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MECHANOMEDICINE IN CANCER: TARGETING MECHANICS TO TREAT METASTASIS

ABSTRACT: Mechanomedicine is an emerging area of mechano-biology that seeks to develop and apply therapeutics that target mechanical changes within cells and tissues. During cancer progression, there are numerous mechanical changes that are specific to the tumor microenvironment and tumor cells. In this talk, I will describe my lab’s efforts to understand the forces driving cell movements in the tumor microenvironment. Combining tissue engineering approaches, mouse models, and patient samples, we create and validate in vitro systems to understand how cells navigate the tumor stroma environment with the goal of identifying novel targets of cancer metastasis. Microfabrication and native biomaterials are used to build mimics of the paths created and taken by cells during metastasis. Using these platforms, we have described a role for a balance between cellular energetics, cell and matrix stiffness, and confinement in determining migration behavior. Moreover, we have extended this work into investigating the role of the mechanical microenvironment in tumor angiogenesis to show that mechanics guides vessel growth and integrity. I will discuss the mechanical influences at play during tumor progression and the underlying biological mechanisms driving angiogenesis and metastatic cell migration with an eye towards potential therapeutic avenues.