Abstract Submitted
for the TSF09 Meeting of
The American Physical Society

Single-Molecule Manipulation Studies of a Mechanically Activated Protein ERIC BOTELLO, NOLAN HARRIS, Department of Physics & Astronomy, Rice University, HUIWAN CHOI, ANGELA BERGERON, JING-FEI DONG, Department of Medicine, Baylor College of Medicine, CHING-HWA KIANG, Department of Physics & Astronomy, Rice University — Plasma von Willebrand factor (pVWF) is the largest multimeric adhesion ligand found in human blood and must be adhesively activated by exposure to shear stress, like at sites of vascular injury, to initiate blood clotting. Sheared pVWF (sVWF) will undergo a conformational change from a loose tangled coil to elongated strings forming adhesive fibers by binding with other sVWF. VWF's adhesion activity is also related to its length, with the ultra-large form of VWF (ULVWF) being hyper-actively adhesive without exposure to shear stress; it has also been shown to spontaneously form fibers. We used single molecule manipulation techniques with the AFM to stretch pVWF, sVWF and ULVWF and monitor the forces as a function of molecular extension. We showed a similar increase in resistance to unfolding for sVWF and ULVWF when compared to pVWF. This mechanical resistance to forced unfolding is reduced when other molecules known to disrupt their fibril formation are present. Our results show that sVWF and ULVWF domains unfold at higher forces than pVWF, which is consistent with the hypothesis that shear stress induces lateral association that alters adhesion activity of pVWF.

Eric Botello
Department of Physics & Astronomy, Rice University

Date submitted: 01 Oct 2009 Electronic form version 1.4