

# Jay D. Humphrey's KEYNOTE seminar “Mechanical Homeostasis and Soft Tissue Growth and Remodeling”

Homeostasis is a ubiquitous biological process that tends to maintain key regulated variables near preferred values, called set-points. Mechanical homeostasis exists at sub-cellular, cellular, and tissue levels in the vasculature [1] and is critical to vessel maintenance as well as in adaptations to altered hemodynamics, disease progression, and responses to injury. In this talk, we will consider how the concept of homeostasis is fundamental to regulation of the extracellular matrix [2] and how it can guide the development of computational approaches for modeling tissue-level growth and remodeling. Different illustrative examples will be drawn from vascular remodeling and disease progression, including tissue engineering and hypertension [3].

[1] Humphrey JD (2008) Vascular adaptation and mechanical homeostasis at tissue, cellular, and sub-cellular levels. *Cell Biochem Biophys* 50: 53-78.

[2] Humphrey JD, Dufrense E, Schwartz MA (2014) Mechano-transduction and extracellular matrix homeostasis. *Nat Rev Mol Cell Biol* 15: 802-812.

[3] Humphrey JD (2021) Constrained mixture models of tissue growth and remodeling – twenty years after. *J Elasticity* (in press).



Dr. Jay Humphrey is John C. Malone Professor and Chair of Biomedical Engineering, Yale University, US. Previously he worked at Texas A&M University, University of Maryland and Johns Hopkins University. He has made numerous seminal contributions to the vascular biomechanics, related to the theory of soft tissue Growth & Remodelling, the computational modelling of vascular adaptation, biomechanics of aneurysms and dissections and the experimental assessments of arterial adaptations. He authors three textbooks and 300+ peer reviewed journal papers. Dr. Humphrey holds B.S. and M.S. degrees in Engineering Science & Mechanics from Virginia Tech and respectively Georgia Institute of Technology. His Ph.D. degree in Applied Mechanics/Bioengineering has also been awarded by Georgia Institute of Technology. He is a fellow of societies, such as IAMBE, AIMBE, ASM, BMES, SES, NAVBO, and was chair US National Committee on Biomechanics, appointed/elected member of the World Council of Biomechanics, NIH Modeling and Analysis of Biological Systems, Federal Interagency Modeling and Analysis Group. Dr. Humphrey is/was editorial board member/associate editor of *BMMB*, *J. Biomech*, *J. Biomech. Egrg*, *J. R. Soc. Interface*, *IJNM Biomed. Engrg*.