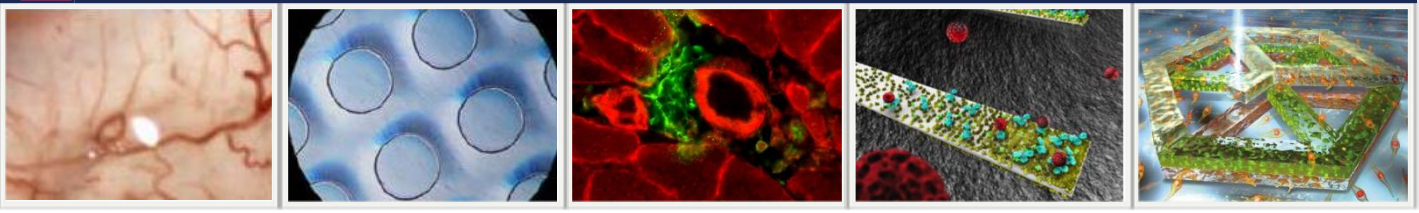
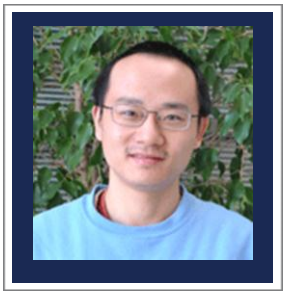
BioNanotechnology Seminar Series

Fall 2011





In vitro Cancer Metastasis Driven by Elasticity of Micro-environment

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Date, Time, and Location:

Tuesday, September 6, 2011 **12:00 – 12:30 p.m. CDT** **1000 MNTL**

10:00 – 10:30 a.m. PDT **KL 232** (UC Merced)

Abstract:

Authors: Xin Tang, Theresa B. Kuhlenschmidt, Jiaxi Zhou, Philip Bell, Fei Wang, Mark S. Kuhlenschmidt, and Taher A. Saif

Cancer deaths are primarily caused by metastases, not by the parent tumor. However, the physical-chemical mechanisms and parameters within the cellular micro-environment that initiate the onset of metastasis, are not understood. Here we show that human colon carcinoma (HCT-8) cells can exhibit a dissociative, metastasislike phenotype (MLP) in vitro when cultured on substrates with appropriate mechanical stiffness, physiologically relevant 21 kPa- 47 kPa, but not on very soft (1 kPa) and very stiff (3.6 GPa) substrates. The cell-cell adhesion molecule E-Cadherin, a metastasis hallmark, decreases 4.73 ± 1.43 times on cell membranes in concert with disassociation. Both specific and non-specific cell adhesion decrease once the cells have disassociated. After reculturing the disassociated cells on fresh substrates, they retain the disassociated phenotype regardless of substrate stiffness. Inducing E-Cadherin overexpression in MLP cells only partially reverses the MLP phenotype in a minority population of the dissociated cells. Traction Force Microscopy reveals that after dissociation, HCT-8 cells exert weaker traction force (~100 Pa) on substrates than they do prior to dissociation (~250 Pa). Our results indicate, during culture on the appropriate mechanical microenvironment, HCT-8 cells undergo a stable cell-state transition with increased in vitro metastasis-like characteristics as compared to parent cells grown on standard, very stiff tissue culture dishes. This novel finding suggests that the onset of metastasis may, in part, be linked to the intracellular forces and the mechanical microenvironment of the tumor.

Seminar Presented by:

Center for Cellular Mechanics
University of Illinois at Urbana-Champaign

IGERT Integrative Graduate Education and Research Traineeship
Cellular and Molecular Mechanics and BioNanotechnology

M-CNTC NCI Alliance for Nanotechnology in Cancer
Midwest Cancer Nanotechnology Training Center

CNST University of Illinois Center for Nanoscale Science and Technology