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Microinterferometric demonstration of actively driven bending excitations of the cell envelope of mouse macrophages. ALEXANDRA ZIDOVSKA, Materials Department, University of California, Santa Barbara, CA 93106, USA, ERICH SACKMANN, Physik Department, Technische Universität München, D-85748 Garching, Germany — We observed pronounced undulation excitations of cell envelope of weakly adhering macrophages. This so called flickering of the cell membrane gives rise to strong entropic disjoining pressures which are consequence of freezing in long wavelength undulations of adhering cells. Membrane fluctuations were analyzed by Reflection Interference Contrast Microscopy (RICM) with $\sim$ 0.3 micron lateral and $\sim$ 1 nm vertical resolution. Under physiological conditions we observe amplitudes of 8-10 nm corresponding to apparent bending moduli of the order of $\kappa \sim 1000$ k_BT. This anomously small bending stiffness very strongly suggests that the excitations are driven by fluctuating biochemical forces. Latrunculin (an actin polymerization blocker) causes softening of the cell envelope resulting in an increase of the membrane undulations amplitude up to 20 nm. Sequestering of intracellular Ca^{++} by the chelator BAPTA leads to a lowering of the membrane fluctuation amplitude to 5-7 nm. The apoptosis inducing agent camptothecin induced strong reductions of the fluctuating amplitudes to 3-4 nm. The capillary length and elastic moduli were determined using the discrete Fourier Transformation.

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