CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP170466

Project Title:
Targeting the Inflammatory Cancer Stem Cell Microenvironment of Triple Negative Breast Cancer with Leukocyte-mimetic Nanovesicles

Award Mechanism:
Individual Investigator

Principal Investigator:
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Entity:
The Methodist Hospital Research Institute

Lay Summary:

Triple negative breast cancer (TNBC) tumors, which lack the expression of progesterone receptor, estrogen receptor, and human epidermal growth factor receptor 2, account for 10-20% of all breast cancer patients. Currently, no targeted therapy exists for TNBC, linking this disease with poor prognosis and an increased risk of relapse and metastatic progression. A sub-population of cancer cells with stem cell-like features is believed to be responsible for this resistance to therapy and metastatic progression. The growth and self-renewal features of these cells are fueled by inflammation and key signaling pathways. Our proposed technology aims to revolutionize TNBC treatment by developing therapies that are more effective, less toxic and target the key pathways that govern the growth and progression of the cancer stem cell population. We will accomplish this by entrapping therapeutics within a nanoparticle that targets the inflammation associated with TNBC. Our technology synergistically combines the advantages of liposomes, the most successful nanoparticle in the clinic to date, with the ability of white blood cells to recognize and home to inflamed vasculature, enabling a nano-based system that targets the inflammatory tumor environment. This strategy will direct therapeutics towards cancer sites, avoiding delivery to healthy tissues and reducing the toxicity associated with current therapies. The inflammatory homing of our nanoparticles coupled with therapy to inhibit these pathways could eliminate the mortality associated with TNBC and metastatic breast cancer. If successful, our approach could provide a therapy that works independent of surface receptors for application with all subsets of breast cancer and could additionally provide a powerful solution to target and eliminate the sub-population of cells believed to cause metastasis.