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The Mechanics of Angiogenesis in Collagen Tubes JOLIE BREAUX, ABIGAIL DE LA PENA, MELANIE SUARIS, STEVEN ZEHNDER, THOMAS ANGELINI, University of Florida — Cells in all types of tissue are sensitive to their mechanical environment. Understanding cell mechanics in tissue growth can lead to advancements in important medical applications, like technologies that enhance angiogenesis during wound healing. Great progress has been made in understanding the mechanics of angiogenesis with assays performed in flat bottomed culture dishes. Here we present results from an in vitro study of collective endothelial cell mechanics in a 3D culture system that mimics the geometry of a real endothelium. Human Aortic Endothelial Cells were grown inside of a collagen tube supported by a rigid cylindrical scaffold. We developed a time-lapse small angle light scattering method to directly measure the radial distribution of cells in the 3D matrix over time. Accompanying live-cell time-lapse microscopy was performed to monitor the cells' collective movement and organization. We find that the cells generate sufficient contractile force to detach the collagen matrix from the support scaffold while maintaining a macroscopic cylindrical arrangement, creating a fiber. Cell sensitivity to scaffold material properties, curvature, and symmetry will be discussed.

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None

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