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Probing the Mechanical Properties of Plasma von Willebrand Factor Using Atomic Force Microscopy SITARA WIJERATNE, ERIC BOTELLO, ERIC FREY, CHING-HWA KIANG, Department of Physics and Astronomy, Rice University, JING-FEI DONG, HUI-CHUN YEH, Department of Medicine, Baylor College of Medicine — Single-molecule manipulation allows us to study the real time kinetics of many complex cellular processes. The mechanochemistry of different forms of von Willebrand factor (VWF) and their receptor-ligand binding kinetics can be unraveled by atomic force microscopy (AFM). Since plasma VWF can be activated upon shear, the structural and functional properties of VWF are critical in mediating thrombus formation become important. Here we characterized the mechanical resistance to domain unfolding of VWF to determine the conformational states of VWF. We found the shear induced conformational, hence mechanical property changes can be detected by the change in unfolding forces. The relaxation rate of such effect is much longed than expected. This supports the model of lateral association VWF under shear stress. Our results offer an insight in establishing strategies for regulating VWF adhesion activity, increasing our understanding of surface-induced thrombosis as mediated by VWF.

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