Engineered Materials Systems for the High-throughput Study of Glioblastoma Multiforme Microenvironmental Regulation

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ABSTRACT

Glioblastoma multiforme (GBM) is the most common and deadly brain tumor in the United States. Despite aggressive state-of-the-art treatment, including surgical resection, chemo- and radio-therapy, mean survival time from the time of diagnosis remains nearly unchanged from decades ago. Due to slow progression of treatments derived from a traditional molecular and genetic understanding of GBM, recently, there is increasing clinical interest in targeting cell-extrinsic factors to slow GBM progression. These cell-extrinsic factors, collectively known as the microenvironment, which include the extracellular matrix, blood vessels, stromal cells and all associated soluble and scaffold-bound signals, exert profound influence on GBM cells, including regulating cell growth and migration. Due to the complexity of the microenvironment, most in vitro approaches to studying microenvironmental regulation have relied on simple, reductionist systems that accurately mimic only one variable of the microenvironment, limiting the field's understanding of how cells integrate multiple, simultaneously presented cues. In this talk, I will discuss my efforts to develop highly reproducible, in vitro systems of increasing complexity that increase the throughput of experiments over traditional approaches and more accurately recapitulate the complex environment of in vivo GBM tumors. I will present two projects: 1) development of a perivascular-niche mimic for use in the study of GBM cell migration away from a tumor mass and 2) creation of dual-patterned hydrogels for the high-throughput, combinatorial exploration of microenvironmental influences on GBM. I will conclude by presenting a future vision that the development of microenvironmental mimics will yield valuable and exciting opportunities as cancer-on-a-chip platforms for use in drug discovery, which may serve as a bridge between traditional reductionist approaches and animal or clinical studies.

BIOGRAPHY

Dr. Rape received his B.S., Phi Beta Kappa, in Biomedical Engineering from the University of Rochester in 2008 and his Ph.D. in Biomedical Engineering from Carnegie Mellon University in 2012. His awards include recognition as an ESPN The Magazine Academic All-American (2006 and 2007), Carnegie Mellon University Biomedical Engineering's Graduate Student Research Award (2012), Siebel Stem Cell Postdoctoral Fellow (2012), and National Cancer Institute National Research Service Award Postdoctoral Fellowship (2013).

EVENT DETAILS

DATE:
Thursday, February 19, 2015

TIME:
1:00 PM

LOCATION:
Carnegie 315
Stevens Institute of Technology

ATTENDANCE:
This event is open to Stevens' Faculty, Students, Staff and Invited Guests