Mechanical Engineering Department Seminar
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1130 Mechanical Engineering

Mechano-Adaptation in Vascular Tissues

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Because arteries exist in a dynamic mechanical environment, they must rapidly respond to changes in external forces to maintain mechanical homeostasis. Though this adaptive response plays a key role in cardiovascular maintenance, maladaptive growth and remodeling have been implicated in a number of vascular dysfunctions. In this talk, I will describe elasticity-based theoretical approaches and tissue-engineered experimental models for elucidating the pathways leading from applied mechanical stress to vascular mechano-adaptation. These approaches will then be applied to better understand the dynamics of vascular remodeling in hypertension and traumatic cerebral vasospasm.

Bio Dr. Alford has been an Assistant Professor in the Biomedical Engineering department at the University of Minnesota for almost two years. He received a B.S. in Mechanical Engineering from Bradley University and a Ph.D. in Biomedical Engineering from Washington University in St Louis. In addition, he was a postdoctoral fellow at Harvard University. Dr. Alford’s lab focuses on the mechanics of, and mechanotransduction in, actively adaptive tissues. He combines microfabrication and tissue engineering approaches with theoretical models to better understand the relationship between mechanical forces and functional cellular responses, such as contraction, migration, or protein and gene expression. Dr. Alford's lab studies a wide range of biomechanics problems including aneurysm formation and growth, cerebral vasospasm, and neurotrauma, with a goal of determining the mechanisms of these mechotransduction-related dysfunctions to help guide future therapeutic strategies.