

IDENTIFYING THE SIGNIFICANCE OF ENVIRONMENTAL FACTORS ON INCREASED BREAST CANCER INCIDENCE ON LONG ISLAND. Catherine Herchenroder and Kenneth McLeod, Biomedical Engineering- Orthopedics Department, State University of New York at Stony Brook

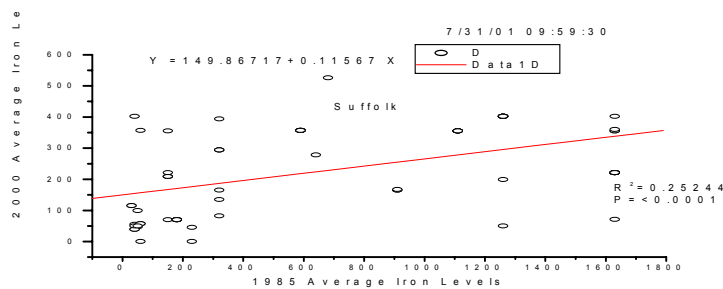
While the incidence of breast cancer in the state of New York is about 94 cases per 100,000 women, the incidence on Long Island is 111 cases per 100,000¹. There have been many conjectures on the causes of such high incidence. Heredity is believed to account for approximately 27% of the risk for breast cancer², leaving the other 73% to environmental factors. Prior studies have suggested iron as an environmental risk factor for many cancers. We feel that an excess of iron in water sources throughout Long Island may contribute to the increased breast cancer incidence. Lifestyle is known to have an effect on breast cancer incidence. In our study, we used socioeconomic status as an indicator of lifestyle. By looking at the geographic distribution of cancer incidence, median income, and iron in the water supply.

We obtained both historical and present water data from Suffolk County Water Authority, NYC Water Suppliers, and several private Nassau County Water Authorities. Income data was obtained from the US Census Bureau. Breast Cancer data was acquired by zip code from the New York State Department of Health and the Cancer Surveillance Improvement Initiative. The data was entered into Origin and S-Plus spreadsheets. One-factor linear regression analyses were done using Origin (Microcal, Inc.); generalized linear models were constructed using S-Plus (MathSoft, Inc.)

Linear regression analysis for Suffolk County showed a decrease in cancer incidence as income increased (p=0.008), while there was increase in cancer incidence as peak iron level increased (p=0.028). Nassau County showed an increase in cancer incidence as median income increased (p=0.32), as well as an increase in cancer incidence as peak iron level increased (p=0.83). Generalized linear models compared the effect of cancer incidence on median household income, peak iron levels, and the interaction between median household income and peak iron level. Nassau, Suffolk, and Queens Counties, when modeled separately, did not show a significant effect of iron on cancer incidence (t-values ranging from 0.3-1.8). When the data from the three counties were combined, however, an exceptional significance of iron levels from the water suppliers on breast cancer incidence was revealed (t-values ranging from 3.5-4.7).

Current water data cannot measure the iron levels from fifteen to twenty years ago, the time it is believed cancers originate in the body. We were able to conclude, however, through linear regression analysis of current water data versus 1985 water data (Fig. 1), that the correlation was significant. The present iron data shows consistently higher numbers than the historical data. I find this peculiar because water filters were installed in many of the wells to decrease the amount of contaminants reaching Suffolk County homes. In the future, we hope to refine our research and include more variables of lifestyle, such as the amount of time women breast-feed their children and the amount of exercise women engage in regularly. The Simons Fellowship funded this project.

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¹Trustees of the University of Pennsylvania - http://cancer.med.upenn.edu/cancer_news.1994/ny_doh.html

² The New England Journal of Medicine: Environmental and Heritable Factors in the Causation of Cancer, Paul Lichtenstein, PH.D, et al.