-DCM Trial**

**Josh M. Hare, MD, FAAC, FAHA**

Director, Donald Soffer Endowed Program in Regenerative Medicine

Chief Science Officer

Senior Associate Dean for Experimental & Cellular Therapeutics

Louis Lemberg Professor of Medicine (Cardiology)

University of Miami Leonard M. Miller School of Medicine

Professor, Molecular and Cellular Pharmacology

Professor, Biomedical Engineering

Director, Interdisciplinary Stem Cell Institute

4:20 p.m.

### **Heart Repair with Tissue Engineered Biological Ventricular Assist Tissue**

**Wolfram-Hubertus Zimmermann, MD**

Director, Institute of Pharmacology and Toxicology

Professor, Pharmacology

University Medical Center Göttingen

4:45 p.m.

### **The CATO Trial: A Phase IIA, Randomized, Double-Blind, Placebo-Controlled, Multicenter Study**

**Roberto Bolli, MD, FAHA, FACC**

Professor, Medicine, Physiology and Biophysics

University of Louisville School of Medicine

7 – 10 p.m

### **Banquet and Awards**

Houston Museum of Natural Science

## Banquet & Awards

7 – 10 p.m.

Houston Museum of Natural Science



# FRIDAY, MAY 24, 2024

7:30 – 8:30 a.m. **Breakfast Reception**

## SESSION 8: **Genome Editing in Cardiovascular Regeneration**

Session Chair: **Gang Bao, PhD**

8:30 a.m. **Gene Editing in the Treatment of Hyperlipidemia and Atherosclerosis**  
**William R. Lagor, PhD**  
Professor, Integrative Physiology, Baylor College of Medicine

8:55 a.m. **Mechanisms and Genetic Strategies to Promote Cardiac Xenotransplantation**  
**Daniel Garry, MD, PhD**  
Professor, Medicine, University of Minnesota Medical School

9:20 a.m. **Genome Editing Based Approaches for Treating Cardiovascular and Blood Diseases**  
**Gang Bao, PhD**  
Professor and Chair, Biomedical Engineering, Rice University

9:45 a.m. **Long-Range Genome Engineering in Human Cells With CRISPR-Cas3**  
**Yan Zhang, PhD**  
Assistant Professor, Biological Chemistry, University of Michigan Medical School

10:10 a.m. **Coffee Break**

## SESSION 9: **Blood Vessel and Metabolic Disease**

Session Chair: **Jun-ichi Abe, PhD**

10:30 a.m. **Vascular Senescence and Dysmetabolic State**  
**Mikhail Kolonin, PhD**  
Harry E. Bovay, Jr. Distinguished University Chair in Metabolic Disease Research  
Professor and Director, Center for Metabolic and Degenerative Diseases  
The University of Texas Health Science Center

10:55 a.m. **Angiogenic Transdifferentiation in Ischemic Tissues**  
**John P. Cooke, MD, PhD**  
Chair and Professor, Cardiovascular Sciences  
Director Center for Cardiovascular Regeneration  
Medical Director, Center for RNA Therapeutics,  
Houston Methodist Research Institute

11:20 a.m. **Pathological Angiogenesis and Therapeutic Approaches**  
**Napoleone Ferrara, MD**  
Distinguished Professor, Ophthalmology and Pathology, Senior Deputy Director for Basic Sciences  
UCSD Moores Cancer Center, University of California San Diego

11:45 p.m. **Bioengineering the Lymphatics in Hypertension**  
**Ying-Nan Bai, MD**  
Associate Professor, Cardiology, Zhongshan Hospital, Fudan University,  
Shanghai Institute of Cardiovascular Diseases

12:30 – 1 p.m. **Lunch Break**

## Concurrent Luncheon Seminars: Dunn and Fondren Conference Halls

12:45 – 1 p.m. **Advances in Engineering Human Heart, Lung and Vascular Models of Disease**  
**Joan Nichols, PhD**  
Director, Regenerative Medicine Program, Houston Methodist Research Institute

1 – 1:20 p.m. **Surgeon Scientists Leading Cardiovascular Device Development**  
**Shock Wave Therapy – Johannes Holfeld, MD**  
Clinician and Staff Surgeon, University Clinic of Cardiac Surgery Founder and Head  
CARE Cardiac Regeneration Research Group

1:20 – 1:40 p.m. **Next Gen Artificial Heart – William E. Cohn, MD**  
Vice President for Medical Devices Companies Johnson & Johnson  
Executive Director, New Center for Device Innovation, Texas Medical Center

1:40 – 2 p.m. **Remote Monitoring for Underserved Populations**  
**Sarah Pletcher, MD, MHCDS**  
System Vice President and Executive Medical Director, Strategic Innovation, Houston Methodist

## SESSION 10: **Insights Gained from Reprogramming to a Cardiovascular Fate**

Session Chair: **John P. Cooke, MD, PhD**

2:30 p.m. **Single Cell Omics Approach to Study Somatic Cell Reprogramming to Cardiomyocytes**  
**Qian Li, PhD**  
Associate Professor, Pathology and Laboratory Medicine  
University of North Carolina

2:55 p.m. **Insights into PCKD from iPSC-derived Cardiomyocytes**  
**Francisco Altamirano, PhD**  
Assistant Professor, Cardiovascular Sciences  
Houston Methodist Research Institute

3:20 p.m. **Modulation of Cardiovascular Cell Fate by Extracellular Matrix**  
**Brenda Ogle, PhD**  
Professor and Department Head, Biomedical Engineering College of Science and Engineering  
University of Minnesota

3:45 p.m. **The Impacts of Microenvironment on Direct Cardiac Reprogramming**  
**Reza Ardehali, MD, PhD**  
Professor and Chief of Cardiology  
Baylor College of Medicine

4:10 p.m. **Epigenetic Determinants of Direct Cardiac Reprogramming**  
**Yang Zhou, PhD**  
Assistant Professor, Biomedical Engineering  
The University of Alabama at Birmingham

# GEORGE AND ANGELINA KOSTAS RESEARCH CENTER FOR CARDIOVASCULAR NANOMEDICINE

## SATURDAY, MAY 25, 2024

7:30 – 8 a.m. **Breakfast Reception**

8 – 8:15 a.m. **Event Check-In**

8:15 – 9 a.m. **Keynote Lecture**

**ARPA-H – Advancing Bold Cardiovascular Breakthroughs**

**Ryan Spitler, PhD**

Program Manager, Health Science Future, ARPA-H

### SESSION 11: Nanomedicine for the Treatment of Cardiovascular Disease

Session Chair: **John P. Cooke, MD, PhD**

9:05 a.m. **In Vivo High Throughput Screening Approaches for Extrahepatic, Tissue-Specific Nucleic Acid Delivery Vehicles**

**Kristopher W. Brannan, PhD**

Assistant Professor, Cardiovascular Sciences and The Center for RNA Therapeutics, Houston Methodist

9:30 a.m. **Secretome as Diagnostic and Therapeutic Tool for Cardiac Therapies**

**Carmen Sucharov, PhD**

Professor, Cardiology, University of Colorado Denver

9:55 a.m. **Coffee Break**

### SESSION 12: Advances in RNA Nanoengineering

Session Chair: **Alessandro Grattoni, PhD**

10:15 a.m. **Engineering Highly Stable RNA Nanoparticles**

**Junhua Mai, PhD**

Assistant Research Professor, Nanomedicine, Houston Methodist Academic Institute

10:40 a.m. **Circular RNA and its Therapeutic Potential**

**Daniel Kiss, PhD**

Assistant Professor, Cardiovascular Sciences, Houston Methodist Academic Institute

11:05 a.m. **RNA Origami and Therapeutic Applications**

**Ewan McRae, PhD**

Assistant Professor, Cardiovascular Sciences, Center for RNA Therapeutics, Houston Methodist

11:30 p.m. **Engineering New Nanoparticles for Better Drug Delivery**

**Henry J. Pownall, PhD**

Sanford I. Weill and Antonio M. Grotto Jr., MD Centennial Chair in Translational Biomedical Sciences Education

Professor, Biochemistry in Medicine

Houston Methodist Academic Institute

Weill College Medical College

11:55 a.m. – 2:30 p.m. **Lunch Break and Poster Session**

### SESSION 13: Nanomedicine-Based Therapies

Session Chair: **Alessandro Grattoni, PhD**

2:30 p.m. **RNA Nanotherapeutic for Skin Regeneration**

**Biana Godin, MScPharm, PhD**

Associate Professor, Nanomedicine, Houston Methodist Academic Institute

Weill Cornell Medical College

2:55 p.m. **RNA Nanoparticle Delivery for Vascular Regeneration**

**Yun Fang, PhD, FAIMBE, FAHA**

Associate Professor, Medicine

Co-Director, Research Training in Respiratory Biology Program, Medicine

University of Chicago

3:20 p.m. **In Vivo Delivery Systems for Genome Editing Tools**

**YouYang Zhao, PhD**

William G. Swartzchild, Jr. Distinguished Research Professor

Director, Program for Lung and Vascular Biology

Head, Injury Repair and Regeneration Research, Stanley Manne Children's Research Institute

Ann & Robert H. Lurie Children's Hospital of Chicago

Professor, Pediatrics, Medicine (Pulmonary and Critical Care Medicine and Pharmacology)

Northwestern University Feinberg School of Medicine

3:45 p.m. **Kostas Strategic Impact Project Presentations**

Session Chair: **Alessandro Grattoni, PhD**

▪ **Presentation Team 1:** 8 min.

▪ **Presentation Team 2:** 8 min.

▪ **Presentation Team 3:** 8 min.

### Shark Tank Session: Cardiovascular Nanomedicine

4:10 – 4:55 p.m. **Introduction of Judges**

**John P. Cooke, MD, PhD**

Shark Tank Judges: **Alessandro Grattoni, PhD**, Houston Methodist

**Christopher Lincoln, PhD**, Houston Methodist

**John Schultz**, Houston Methodist

**Ryan Spitler, PhD**, Health Science Futures, ARPA-H

Shark Tank Competitors:

**Team 1:** 15 min. (5-minute pitch; 10 min. Q&A)

**Team 2:** 15 min. (5-minute pitch; 10 min. Q&A)

**Team 3:** 15 min. (5-minute pitch; 10 min. Q&A)

5:00 – 5:10 p.m. **Awards Announcement**

Session Chair: **John P. Cooke, MD, PhD**

▪ **Grant Awards**

▪ **Poster Awards**

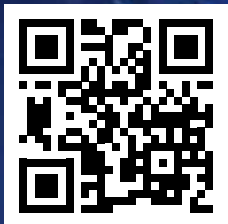
▪ **Shark Tank Award**

5:10 – 5:15 p.m. **Closing Remarks and Adjournment**

**John P. Cooke, MD, PhD** and **Alessandro Grattoni, PhD**







Visit [cvbe2024tmc.org](https://cvbe2024tmc.org) for more information.

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