Abstract Submitted
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Statistical Analysis of the Chemotactic Motility Cycle of Amoeboid Cells B. ALONSO-LATORRE, J.C. DEL ALAMO, R. MEILI, UC San Diego, J. RODRIGUEZ-RODRIGUEZ, UC3 Madrid, R. A. FIRTEL, J.C. LASHERAS, UC 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 cellular traction forces are much larger than needed to overcome the viscous drag from the lubrication layer between the cells and the substrate, but they do not correlate with V. These results suggest that the speed of amoeboid migration is determined by the ability of the cell to repeat the steps of the motility cycle in a coordinated way. The phase average allowed 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. JCA supported by MEC/Fulbright (Spain).

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