UMassAmherst

College of Natural Sciences

Center for Agriculture, Food, and the Environment

Overview

Breast cancer is around 30% heritable, which means about 70% of breast cancers are due to environmental factors (Mucci, 2016).

- Air quality
- <u>Diet</u>
- Exposure to chemicals
- Temperature/ climate
- Weight
- Exercise

Estimate: One-third of cancer deaths preventable through <u>dietary modification</u> (Brennan, 2010).

Compounds in <u>fruits and vegetables</u> have anti-inflammatory and anti-carcinogenic properties that can reduce breast cancer risk (Hayes, 2005).

This study aims to associate the two.



General Steps

Lactating women will be asked to consume 8-10 serving of fruits and vegetables a day for 20 weeks (Intervention group)

• Collect milk at 5 different periods

- Record weight change and infant growth
- Analyze <u>DNA methylation and cytokine profiles</u>

• Compare to control group

• Associate with breast cancer risk

A Randomized Clinical Trial

A Randomized clinical trial is considered the gold standard when it comes to medical research (Hariton, 2018). It is a form of scientific experiment used to control factors not under direct experimental control.

This study contains both an intervention group that will be consuming the vegetables, and a control group that will receive no dietary intervention or nutritional counseling.



A Randomized Clinical Trial Ryan Baker, Drs. Kathleen Arcaro, Lindiwe Sibeko, Susan Sturgeon

chtenstein et al., 2000; Mucci et al., 2016



DNA Methylation

- When a methyl group is added to DNA
- Regulates gene activation and gene inhibition
- Only cytosines that are followed by guanines are methylated in human DNA (CpG sites)
- DNA methylation regulates <u>gene expression</u> and plays a large and diverse role in many <u>cancers</u>

Cytokines

- Small secreted proteins released by cells
- Affect the interactions and communications between leukocytes and irritant
- Inflammatory cytokines in the breast are directly related to the growth and proliferation of early premalignant cells



Breastmilk offers a method of sample collection that is extremely convenient. It allows noninvasive access to the breast

microenvironment & noninvasive access to breast epithelial cells

- The dietary intervention can be assessed directly in the breast.
- Having access to breast epithelial cells gives access to DNA.



New Moms Wellness Study



United States Department of Agriculture National Institute of Food and Agriculture

Archival System





Current Progress

• Currently in the 2nd year of the study (2019-2023) • 130 women currently enrolled (goal: 400) • Over 1000 samples in storage

Future Directions

• Additional participant recruitment • Sample collection and DNA extractions • Analyze DNA methylation patterns with pyrosequencing • Analyze cytokine profiles with pro-inflammatory panel cytokine assays

Goal of the Study

To determine if a diet rich in nutrient-dense fruits and vegetables can alter breast cell DNA methylation and cytokine levels in breastmilk in a manner consistent with reduced breast cancer risk, and help women achieve and maintain a healthy postpartum weight.

References

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