

310a Live-Cell Microrheology

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Cell migration proceeds through the highly coordinated translation of biochemical signals into specific biomechanical events. The biochemical and structural properties of the proteins involved in cell motility, as well as their subcellular localization, have been studied extensively. However, how these proteins work in concert to generate the mechanical properties required to produce global motility is not well understood. Using the method of particle-tracking microrheology applied to single living cells, we show that cytoskeleton reorganization produced by motility events results in regional stiffening of the cytoplasm of motile cells. We demonstrate that small GTPases Rho, Rac, and Cdc42 and their downstream effectors regulate cell mechanics and in turn control cell motility. We will also discuss recent advances in microrheology to compare the micromechanics of migrating fibroblasts in two-dimensional vs. three-dimensional matrices and study the intracellular mechanical response of endothelial cells subjected to shear flows.