



American Heart Association®

Vascular Discovery: From Genes to Medicine

**Council on Arteriosclerosis, Thrombosis and
Vascular Biology (ATVB) Invited Lecture Series**

Conference Highlights – Lectures and Awards

Thursday, May 7, 2020

- 10:30 AM – Jeffrey M. Hoeg Arteriosclerosis, Thrombosis and Vascular Biology Award for Basic Science and Clinical Research Lecture
- 10:50 AM – Keynote Lecture
- 11:10 AM – Distinguished Lecture

JEFFREY M. HOEG ARTERIOSCLEROSIS, THROMBOSIS AND VASCULAR BIOLOGY AWARD FOR BASIC SCIENCE AND CLINICAL RESEARCH



At 10:30 AM, The Jeffrey M. Hoeg Lecture will be presented by Elena Aikawa, MD, PhD, FAHA

Dr. Aikawa will lecture on Cardiovascular Calcification: From Extracellular Vesicles to Systems Biology.

Dr. Aikawa is Professor of Medicine at Harvard Medical School. She is Co-director of the Center for Interdisciplinary Cardiovascular Sciences, Founding Director of the Heart Valve Translational Research Program and Associate Head of Cardiovascular Life Sciences Section at Brigham and Women's Hospital.

Her research focuses on the development of new therapies to prevent and treat calcific aortic valve stenosis, a disease that currently has no treatment options except invasive valve replacement. She was at the forefront in the discovery of inflammation-dependent mechanisms of cardiovascular calcification. Her studies contributed to the discovery of calcifying extracellular vesicles - precursors of microcalcification (Circulation Research 2013; Nature Materials 2016, JCI 2016). Recently she used systems approaches, involving multi-omics and network medicine, to identify novel anti-calcification targets (Circulation 2018).

Dr. Aikawa was a member of the NHLBI Working Group on Calcific Aortic Valve Stenosis and the Alliance of Investigators on Calcific Aortic Valve Disease. She holds editorial board member positions at PLOS ONE, Journal of Extracellular Vesicles, Circulation Research and ATVB. Dr. Aikawa has delivered over 160 invited talks and authored more than 210 manuscripts. Her research program has been continuously supported by NIH funding.

In addition to her strong interest in research, Dr. Aikawa enjoys mentoring young scientists and is committed to advancing the careers of women in science and medicine. She is vice-chair of the ATVB Council Women's Leadership Committee and president of the International Society for Applied Cardiovascular Biology. She is serving as the society's first female president.

Cardiovascular Calcification: From Extracellular Vesicles to Systems Biology

Cardiovascular calcification associates with cardiovascular events and strongly predicts morbidity and mortality. We previously showed that extracellular vesicles (EVs) contribute to formation of microcalcification that can lead to atherosclerotic plaque rupture and aortic valve stenosis. While circulating EVs act as disease biomarkers, the contents and function of tissue-EVs associated with early mineralization/microcalcification remain unknown. In addition, while atherosclerosis and aortic valve stenosis share similar risk factors, only 25-50% of patients develop both vascular and valvular calcification, suggesting that they involve different pathways and disease drivers.

Our most recent research used global proteomics of calcified human carotid artery plaques and aortic valves that revealed significant increase of proteins with EV-associated pathways common to both diseases. We then developed a hybrid isolation approach to examine EVs in whole-tissue samples to demonstrate that tissue-EV cargoes contribute to the shared- and tissue-specific pathogenesis of cardiovascular calcification. Lastly, we applied proteomics, miRNA sequencing, multi-omics integration, multi-dimensional network analysis, and bioinformatic techniques to derive biological insights from tissue-EV cargoes. Proteomics and miRNA-seq of tissue-EVs quantified 1,104 proteins and 123 miR cargoes linked to 5,182 target genes. Pathway networks of proteins and miR targets common to artery and valve tissue-EVs revealed a shared regulation of Rho GTPase and MAPK intracellular signaling pathways. 179 proteins and 5 miRs were significantly different between artery and valve EVs; multi-omics integration determined that EVs differentially modulated cellular contraction and p53-mediated transcriptional regulation in vascular vs. valvular disease. In conclusion, multi-omics and systems biology approaches implicated tissue-EVs in human cardiovascular disease pathogenesis.

Jeffrey M. Hoeg Arteriosclerosis, Thrombosis and Vascular Biology Award for Basic Science and Clinical Research – Award History

The Jeffrey M. Hoeg Arteriosclerosis, Thrombosis and Vascular Biology Award for Basic Science and Clinical Research was established in 1999. The award recognizes an established investigator in the prime of his/her career who has made an outstanding contribution to furthering understanding of the pathophysiology of atherosclerosis and/or the development of treatment strategies for its prevention through basic science and clinical research efforts.

This award honors the memory of Jeffrey M. Hoeg, MD, chief of the Section of Cell Biology within the Molecular Disease Branch of the National Heart, Lung, and Blood Institute, NIH. He was an extraordinary research scientist and physician who, in the prime of his career, was working in the field of lipoprotein metabolism and atherosclerosis. Dr. Hoeg died in July 1998 after a courageous battle with cancer.

KEYNOTE LECTURE



At 10:50 AM, the Keynote Lecture will be presented by Luisa Iruela-Arispe, PhD

Luisa Iruela-Arispe is a cell and developmental biologist and Stephen Walter Ranson Professor and Chair Department of Cell & Developmental Biology at Northwestern Feinberg School of Medicine.

Originally from Spain, she earned her Ph.D. degree from the University of Sao Paulo in Brazil in 1989 and received post-doctoral training at the University of Washington in Seattle.

She was appointed Assistant Professor at the Department of Pathology at Harvard Medical School in 1994 and in 1998, Dr. Iruela-Arispe joined the faculty of the

Department of Molecular, Cell and Developmental Biology at UCLA. Her research centers in understanding the molecular regulation of endothelial cell commitment and differentiation, patterning of the vasculature and homeostatic vascular function.

This information has provided the basis to develop strategies to control vascular growth during disease, particularly in cancer. Dr. Iruela-Arispe is strongly committed to education.

She served as Vice-Chair for her home department from 2004 through 2017. She served as the Chair of the Molecular Biology Interdepartmental Graduate Program for eight years and the Director of the Molecular Biology Institute for five years, bringing together over 200 faculty members from 30 different UCLA Departments.

In 2002, Dr. Iruela-Arispe founded the Vascular Biology Training program that has been continuously supported by an NIH T32 award, now in its fourth iteration. On October 1, 2020, she was named Stephen Walter Ranson Professor and Chair of the Department of Cell and Developmental Biology at Northwestern University Feinberg School of Medicine. She is actively involved in her field of research and has participated in the organization of several Gordon Conferences, Keystone meetings and the 2010 International Vascular Biology Meeting.

DISTINGUISHED LECTURE



At 11:10 AM, the Distinguished Lecture will be presented by Joseph Loscalzo, MD, PhD, FAHA

Dr. Joseph Loscalzo is Hersey Professor of the Theory and Practice of Medicine, and Soma Weiss, M.D., Distinguished Chair in Medicine at Harvard Medical School, Chairman of the Department of Medicine, and Physician-in-Chief at Brigham and Women's Hospital. Dr. Loscalzo received his A.B. degree, summa cum laude, his Ph.D. in biochemistry, and his M.D. from the University of Pennsylvania. His clinical training was completed at Brigham and Women's Hospital and Harvard Medical School, where he served as Resident and Chief Resident in medicine and Fellow in cardiovascular medicine.

After completing his training, Dr. Loscalzo joined the Harvard faculty and staff at Brigham and Women's Hospital in 1984. He rose to the rank of Associate Professor of Medicine, Chief of Cardiology at the West Roxbury Veterans Administration Medical Center, and Director of the Center for Research in Thrombolysis at Brigham and Women's Hospital. He joined the faculty of Boston University in 1994, first as Chief of Cardiology and, in 1997, Wade Professor and Chair of Medicine, Professor of Biochemistry, and Director of the Whitaker Cardiovascular Institute. He returned to Harvard and Brigham and Women's Hospital in 2005.

Dr. Loscalzo is recognized as an outstanding cardiovascular scientist, clinician, and teacher. He has received many awards, including the Clinician-Scientist Award, the Distinguished Scientist Award, the Research Achievement Award, the Paul Dudley White Award and the Gold Heart Award from the American Heart Association. He is currently Director of the NIH-funded Center for Accelerated Innovation (the Boston Biomedical Innovation Center), and of the NIH-funded Harvard Undiagnosed Disease Network program. He is also former Editor-in-Chief of *Circulation*, currently Editor-at-Large of the *New England Journal of Medicine*, and a current senior editor of *Harrison's Principles of Internal Medicine*.

Dr. Loscalzo has been a visiting professor at many institutions, holds three honorary degrees, has authored or co-authored over 1,000 scientific publications, has authored or edited 51 books, and holds 32 patents for his work in the field of nitric oxide, redox biology, and vascular biology. He is also the recipient of many grants from the NIH and industry for his work in the areas of vascular biology, thrombosis, atherosclerosis, and, more recently, systems biology over the past thirty years. His most recent work has established the field of network medicine, a paradigm-changing discipline that seeks to re-define disease and therapeutics from an integrated perspective using systems biology and network science.

JEFFREY M. HOEG ARTERIOSCLEROSIS, THROMBOSIS AND VASCULAR BIOLOGY AWARD FOR BASIC SCIENCE AND CLINICAL RESEARCH – PAST WINNERS

2000	Shaun Coughlin, MD, PhD	2012	Kathryn J. Moore, PhD
2001	Jay W. Heinecke, MD	2013	Susan Smyth, MD, PhD
2002	James Kuango-Jan Liao, MD	2014	Catherine C. Hedrick, PhD
2003	Linda L. Demer, MD, PhD	2015	Alan E. Mast, MD, PhD
2004	Robert Hegele, MD	2016	Esther Lutgens, MD, PhD
2005	Daniel Rader, MD	2017	Filip K. Swirski, PhD
2006	Hiroaki Shimokawa, MD, PhD	2018	Muredach P. Reilly, MBBCH, MSCE, FAHA
2007	Stanley Hazen, MD, PhD	2019	Carlos Fernández-Hernando, PhD
2008	Steven Lentz, MD, PhD		
2009	Elazer R. Edelman, MD, PhD		
2010	Peter Tontonoz, MD, PhD		
2011	Nigel Mackman, PhD		

ATVB MENTORING PROGRAM

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- Get connected with senior investigators on the ATVB Council.
- Get the advice and external mentorship you need to succeed.

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