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Increase in Mechanical Resistance to Force in a Shear-Activated Protein ERIC BOTELLO, NOLAN HARRIS, Physics & Astronomy, Rice University, HUIWAN CHOI, ZHOU ZHOU, ANGELA BERGERON, JING-FEI DONG, Department of Medicine, Baylor College of Medicine, CHING-HWA KIANG, Physics & Astronomy, Rice University, PHYSICS & ASTRONOMY, RICE UNIVERSITY COLLABORATION, DEPARTMENT OF MEDICINE, BAYLOR COLLEGE OF MEDICINE COLLABORATION — von Willebrand factor (VWF) is the largest multimeric adhesion ligand found in human blood. Plasma VWF (pVWF) must be exposed to shear stress, like at sites of vascular injury, to be activated to bind platelets to induce blood clotting. In addition, adhesion activity of VWF is related to its polymer size, with the ultra-large form of VWF (ULVWF) being hyperactive, and forming fibers even without exposure to shear stress. We used the AFM to stretch pVWF, sheared VWF (sVWF) and ULVWF, and monitor the forces as a function of molecular extension. We showed a similar increase in force resistance to unfolding for sVWF and ULVWF when compared to pVWF. The increase in force is reduced when other molecules that are known to disrupt their fibril formation are present. Our results provide evidence that the common higher order structure of sVWF and ULVWF may affect the domain structure that causes difference in their adhesion activity compared to pVWF.

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