Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Simulation of Red Blood Cell Interaction with the Endothelial Cell Surface CYRUS AIDUN, Georgia Tech, XINLI JIA, Clarkson University, JEFF MORRIS, City College of New York, JOHN MCLAUGHLIN, Clarkson University — It is hypothesized that the stress field on the EC surface felt through hydrodynamic interaction at the extracellular layer, known as the glycocalyx, is the pathophysiological link between the hemodynamics and the cell function. Simulations revealing the general stress distribution on the EC surface, and in particular the mechanical interactions of red blood cells (RBC's) with the EC's will be presented. The current focus is to investigate the drag force and the bending moment on the core proteins in the EC glycocalyx. The glycocalyx has been modeled as a quasiperiodic array of cylinders (Weinbaum et al., PNAS **100**, 1988-7995, 2003). The height and diameter of the cylinders were assumed to be 150 nm and 6 nm, respectively, and the gap between cylinders was 8 nm. Weinbaum et al. computed the average velocity profile by treating the glycocalyx as a porous medium. The focus of the work to be presented is on the effects upon the EC by close encounters with RBC's over a long period of time. We will present results for the flow in and above a model glycocalyx caused by the motion of a nearby surface. The flow was computed using the lattice Boltzmann method (LBM). The results of the LBM for the mean flow and the bending moment and drag on a model protein fiber will be compared with the predictions obtained from the model of Weinbaum.

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Date submitted: 04 Aug 2005 Electronic form version 1.4