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Simple, Voltage Dependent Statistics Governing Cell-Substrate Contact Times

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The distribution of contact times between a nanofilament-based contact sensor and individual pseudopods of *D. discoideum* have been measured as a function of voltage applied to the filament. The distributions are well described by exponential distributions. The average duration of the pseudopod-filament contact was found to increase across the +20 mV to -50 mV range of filament-voltages. These results are consistent with the predictions of a simple model based on rather general considerations of energy usage by the cell. This analysis indicates that the exponential functionality (of the contact time distributions) results from competition between a large number of cellular processes for the available energy. The evolution of these distributions across the +20 mV to -50 mV voltage range suggests that the negatively biased filament enhances adhesion to the filament by activating additional adhesion molecules to bind to its surface. These results will be discussed in the context of recent findings on the coupling of voltage gated ion channels and cellular adhesion.