The role of osteoblasts in maintaining dormancy of breast cancer cells

HYPOTHESIS:
Breast cancer cells remain dormant in the bone marrow for potentially many years. They are quiescent and protected from chemotherapy by interactions with the stroma. The stromal cells protect hematopoietic stem cells and keep them quiescent are osteoblasts. We hypothesize that cancer cells use the same osteoblast niche to escape toxicity and remain quiescent as that used by hematopoietic stem cells.

PROJECT DESCRIPTION (Include design, methodology, data collection, techniques, data analysis to be employed and evaluation and interpretation methodology)
We will use an osteoblast cell line from mouse calvarium to develop monolayers in tissue culture on which we will co-incubate human breast cancer cell lines and determine the effect on dormancy. The osteoblasts cells will be differentiated and the state of differentiation will be correlated with their ability to support dormancy. The expression and export of FGF-2 will be determined at various stages of differentiation to correlate its production and export with the capacity of osteoblasts to support dormancy. FGF-2 is a breast cancer morphogenic differentiation agent demonstrated to play a significant role in the dormancy model. Osteoblasts demonstrated to support dormancy will be mixed with stromal fibroblasts to demonstrate the specific role of osteoblast patches in the bone marrow in supporting breast cancer dormancy.

SPONSOR’S MOST RECENT PUBLICATIONS RELEVANT TO THIS RESEARCH:


IS THIS PROJECT SUPPORTED BY EXTRAMURAL FUNDS?  
Yes ☒ or No ☐

(IF YES, PLEASE SUPPLY THE GRANTING AGENCY’S NAME)

NIH, DOD

THIS PROJECT IS: ☐Clinical  ☑Laboratory  ☐Behavioral  ☐Other
Summer Student Research Program
Project Description

THIS PROJECT EMPLOYS RADIOISOTOPES

THIS PROJECT INVOLVES THE USE OF ANIMALS

  PENDING  □  APPROVED  □  IACUC PROTOCOL #

THIS PROJECT INVOLVES THE USE OF HUMAN SUBJECTS

  PENDING  □  APPROVED  □  IRB PROTOCOL # M

WHAT WILL THE STUDENT LEARN FROM THIS EXPERIENCE?
Principles of cancer biology and the concept of dormancy in a microenvironment; *in vitro* methods for posing complex research questions, tissue culture techniques, molecular biology techniques, including western blots, immunofluorescence labeling, testing a hypothesis, the concept of appropriate controls.