



BIOINFORMATICS 2014 FALL SEMINAR SERIES

Hosted by: Center for Bioinformatics and Computational Biology
Department of Computer and Information Sciences, &
Department of Electrical and Computer Engineering
<http://bioinformatics.udel.edu/seminars>

MONDAY, October 27, 2014
3:30pm
DBI Room 102

**The role of water in cell mechanics,
cell shape and cell motility**

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ABSTRACT: The lipid bilayer membrane of eukaryotic cells is directly permeable to water. Carefully volume measurements during osmotic shock experiments show that the cell can actively adjust its volume by adapting to external osmotic shocks. We mathematically analyze cellular pressure and volume control by considering both cytoskeletal dynamics and active regulation of cellular osmotic content. We show that water permeation across the cell membrane is a major contribution to the slow phase of cellular mechanical response. Cell shape changes during division and morphogenesis, and cellular tension homeostasis may also have significant contributions from water dynamics. We demonstrate that water permeation alone can drive cell motility in confined environments. The last finding is significant for cancer cell motility in some situations.