Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

The motion of a single red blood cell in a capillary THIERRY SAVIN, L. MAHADEVAN, Harvard University — The collective vaso-occlusive event in sickle cell disease induced by multiple red blood cells (RBC's) has recently been evoked and controlled in vitro using a microfluidic platform [1]. The increase in the cells' stiffness in this disease is believed to be a predominant factor at the onset of the occlusion. We report here the motion of a single swollen RBC in a capillary. We use a tapered glass capillary with inner diameter as low as 3 microns, and track the squeezed cell driven by a controlled pressure drop. This allows us to simultaneously measure the variations of the RBC velocity as a function of the pressure gradient and of the local capillary diameter in a single experiment. We show that under certain regimes of confinement, the velocity increases with the pressure head with a characteristic power-law. We analyze our findings in terms of a elasto-hydrodynamical model for soft lubrication.

[1] Higgins et al., Proc. Natl. Acad. Sci. U.S.A. **104**: 20496 (2007).

Thierry Savin
Harvard University

Date submitted: 10 Aug 2009 Electronic form version 1.4