Local Nanomechanical Motion of the Cell Wall of *Saccharomyces cerevisiae*

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Abstract

We demonstrate that the cell wall of living *Saccharomyces cerevisiae* (baker's yeast) exhibits local temperature-dependent nanomechanical motion at characteristic frequencies. The periodic motions in the range of 0.8 to 1.6 kHz with amplitudes of ~3 nm were measured using the cantilever of an atomic force microscope (AFM). Exposure of the cells to a metabolic inhibitor causes the periodic motion to cease. From the strong frequency dependence on temperature, we derive an activation energy of 58 kJ/mol, which is consistent with the cell's metabolism involving molecular motors such as kinesin, dynein, and myosin. The magnitude of the forces observed (~10 nN) suggests concerted nanomechanical activity is operative in the cell.