1176-92-15 **Pak-Wing Fok*** (pakwing@udel.edu), 412 Ewing Hall, University of Delaware, Department of Mathematical Sciences, Newark, DE 19716. *Nitric Oxide Regulated Growth and Remodeling of Cylindrical Arteries.*

The mechanisms employed by arteries in order to adapt to their hemodynamic environment are important for our understanding of cardiovascular disease and general developmental. Changes in arterial geometry are induced by vasodilation/constriction, and growth and remodeling ("G&R"). The first can occur over periods of a few minutes, while the second usually occurs over timescales of weeks. Nitric oxide (NO) is one of the few biological signaling molecules that is gaseous. When the smooth muscle cells internalize NO, they relax and induce a relaxation of the artery.

We present a multi-layered, mechanical model for an artery in which vasodilation and G&R are regulated by a steady-state Poiseuille flow. The transport of NO is governed by a diffusion equation with a shear-stress dependent flux boundary condition. Arterial opening angle is assumed to be a Hill function of mean NO concentration. We find that NO helps to control the shear stress, but this mechanism is substantially enhanced by medial growth. In particular, morphological changes in the artery are "entrenched" and made permanent with growth, in line with experimental observations. Our model is calibrated using experimental data from the carotid arteries of adult and weanling rabbits. (Received December 22, 2021)