Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

The Effect of Discoid Shape on Platelet Margination in a Microvessel[1] MARMAR MEHRABADI, DANIEL REASOR, DAVID KU, CYRUS AIDUN, Georgia Institute of Technology — Margination of platelets to the skimming layer only occurs above a threshold hematocrit (Ht.). Platelet size and concentration in blood is much smaller compared to red blood cells (RBCs). We study the hypothesis that platelets are passively convected to vessel walls and that their morphology can effect margination rate and dynamics. To examine this, we study the influence of particle shape on margination rate through changing the aspect ratio (AR) of rigid particles at fixed volume. We use a coarse-grained spectrin-link method for RBC membranes and Newtonian dynamics for rigid particles coupled with a 3D lattice-Boltzmann fluid solver using standard bounce-back boundary conditions. Simulations are performed at Ht.=20% in a $41.\bar{3}$ μm vessel. Our results show that AR has a significant effect on margination rate: Lower AR particles marginate more rapidly. We also show that the higher AR particles "flip" and "slide" between RBCs as they migrate to the skimming layer. The final location of particles in the skimming layer is also influenced by their shape. Thin disk-shaped particles interact with the RBCs at the edge of the skimming layer more frequently than with the vessel wall while spherical particles interact with both simultaneously.

[1]NSF TeraGrid Grant: TG-CTS100012

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Date submitted: 26 Oct 2011 Electronic form version 1.4