MAR14-2013-008910

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

**Single Cell Traction Microscopy within 3D Collagen Matrices**[1]

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Mechanical interaction between the cell and its extracellular matrix (ECM) regulates cellular behaviors, including proliferation, differentiation, adhesion and migration. Cells require the three dimensional (3D) architectural support of the ECM to perform physiologically realistic functions. However, our current understanding of cell-ECM and cell-cell mechanical interactions is largely derived from 2D traction force microscopy, in which cells are cultured on a flat substrate. It is now clear that what we learn about cellular behavior on a 2D substrate does not always apply to cells embedded within a 3D biomatrix. 3D traction microscopy is emerging for mapping traction fields of single cells embedded in 3D gel, but current methods cannot account for the fibrous and nonlinear properties of collagen gel. In this talk, I will present a forward computation algorithm that we have developed for 3D cell traction measurements within collagen gels. The application of this technology to understanding cancer migration and invasion will be discussed.

[1]This work is supported by the National Center for Research Resources (5R21RR025801-03, NIH) and the National Institute of General Medical Sciences (8 R21 GM103388-03,NIH), and the Cornell Center on the Microenvironment & Metastasis.
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