Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Red Blood Cell Hematocrit Influences Platelet Adhesion Rate in a Microchannel[1] ANDREW SPANN, Stanford University, JAMES CAMPBELL, United States Army Institute of Surgical Research, SEAN FITZGIBBON, Stanford University, ARMANDO RODRIGUEZ, United States Army Institute of Surgical Research, ERIC SHAQFEH, Stanford University — The creation of a blood clot to stop bleeding involves platelets forming a plug at the site of injury. Red blood cells indirectly play a role in ensuring that the distribution of platelets across the height of the channel is not uniform – the contrast in deformability and size between platelets and red blood cells allows the platelets to preferentially marginate close to the walls. We perform 3D boundary integral simulations of a suspension of platelets and red blood cells in a periodic channel with a model that allows for platelet binding at the walls. The relative rate of platelet activity with varying hematocrit (volume fraction of red blood cells) is compared to experiments in which red blood cells and platelets flow through a channel coated with von Willebrand factor. In the simulations as well as the experiments, a decrease in hematocrit of red blood cells is found to reduce the rate at which platelets adhere to the channel wall in a manner that is both qualitatively and quantitatively similar. We conclude with a discussion of the tumbling and wobbling motions of platelets in 3D leading up to the time at which the platelets bind to the wall.

[1]Funded by Stanford Army High Performance Computing Research Center, experiments by US Army Institute of Surgical Research

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Date submitted: 31 Jul 2014 Electronic form version 1.4