

Joseph Loscalzo

Dr. Joseph Loscalzo is Chairman of the Department of Medicine and Physician-in-Chief at Brigham and Women's Hospital, and Hersey Professor of the Theory and Practice of Medicine at Harvard Medical School. He is also Director of the Brigham Biomedical Research Institute.

Education and training

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 internal 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 next 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.

Research contributions

Dr. Loscalzo's research interests focus on blood vessel biology in health and disease. He and his colleagues' seminal work in the field of nitric oxide showing that this endothelial product is susceptible to oxidative inactivation and is protected therefrom by the formation of S-nitrosothiols led to an understanding of the redox states of nitric oxide and of vascular thiols in governing the antioxidant protection essential for normal blood vessel function. Deficiencies of important antioxidant enzymes, such as glucose-6-phosphate dehydrogenase (a key source of cytosolic NADPH), glutathione peroxidase-1, and glutathione peroxidase-3, are associated with enhanced susceptibility to vascular diseases through increased oxidant stress, one manifestation of which is a deficiency of bioactive nitric oxide. These antioxidant enzyme deficiencies--termed oxidative enzymopathies--can be either inherited or acquired, and promote the development of coronary artery disease, hypertension, stroke, and pulmonary arterial hypertension. His research group also showed that many drugs can be modified to carry (and protect) nitric oxide, restoring normal blood vessel function in the face of increased oxidant stress, a concept which served as a basis for establishing the company, NitroMed, Inc., of which he was scientific founder.

In the last few years, his laboratory has begun to apply a systems biology approach to understanding cellular responses to hypoxia and to oxidant stress. For example, identifying those microRNAs that increase in response to hypoxia--so-called hypoxamirs--has led to an integrated approach to the determinants of changes in gene expression accompanying hypoxia, and an appreciation of the role of select microRNAs in regulating the Pasteur effect (such as miRNA 210), or the conversion from oxidative phosphorylation to glycolysis with attenuated reactive oxygen species production by uncoupled mitochondria.

Building on holistic systems approaches to human pathobiology, he and Albert Laszlo-Barabasi have established the field of network medicine. This nascent discipline uses and integrative static and dynamic analysis of -omic data sets coupled with careful pathophenotyping to identify key disease pathways well in advance of the development of end-stage, end-organ disease. Network medicine is viewed as the

contemporary alternative to reductionist Oslerian definitions of end-organ disease expression, the identification of which has characterized medicine for the past 125 years. The promise of this integrative networked systems approach will provide early disease recognition, personalized prognostic features of an illness, and a clear path to individualized molecular therapies.

Awards and recognitions

Dr. Loscalzo is recognized as an outstanding cardiovascular scientist, clinician, and teacher.

- Clinician-Scientist Award, American Heart Association
- Distinguished Scientist Award, American Heart Association
- Research Achievement Award, American Heart Association
- Paul Dudley White Award, American Heart Association
- Lewis A. Conner Lecture, American Heart Association
- Research Career Development Award, National Institutes of Health
- Specialized Center of Research in Ischemic Heart Disease Award, National Institutes of Health
- MERIT Award, National Institutes of Health
- George W. Thorn Award for Excellence in Teaching, Brigham and Women's Hospital
- Educator of the Year Award in Clinical Medicine, Boston University School of Medicine
- Glaxo Cardiovascular Research Award
- Outstanding Investigator Prize, International Society for Heart Research
- Election to the American Society for Clinical Investigation
- Election to the Association of American Physicians
- Election to the Institute of Medicine of the National Academy of Sciences
- Served on several NIH study sections and editorial boards, and has chaired the Gordon Conference on Thrombolysis
- Served as an associate editor of the *New England Journal of Medicine* for nine years
- Chair of the Cardiovascular Board of the American Board of Internal Medicine
- Chair of the Research Committee of the American Heart Association
- Chair of the Scientific Board of the Stanley J. Sarnoff Society of Fellows for Research in the Cardiovascular Sciences
- Chair of the Board of Scientific Counselors of the National Heart, Lung, and Blood Institute of the National Institutes of Health.
- Editor-in-Chief of *Circulation*
- A senior editor of **Harrison's Principles of Internal Medicine**
- Former member of the Advisory Council of the National Heart, Lung, and Blood Institute
- Former member of the Council of Councils of the National Institutes of Health.

Dr. Loscalzo has been a visiting professor at many institutions, holds two honorary degrees, has authored or co-authored ~700 scientific publications, has authored or edited 29 books, and holds 31 patents for his work in the fields of nitric oxide 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, and atherosclerosis over the past thirty years.
