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Myosin-II sets the optimal response time scale of chemotactic amoeba HSIN-FANG HSU, CHRISTIAN WESTENDORF, MARCO TARANTOLA, EBERHARD BODENSCHATZ, CARSTEN BETA¹, Max Planck Institute for Dynamics and Self-Organization, Am Fassberg 17, 37077 Göttingen, Germany — The response dynamics of the actin cytoskeleton to external chemical stimuli plays a fundamental role in numerous cellular functions. One of the key players that governs the dynamics of the actin network is the motor protein myosin-II. Here we investigate the role of myosin-II in the response of the actin system to external stimuli. We used a microfluidic device in combination with a photoactivatable chemoattractant to apply stimuli to individual cells with high temporal resolution. We directly compare the actin dynamics in *Dictyostelium discodielium* wild type (WT) cells to a knockout mutant that is deficient in myosin-II (MNL). Similar to the WT a small population of MNL cells showed self-sustained oscillations even in absence of external stimuli. The actin response of MNL cells to a short pulse of chemoattractant resembles WT during the first 15 sec but is significantly delayed afterward. The amplitude of the dominant peak in the power spectrum from the response time series of MNL cells to periodic stimuli with varying period showed a clear resonance peak at a forcing period of 36 sec, which is significantly delayed as compared to the resonance at 20 sec found for the WT. This shift indicates an important role of myosin-II in setting the response time scale of motile amoeba.

¹Institute of Physics und Astronomy, University of Potsdam, Karl-Liebknecht-Str. 24/25, 14476 Potsdam, Germany

Hsin-Fang Hsu
Max Planck Institute for Dynamics and Self-Organization,
Am Fassberg 17, 37077 Göttingen, Germany

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