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Using blocking peptides to control and analyze the mechanical properties of single fibrin fibers PRANAV MADDI, NC School of Science and Mathematics, Durham, NC, E. TIM O'BRIEN III, Dept. of Physics and Astonomy, UNC-Chapel Hill, OLEG GORKUN, Dept. of Pathology and Laboratory Medicine, UNC-Chapel Hill, MICHAEL R. FALVO, Dept. of Physics & Astronomy, UNC -Chapel Hill — Fibrin is the main structural protein involved in blood clotting, and exhibits high strength and elasticity. Fibrin study traditionally focuses on fully formed clots, whereas we employ new AFM nanoManipulation techniques to study single fibrin fiber mechanics. We used 4 and 10 residue peptides to interfere with the knob-hole and αC interactions involved in fibrin polymerization to evaluate the contribution of each interaction to the fiber's mechanical properties. We varied the concentration of each peptide present during polymerization to find the concentration that inhibited polymerization by half. The presence of either peptide during fibrin polymerization did not affect single fiber breaking strain ($\frac{\Delta L}{L_0}$). The breaking force of all treated fibers reduced from 10-50nN to 2-10nN, suggesting treated fibers are thinner or are the same diameter with some inhibition of interactions. Fibers polymerized with the knob-hole targeting peptide visibly lost elasticity after 100% strain, while fibers polymerized with the αC targeting peptide lost elasticity after reaching 150% strain, suggesting that the knob-hole interactions control single fiber elasticity.

Michael Falvo
Dept. of Physics & Astronomy, UNC -Chapel Hill

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