Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Modeling the role of nuclear mechanics in determining cell shape and motility through microfluidic channels[1] JAKE SHECHTER, KARA MAKI, MOUMITA DAS, Rochester Institute of Technology, Rochester, NY — Cell mechanics and migration through tight spaces are critical to life processes such as immune response and fertilization, in several diseases, and in diagnostics and drug delivery. For example, breast cancer cells have been shown to deform more easily and transit more rapidly through microfluidic channels than healthy breast cells. In this computational biophysics project, we simulate a cell moving through a microfluidic channel. We calculate the deformation energy of a model cell, which includes contributions from the cell cytoskeleton and the cell nucleus. We study how the model cell deforms in response to external forces, focusing on the deformability of the cell as it squeezes into and through a microfluidic channel and how the nucleus plays a part in this. Recent experiments suggest that the nucleus can be up to an order of magnitude stiffer than the rest of the cell and our results may provide insights into how the nucleus influences cell mechanics and migration.

[1]This work was supported by a FEAD grant from the College of Science at Rochester Institute of Technology.

Moumita Das
Rochester Institute of Technology, Rochester, NY

Date submitted: 22 Oct 2013 Electronic form version 1.4