

Abstract Submitted
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Origin and Spatial Distribution of Forces in Motile Cells JOSEF A. KAS, CLAUDIA BRUNNER, MICHAEL GOEGLER, ALLEN EHRLICHER, DANIEL KOCH, THOMAS FUHS, Division of Soft Matter Physics, Institute of Experimental Physics I, University of Leipzig, CHARLES WOLGEMUTH, Department of Cell Biology, University of Connecticut Health Center — A fundamental step in cell migration is the advancement of the cell's leading edge. It is generally accepted that this motion is driven by actin polymerization against the plasma membrane but this has not been directly measured. Our SFM measurements together with drugs that stimulate or inhibit actin polymerization or myosin contractility create a map of the magnitude, direction, and origin of the dynamic intracellular forces. We resolve that the force generating mechanism at the leading edge is indeed actin polymerization, and we directly measured the force associated with the retrograde flow within the lamella, critically demonstrating that the protrusion forces are decoupled from the cell body and are generated exclusively at the leading edge. Actin-mediated myosin contractility is primarily responsible for cell body and substrate force generation. These quantitative and polymer specific measurements presented here offer essential insight into the movement of cells, which is an important prerequisite for cancer metastasis and nerve regeneration.

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