Abstract Submitted
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Chemotaxis and Actin Oscillations[1] EBERHARD BODENSCHATZ, HSIN-FANG HSU, MPI Dynamics and Self-Organization, JOSE NEGRETE, MPI Physics of Complex Systems, CARSTEN BETA, MPI Dynamics and Self-Organization, ALAIN PUMIR, ENS Lyon, AZAM GHOLAMI, MARCO TARANTOLA, CHRISTIAN WESTENDORF, VLADIMIR ZYKOV, MPI Dynamics and Self-Organization — Recently, self-oscillations of the cytoskeletal actin have been observed in Dictyostelium, a model system for studying chemotaxis. Here we report experimental results on the self-oscillation mechanism and the role of regulatory proteins and myosin II. We stimulate cells rapidly and periodically by using photo un-caging of the chemoattractant in a micro-fluidic device and measured the cellular responses. We found that the response amplitude grows with stimulation strength only in a very narrow region of stimulation, after which the response amplitude reaches a plateau. Moreover, the frequency-response is not constant but rather varies with the strength of external stimuli. To understand the underlying mechanism, we analyzed the polymerization and de-polymerization time in the single cell level. Despite of the large cell-to-cell variability, we found that the polymerization time is independent of external stimuli and the de-polymerization time is prolonged as the stimulation strength increases. Our conclusions will be summarized and the role of noise in the signaling network will be discussed.

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MPI Dynamics and Self-Organization

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