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Research Area: Vascular Mechanics

The vascular wall is a complex system composed of three general layers: the intima, the media, and the adventitia. Due to the different cellular components of these layers, different mechanical properties are observed. Making the measurement of these properties even more difficult is the constant remodeling taking place within the wall due to circumstances such as aging, cardiovascular disease, and also the treatment of these diseases. It is important to know how these factors contribute to the properties of the vascular wall to ensure the health and stability of the cardiovascular system. More specifically, the project will evaluate how angioplasty procedures (using a balloon to unblock the artery) affect the mechanical makeup of the vascular wall, in contrast to a healthy vascular wall and a diseased wall prior to angioplasty.

In collaboration with the UT Medical Center, images of a patient obtained pre-angioplasty and directly following the procedure will be provided to develop a base finite-element model using ABAQUS. A data base of material properties found through literature research will be developed and used in computational models for comparing the affects before and after angioplasty. Stresses in the vascular wall and how the procedure affects the remodeling (repair) of the vessel will receive particular attention.

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