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Force Dynamics During T Cell Activation DAVID A GARCIA , ARPITA UPADHYAYA, Univ of Maryland-College Park — T cell activation is an essential step in the adaptive immune response. The binding of the T cell receptor (TCR) with antigen triggers signaling cascades and cell spreading. Physical forces exerted on the TCR by the cytoskeleton have been shown to induce signaling events. While cellular forces are known to depend on the mechanical properties of the cytoskeleton, the biophysical mechanisms underlying force induced activation of TCR-antigen interactions unknown. Here, we use traction force microscopy to measure the force dynamics of activated Jurkat T cells. The movements of beads embedded in an elastic gel serve as a non-invasive reporter of cytoskeletal and molecular motor dynamics. We examined the statistical structure of the force profiles throughout the cell during signaling activation. We found two spatially distinct active regimes of force generation characterized by different time scales. Typically, the interior of the cells was found to be more active than the periphery. Inhibition of myosin motor activity altered the correlation time of the bead displacements indicating additional sources of stochastic force generation. Our results indicate a complex interaction between myosin activity and actin polymerization dynamics in producing cellular forces in immune cells.

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