

# Air pollution exposure affects chances of developing premenopausal breast cancer

April 20 2011

---

Exposure to air pollution early in life and when a woman gives birth to her first child may alter her DNA and may be associated with premenopausal breast cancer later in life, researchers at the University at Buffalo have shown.

The findings indicated that higher [air pollution](#) exposure at birth may alter [DNA methylation](#), which may increase levels of E-cadherin, a protein important to the adhesion of cells, a function that plays an essential role in maintaining a stable cellular environment and assuring healthy tissues.

Methylation is a chemical process that has been implicated in determining which genes in a cell are active, a process essential to normal cellular function.

Women with [breast cancer](#) who lived in a region with more [air pollution](#) were more likely to have the alteration in the DNA in their tumor than those who lived in a less-polluted region, results showed.

Higher air pollution concentration at the time of first child birth also was associated with changes in p16, a gene involved in tumor suppression, according to findings.

Results of the research were presented April 6 at the 2011 American Association for Cancer Research annual meeting in Orlando, Fla.

Lead investigator Katharine Dobson, MPH, an epidemiology doctoral student and research assistant in UB's Department of Social and Preventive Medicine, says of the findings: "To our knowledge, this is the first study to examine exposure to ambient air pollution at key points in a woman's lifetime.

"The investigation looked for an association between exposure to pollution and alterations to DNA that influence the presence or absence of key proteins. Such genetic changes are thought to be major contributors to [cancer development](#) and progression, including at very early stages," Dobson says.

The study is based on data from the Western New York Exposures and Breast Cancer (WEB) study, which collected information from 1,170 women with recently diagnosed breast cancer and 2,116 healthy women who lived in New York's Erie and Niagara counties between 1996 and 2001. This research involved only cancer cases.

Participants provided information on where they were born, where they lived at the time of their first menstrual period, and, if they had children, where they lived when they bore their first child. Data from air monitors operating in the relevant time periods was used to determine the amount of particulate matter at each participant's residence at those time periods. Air pollution data from 87 sites in Western New York was matched with residence location at year of birth, year of menarche and year of first child birth.

"We found that decreased E-cadherin promoter methylation was associated with higher exposure at birth, and increased p16 methylation with higher exposure at the time of a first child birth," says Dobson.

"For [breast cancer](#) cases, menopausal status appeared to modify the association between air [pollution exposure](#) and E-cadherin promoter

methylation, with premenopausal women more susceptible to these early exposures than postmenopausal women."

More research is needed to determine the role of air pollution in [DNA methylation](#) in breast [cancer development](#) and progression, and to address changing air pollution contents and levels over time, Dobson notes.

Provided by University at Buffalo

Citation: Air pollution exposure affects chances of developing premenopausal breast cancer (2011, April 20) retrieved 6 May 2024 from <https://medicalxpress.com/news/2011-04-air-pollution-exposure-affects-chances.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.