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Study finds diet and alcohol alter epigenetics of breast cancer

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Researchers from Brown University and the University of California San Francisco have found that epigenetic changes to DNA in breast cancers are related to environmental risk factors and tumor size, providing a window into the severity of the disease. The study is published in today's edition of *PLoS Genetics*. The researchers found that epigenetic profiles of tumors had a direct association with diet, alcohol, and tumor size.

The findings point to the emergence of new biomarkers that researchers hope will give a more detailed view of the environmental factors that contribute to tumor development and could, in the future, provide improvements in diagnostics and treatment decisions, as well as potentially more personalized recommendations to help prevent recurrence. The use of epigenetic profiles as biomarkers of disease subtype and severity is a rapidly emerging field with other notable contributions from this group; a field that is being advanced with the support of the NIH, and shows promise for developing novel clinical tools.

"We undertook this study to help illuminate how diet and environmental factors might contribute to differences observed among breast cancers," said Brock Christensen of the Center for Environmental Health and Technology (CEHT) at Brown University and lead author of the report.

The study measured epigenetic profiles in stage I to IV breast tumors from 162 women enrolled in the Pathways Study, a study of breast cancer survivorship based at Kaiser Permanente of Northern California.

The researchers took a detailed assessment of an individual's demographic and dietary information, as well as breast cancer tumor characteristics. The study's data show the promise of tumor epigenetic signatures to provide more detailed tumor staging, and eventually prediction of prognosis. In particular, the study found that alcohol consumption, folate intake (vitamin B9), and tumor size are each independently associated with epigenetic profiles of tumors.

"By investigating epigenetic patterns in tumors from patients we have extensive lifestyle data on, we are helping to bridge the gap between environmental research and translational research." said Karl Kelsey, professor of community health at Brown, director of CEHT, and a contributing author on the paper.

Epigenetics refers to the control of patterns of gene expression in cells, which give rise to the necessary differences responsible for creating the complex and interacting tissues in the body.

"This study provides a new window for finding environmental links to breast disease," said John Wiencke, professor of neurosurgery at the University of California, San Francisco and senior author of the paper. "Our work indicates that we will soon have new ways to monitor and assess lifestyle and environmental factors for breast cancer."

Breast cancer is the most common non-skin cancer among American women. The American Cancer Society's estimates indicate that approximately 1.3 million new cases of invasive breast cancer were diagnosed globally in 2007 and nearly 500,000 died from the disease. Currently there are more than 2.5 million breast cancer survivors in the United States, and this population is expected to grow to 3.4 million by 2015.

Provided by Brown University