

Public Abstract

First Name: Aaron

Middle Name: Joseph

Last Name: Stupica

Adviser's First Name: Michael

Adviser's Last Name: Hill

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term: FS 2011

Department: Biological Engineering

Degree: MS

Title: Regional Heterogeneity of Adventitial Elastin in the Arteriolar Wall Reflects Differences in the Mechanical Environment

Arterioles are an important element in the control and distribution of blood circulation. A number of proteins, composing the extracellular matrix (ECM), surround the arteriole and provide the vessel with flexibility and stability during changes in pressure. Elastin has been recorded in the ECM as well as in arteriolar wall at two additional locations. However, elastin in the ECM has been directly linked to vessel flexibility and elasticity. When this protein is destroyed, vessel stiffness and decreased vessel capabilities have been recorded. Elastin structure in microvessels such as arterioles has been an area of little research due to the low overall amount of elastin. However through development of an imaging protocol and 3D confocal imaging, the elastin structure of three different vessels has been recorded and significant differences have been observed. Skeletal muscle and mesenteric small arteries each showed a vast network of elastin proteins in the ECM while small cerebral arteries showed a complete absence elastin in the ECM. One explanation for this difference is the differences in the mechanical environments of these vessel types. Skeletal muscle and mesenteric vessels will undergo periods of stretch and recoil, while cerebral arteries are largely protected by the skull from exposure to longitudinal stretch.