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The compliance of vascular endothelial cells (VECs) change after exposure to cyclic, uniaxial stretch KATHRYN OSTERDAY, Mechanical and Aerospace Engineering; University of California, San Diego (UCSD), THOMAS CHEW, LOURY PHILLIP, Bioengineering; UCSD, JASON HAGA, Bioengineering and Institute For Engineering in Medicine; UCSD, MANUEL GOMEZ-GONZALEZ, Mechanical and Aerospace Engineering; UCSD, JUAN CARLOS DEL ALAMO, Mechanical and Aerospace Engineering and Institute For Engineering in Medicine; UCSD, SHU CHIEN, Bioengineering, Institute For Engineering in Medicine and School of Medicine; UCSD — In vivo, VECs are exposed to both shear stress and cyclic, uniaxial stretch. It is known that VECs remodel their cytoskeleton perpendicular to stretch and parallel to shear and that cytoskeletal structure is critical to vessel function. Cytoskeletal structure must affect the magnitude and direction of the maximum and minimum shear compliance of the cytoplasm. This may provide the cell with a mechanism to tune their sensitivity to external mechanical stimuli differently along different directions, providing the flow-sensing mechanism needed for mechanotransduction. To study how cytoskeletal remodeling is correlated to changes in subcellular microrheology, we used directional particle tracking microrheology (DPTM) to calculate the shear compliance of the cytoplasm before and after exposure to cyclic, uniaxial stretch. When stretched, we find, VECs align their direction of maximum shear compliance perpendicular to stretch, their cytoplasm becomes less liquid, and the magnitude of the shear compliance along both directions of mechanical polarization decrease.

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