

Cellular Biomechanics Laboratory

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Lab Wiki



Lab Trip 2009 Summer to the Ohiopyle State Park (From the top) Robert, Tony, Lina, Marina, Jon, and Phil

The Cellular Biomechanics Lab focuses on linking mechanics to biochemistry through exploring the science of molecular to cellular biomechanics through nano- and micro-technology, and

computational biology.

The link between mechanics and biochemistry has been implicated in a myriad of scientific and medical problems, from orthopedics and cardiovascular medicine, to cell motility and division, to signal transduction and gene expression. Most of these studies have been focused on organ-level issues, yet cellular and molecular level research has become essential over the last decade in this field thanks to the revolutionary developments in genetics, molecular biology, microelectronics, and biotechnology. Developing molecular and cellular biomechanics with relation to biochemistry promises for a bright future with potential impacts on genomics,

proteomics, tissue engineering, and medical diagnostics. By examining these issues in novel manners including utilizing nanotechnology, BioMEMS, and computational biology, we can begin to explore the linkages among these disciplines.

In our lab, we investigate the link between mechanics and biochemistry with respect to the structural regulation in living cells. Specifically, we are interested in the question of how cells sense and respond to mechanical signals and convert them into biochemical processes. The research involves direct mechanical excitation as well as structural regulation of cells since biochemical signaling may be modulated through the dynamics of cell cytoskeleton. Our lab consists of researchers trained in a wide variety of fields including engineering, genetics, physics, and chemistry as we feel that combining a diversity of viewpoints and talents will continue to lead to exciting breakthroughs. I have previously conducted, and will continue to conduct research in probing DNA conformational dynamics, exploring global cell resonance, and utilizing microfluidics, BioMEMS, micropatterning, and laser modulation to study biological processes including apoptosis, glucocorticoid receptor transport, and cell motility. By combining novel approaches through engineering and biotechnology as well as translating this exciting technology to entrepreneurial products, this multidisciplinary research can make a huge impact to the studies of human health and diseases.

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Laboratory Alumni

Postdoctoral Researcher

- Theresa Cassino (2008)
- Ying Zhang (2008)
- Ioanna Pagani (2006)

Ph.D.

- Jonathan Didier (2009)
- Warren Ruder (2009)
- Chao-Min Cheng (2009)
- Brandon Kuczenski (2008)
- Jim Kubicek (2007)
- Kathy Puskar (2006)

Master's

- Lab Mays (MS 2006)
 - Ryan Yang (MS 2005)
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