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Study of Large Multimeric Biomolecules by Single-Molecule Manipulation and Imaging KAI LOU, SITARA S. WIJERATNE, Department of Physics and Astronomy, Rice University, JERAHME MARTINEZ, Department of Biochemistry and Cell biology, Rice University, HUI-CHUN YEH, Puget Sound Blood Center and Division of Hematology, Department of Medicine, University of Washington, JOEL MOAKE, Department of Bioengineering, Rice University, JING-FEI DONG, Puget Sound Blood Center and Division of Hematology, Department of Medicine, University of Washington, MARY C. FARACH-CARSON, Department of Biochemistry and Cell biology, Rice University, CHING-HWA KIANG, Department of Physics and Astronomy, Rice University — Single-molecule manipulation enables us to study the properties of long chain, multimeric biomolecules. Perlecan, a giant secreted heparin sulfate proteoglycan, is a major component of basement membrane, bone stroma and blood vessels. It is involved in processes such as cell adhesion, migration and modulation of apoptosis. The changes in its synthesis and function are closely associated with many diseases, including cancer. Von Willebrand factor is a large multimeric protein circulating in blood, and is crucial for initiation of blood coagulation. We use atomic force microscope to obtain force curves and images of these proteins. We characterized the mechanical property of perlecan as well as the domain conformational changes of von Willebrand factor. The results demonstrate that single-molecule manipulation can probe directly the dynamics of large biomolecules that are usually not accessible with other methods.

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