Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Pulsatile flow-induced shear stress in large vessels affects VE-Cadherin and Neuregulin-1 expression in endothelial cells. MATTHEW WATSON, LAUREN BAUGH, LAUREN BLACK, ERICA KEMMERLING, Tufts Univ — It is well known that endothelial cell behavior is modulated by flow-induced shear stress. In smaller vessels, where Reynolds and Womersley numbers are much less than one, vessel wall shear stress is close to steady; however, in the larger vessels, shear stress is pulsatile. We investigated the effect of realistic healthy and unhealthy large vessel shear stresses on the endothelial cells' expression of vascular endothelial cadherin (VE-Cad) and neuregulin-1 (NRG-1). Our model accounts for the shear thinning behavior of blood when determining the shear stress profiles. A motor-driven cone-plate shearing device was used to expose human umbilical vein endothelial cells (HUVECs) to desired shear waveforms for 24 hours. Immunohistochemistry was used to qualitatively show that HUVECs were expressing VE-Cad and NRG-1. Western blots were performed to quantify the amount of VE-Cad and NRG-1 expressed by HUVECs after exposure to flow-induced shear stress.

Matthew Watson
Tufts Univ

Date submitted: 28 Jul 2017 Electronic form version 1.4