Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Mechanotransduction through the plasma membrane & cytoskeleton KRISTINA HAASE, ANDREW PELLING, University of Ottawa — Mechanical forces initiate immediate and long-term changes in cells; however the exact mechanisms remain unclear, albeit crucial for understanding the pathology of disease. We used combined confocal and atomic force microscopy (AFM) to investigate changes in cell morphology and elasticity in response to a mechanical stimulus. The AFM was used as a nano-indentor to gauge the response of the membrane and cytoskeleton (CSK) of HeLa cells. We observed their viscoelastic nature by probing cells transfected with a green fluorescent protein localized at the plasma membrane. Inhibition of acto-myosin contractility (AMc) resulted in a significant decrease of cellular elasticity, and a corresponding increase in mean deformation. We also investigated the rate at which the membrane and CSK deform and relax in response to a local force. The response to a local perturbation is nearly instantaneous for control cells and shows no statistical difference when compared to cells treated with CSK-inhibiting drugs. Inhibition of AMc affects the rate of recovery, in comparison to control cells which recover quite quickly (30-60s). Overall, we demonstrated short and long-term deformation and subsequent recovery of both the cell membrane and actin network in response to a local force.

Kristina Haase
University of Ottawa

Date submitted: 11 Nov 2011 Electronic form version 1.4