

Title: Effects of Glycocalyx on Attenuation of Shear Stress on Endothelial Cells

Authors: Ilenia Battiato (Clemson University), Marcos Intaglietta (University of California, San Diego), Daniel M. Tartakovsky (University of California, San Diego)

Abstract: Fluid shearing forces acting on endothelial cells (ECs) significantly affect EC morphology and nitric oxide production. The role of the glycocalyx, an extracellular matrix of proteoglycans and glycoproteins, is also crucial since it attenuates the shear stress at the edge of the endothelial surface layer. We use a double viscosity Stokes-Brinkman flow model to estimate a shear stress distribution inside the endothelium glycocalyx, while taking explicitly into account both Newtonian and non-Newtonian flow of plasma and red blood cells, respectively. We show that the presence of porous flow tangential to the endothelium decreases the mechanical energy transmitted to the endothelium. We compare our model with experimental data.