Ductal carcinoma in situ (DCIS) is a premalignant “stage 0” breast cancer that is fully contained within the mammary ducts; in other words, a condition that has many of the hallmarks of cancer, but has not yet invaded the surrounding breast tissue. Not all DCIS lesions are destined to become cancer; however the risk of progression result in aggressive treatment with surgery, radiation therapy, and/or Tamoxifen treatment. My project is focused on understanding the mechanisms involved in why some DCIS lesions become malignant. I am using in vitro three dimensional cell culture of normal and premalignant mammary epithelial cells with which I can generate physiologically relevant models of healthy and DCIS tissue. Through collaboration with the Radiation Oncology Department at Drexel University College of Medicine, I treat these cells with ionizing radiation and have found that a sub-population of the DCIS-like cells begins to invade their surroundings. I am strongly focused on studying the mechanisms of 1. why these cells become invasive and 2. how they are different from their sister cells in the same culture condition. Specifically, I am focusing on a process called epithelial-mesenchymal transition (EMT) and the involvement of the Her2/Neu breast cancer oncogene in this process, as its expression is highly associated with DCIS.