



Mechanobiology of Cancer Invasion and Metastasis Mediated by 3D Extracellular Matrix

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Invasion and metastasis are a hallmark of cancer and governed by mechanical interactions with the extracellular matrix. Indeed, there exists a dynamic reciprocity where by cell migration is shaped by matrix architecture, but the matrix architecture is (in turn) shaped by cell migration. We seek to reverse engineer human tumor progression using biomimetic platforms that reveal collective behaviors in space and time. Here, I present my lab's recent results on the mechanobiology of cancer cells. First, we analyze the disorganization and dissemination of multicellular spheroids cultured in 3D matrix, which exhibit a transition from coordinated circumferential orbiting towards radial matrix invasion. Second, we analyze how human circulating tumor cells that metastasize to particular organs in patients and xenograft models adhere to decellularized extracellular matrix. We further use gene expression profiling to predict drug sensitivity and identify candidate drug compounds. We envision these technologies can enable new fundamental insights into the interplay between tumor cells and their physical microenvironment, with potential translation for precision medicine and drug development.

ABOUT the SPEAKER

Ian Wong is Associate Professor of Engineering, and of Pathology / Laboratory Medicine at Brown University. He engineers new miniaturized technologies based on biomaterials and microfluidics to investigate cancer cell invasion, drug resistance, and heterogeneity. He is also interested in the unconventional fabrication of bio and nano materials using self-assembly and 3D printing. He did his graduate work on the directed self-assembly of biomolecular materials with Nick Melosh, receiving a PhD in Materials Science and Engineering from Stanford University. His postdoctoral training was with Mehmet Toner and Daniel Irimia at the Center for Engineering in Medicine at Massachusetts General Hospital.

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