

Abstract Submitted
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Statistical Analysis of the Chemotactic Motility Cycle of Amoeboid Cells. BALDOMERO ALONSO-LATORRE, JUAN C. DEL ALAMO¹, RUEDI MEILI, RICHARD A. FIRTEL, JUAN C. LASHERAS, University of California, San Diego — Amoeboid motility results from the repetition of stereotypic steps that produce quasi-periodic oscillations of cell length and speed. We characterize the steps of the motility cycle of *Dictyostelium* cells crawling on elastic substrates by analyzing their traction forces. Using a high-resolution force cytometry method for wild type cells and mutants with contractility and adhesion defects, we find that the time evolution of the traction forces is quasi-periodic, with a period (T) that correlates strongly with the cell speed (V) according to a simple law $VT=L$. The constant L is the distance traveled per cycle. The magnitude of the traction forces exerted by the cells does not correlate with the cell speed, suggesting that the speed of migration is determined by the ability of the cell to rapidly repeat the phases of the motility cycle. Phase average statistics allow us to combine time sequences of force maps derived from different cells to obtain a spatio-temporal representation of a canonical motility cycle divided into four steps: protrusion, contraction, retraction and relaxation. We find that myosin II-dependent contraction is present in all the steps of the wild-type motility cycle, including protrusion.

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