CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP110075

Project Title:
Mechanical Force-Induced Signaling for Local Estrogen Production in Breast Cancer

Award Mechanism:
Individual Investigator

Principal Investigator:
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Entity:
The University of Texas Health Science Center at San Antonio

Lay Summary:

Tissue stiffness is one of the earliest telling phenotypes of breast tumors. In addition, dense breast tissue as revealed by mammography is one of the strongest and most prevalent risk factors for breast cancer. In both cases, physical forces applied to cells within the breast tissue are altered substantially. Recent studies demonstrate that aberrant physical forces can promote cancer development and progression. Over the past several decades, cancer researchers have acquired a wealth of information concerning how tumor cells respond to various soluble cues including growth factors and hormones. In contrast, the molecular basis for force-induced biophysical signaling during tumor development is poorly understood. Stromal cells within the tumor microenvironment play important roles in influencing the behaviors of tumor cells including their growth and invasion. For example, breast stromal cells are the major source of local estrogens, which stimulate the growth of estrogen-dependent breast tumor cells. We recently found that physical forces can significantly stimulate the estrogen-synthesizing ability of breast stromal cells. This has led to the hypothesis that, by increasing local estrogen production, altered mechanical forces can contribute to increased breast cancer risk such as in the case of mammographic density. A strong cross-disciplinary consortium has been formed to test this innovative hypothesis and to identify the molecular players that mediate force-induced hormone production in breast tissue. If successful, our work may uncover quantifiable metrics for measurement of tissue stiffness and breast cancer risk. Taken together, the proposed work promises to have a transformative and broad impact on breast cancer prevention efforts.