J.D. Humphrey
Title: Mechano-sensing and Thoracic Aortic Aneurysms

Abstract:
Thoracic aortic aneurysms and dissections (TAADs) are responsible for significant morbidity and mortality in young and old individuals alike. Advances over the past 15 years in genetics have revealed diverse mutations that either lead to or associate with TAADs. These mutations tend to affect extracellular matrix proteins, transmembrane structures / receptors, or actomyosin machinery. The goal of this presentation is to discuss how knowledge of these mutations led naturally to a hypothesis of dysfunctional mechanobiological responses by the aortic smooth muscle cells, which in turn likely leads to a dysregulated mechanical homeostasis. Moreover, based on biomechanical data from multiple mouse models, we present biomechanical simulations and calculations that support a new hypothesis for the fundamental role of accumulated glycosaminoglycans in thoracic aortic dissection.

J.D. Humphrey received the Ph.D. in Engineering Science and Mechanics from The Georgia Institute of Technology and completed a post-doctoral fellowship in Medicine - Cardiovascular at the Johns Hopkins University. He is currently John C. Malone Professor and Chair of Biomedical Engineering at Yale University. His primary technical interest is in vascular mechanics and mechanobiology, especially vascular aging, hypertension, aneurysms, and tissue engineering. He has authored a graduate textbook (*Cardiovascular Solid Mechanics*) and co-authored both an undergraduate textbook (*An Introduction to Biomechanics*) and a short handbook (*Style and Ethics of Communication in Science and Engineering*). He has also co-edited a research text (*Cardiovascular Soft Tissue Mechanics*), published chapters in 30 other books or encyclopedias, and published nearly 300 archival journal papers. He served for a decade as founding co-editor-in-chief for the international journal *Biomechanics and Modeling in Mechanobiology*. He also served as a US representative to the World Council for Biomechanics for more than a decade and served as Chair of the US National Committee on Biomechanics. He is a Fellow of the American Institute of Medical and Biological Engineering, American Society of Mechanical Engineers, and International Academy of Medical and Biological Engineering. He is also an elected member of the Connecticut Academy of Science and Engineering.