SEMINAR SERIES

Supported by The Department of Biomechanics and
The Center for Research in Human Movement Variability (MOVCENTR)

Biomechanics & Mechanobiology of Vascular Grafts

Featuring Dr. John Eberth
University of South Carolina

Friday, March 11 | 12:00 - 1:15 pm | Via Zoom

https://unomaha.zoom.us/s/92012305734

PRESENTATION ABSTRACT

Autografts remain the standard-of-care for small-diameter vascular procedures with transplanted tissues experiencing profound remodeling in order to function effectively in the coronary environment. Fortunately, blood vessel microarchitecture is dynamic and responsive to subtle mechanobiological cues that can initiate favorable remodeling processes such as the expression of anti-inflammatory and anti-thrombotic genes, the synthesis and removal of extra-cellular-matrix proteins, and the eventual quiescence of smooth muscle cells. However, severe biomechanical incompatibilities (e.g., compliance mismatch) underly several vascular etiologies, which may be deterministic in graft outcomes. This presentation describes novel tools, techniques, and experiments to quantify and alter functional porcine blood vessels to match coronary targets. Data from experiments were used within a continuum mechanics framework to fit structurally motivated, nonlinearly elastic, collagen fiber reinforced, constitutive models using bootstrapping statistical techniques and the theory of "small-on-large" to improve the physical interpretation of cellular mechanosensing. These data informed finite element and, subsequently, computational fluid dynamic simulations revealing the fluid-solid penalties occurring at the anastomotic junction of graft-host mismatched tissues.

ABOUT DR. EBERTH

John F. Eberth is an Associate Professor at the University of South Carolina's School of Medicine and a core member of the Biomedical Engineering Program. His formal training includes BS and MS degrees in Mechanical Engineering, a PhD in Biomedical Engineering from Texas A&M, and a Bioengineering postdoctoral fellowship from Rice. To date, he has authored 45+ peer-reviewed manuscripts and book chapters on cardiovascular growth & remodeling, aneurysm mechanics, arterial stiffening, perfusion tissue culture, cardiac development, congenital heart defects, hydrogel mechanics, and tissue-engineered vascular grafts. Research in his *Applied Biomechanics and Mechanobiology Lab* is currently supported by multiple grants from the NIH, NSF, and other private sources to study vascular inflammation, aortic aneurysm attenuation, endothelial dysfunction, and medial calcification chelation therapy.

more info at **cobre.unomaha.edu**

*This seminar was supported by the National Institutes of General Medical Sciences of the National Institutes of Health under Award Number P20GM109090 Center for Research in Human Movement Variability. |