CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP130372

Project Title:
The Influence of Tumor Stiffness on Therapeutic Efficacy

Award Mechanism:
Individual Investigator

Principal Investigator:
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Entity:
The University of Texas at Austin

Lay Summary:

Breast cancer is the most frequently diagnosed and second most deadly form of cancer in American women; afflicting 1 in 8 women worldwide. The majority of breast cancer related deaths are caused by complications from metastatic disease. Tumor metastasis, or spreading of tumor cells to other tissues, can occur with virtually any type of cancer. While some metastatic cancers respond to treatment, most do not. The steps of tumor cell progression towards a metastatic phenotype have been well-described. In particular, cancer growth and cellular changes are regulated by the tumor microenvironment which comprises soluble factors, adjacent cells as well as the surrounding insoluble or extracellular matrix (ECM). The ECM of tumors is much stiffer than surrounding, healthy tissue, and tumor stiffness is known to correlate with the progression of disease. We are interested in modulating the stiffness of an artificial ECM and examining the effects of stiffness on the efficacy of a particular chemotherapy drug. We hypothesize that the efficacy of the drug will depend on matrix stiffness as the drug of interest is known to be involved in mechanisms of ECM sensing and tumor progression. We have developed a novel mechanism to control the stiffness of artificial ECM using a light initiated system. This system will allow for ECM stiffening either inside or outside a mouse tumor model. Our system allows us to observe the changes that occur in the transition from weak to stiff matrices or vice versa. Overall, knowledge of the relationship between tumor stiffening and drug efficacy will be beneficial clinically by informing physicians of the likelihood of success for different stages of cancer or with different combination therapies. We expect this system to lead to greater efficiency in designing clinical trials and improved patient outcomes for existing therapies.