Biomarkers of Breast Cancer

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Concerns about adverse health effects associated with exposure to environmental contaminants are increasing globally. These concerns are often focused on the impact of environmental contaminants on fetuses, as insults in utero can have life-long health consequences, including an increased risk of breast cancer. Breast cancer risk is associated with total lifetime exposure to estrogens, but most studies have examined the association between breast cancer and exposure to man-made xenoestrogens, ignoring the effect of exposure to dietary phytoestrogens. The objective of this project is to identify biomarkers of breast cancer representative of estrogenic exposures in utero. We hypothesized that in utero exposure to estrogenic compounds will change the expression of genes involved in mammary tumor development. We predicted that altered gene expression of a suite of genes critical to tumorigenesis in our animal model can also be expressed in human tissues, and are useful as biomarkers for breast cancer. To test our hypothesis, we utilized a transgenic mouse model that closely mimics the human disease state, to study interactions between genes and proteins relevant to human breast cancer and in utero exposure to estrogenic agents.

Implications: Successful completion of this project provides context regarding the risk of in utero exposure to man-made and dietary estrogenic compounds, and the subsequent development of breast cancer. Our results will inform policy makers, regulators, health care providers, and patients so that evidence-based decisions can be made. Our results also expand the literature by identifying key genes and proteins in breast cancer.

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