Breast Cancer: Why the Environment Matters

A woman has a 1 in 8 chance of developing breast cancer in her lifetime, according to the American Cancer Society. It is the second most common cancer among women in the United States, next to skin cancer. Breast cancer occurs mostly in women who are 50 years old or older.

Prevention is Key
Supported by NIEHS and the National Cancer Institute, the Interagency Breast Cancer and Environmental Research Coordinating Committee concluded, in a 2013 landmark report\(^1\), that prevention is key to reducing the emotional, physical, and financial burden of breast cancer.

Research shows, in general, maintaining a healthy weight, staying physically active, and consuming a nutritious diet can reduce the chance of developing cancer over your lifetime.

What Causes Breast Cancer?
Most women who develop breast cancer have no family history of the disease, suggesting an environmental link. In a study, inherited factors, such as the BRCA1 or BRCA2 genes, accounted for only 27% of breast cancer risk.\(^2\)

Although we know of many risk factors that increase women's chances of developing breast cancer, scientists do not completely understand what causes normal cells to become cancerous. But most experts agree that a combination of genetic, hormonal, and environmental factors leads to breast cancer.

What Does NIEHS Research Tell Us About Breast Cancer?
NIEHS plays a leadership role in funding and conducting studies on the ways in which genetic and environmental factors may affect breast cancer risk. For example, NIEHS scientists discovered women living in areas with higher levels of air pollution may have a higher risk of breast cancer.\(^3\) Research that helps us figure out how to reduce contact with environmental factors linked to breast cancer presents tremendous opportunity for disease prevention.

The Sister Study
The NIEHS Sister Study includes more than 50,000 sisters of women with breast cancer from the U.S. and Puerto Rico. The study looks at lifestyle and environmental exposures, as well as genetic and biological factors that may affect a woman's chance of developing breast cancer. Genetic profiles and environmental exposures of women who developed breast cancer are compared with their sisters who have not. These scientific comparisons help uncover how the disease develops. Important study findings follow.

- Women who exercised or played sports more than seven hours a week during ages 5-19 had a lower risk of breast cancer as adults.\(^4\)
- Women who regularly took vitamin D supplements had lower rates of postmenopausal breast cancer.\(^5\)
- Women who developed diabetes during two or more pregnancies had a higher incidence of breast cancer.\(^6\)
Findings include:

- Exposures to common chemicals may change the timing of puberty. For example, girls exposed to high levels of triclosan, used in some antimicrobial soaps, had early breast development. Also, girls exposed to high levels of benzophenone-3, found in some sunscreens, had later breast development.

- The chance of developing breast cancer increases with exposure to endocrine disrupting chemicals during these periods: her prenatal development, puberty, pregnancy, and menopausal transition.

- About 300 chemicals used in personal care products, flame retardants, food processing, pesticides, and other purposes were tested and found to affect hormones known to increase breast cancer risk. Some chemicals tested may be in air and water pollution.

**National Toxicology Program (NTP)**

An interagency program headquartered at NIEHS, NTP reported these six substances cause or may cause breast cancer:
- diethylstilbestrol (DES), a synthetic estrogen that was used to prevent miscarriages; steroidal estrogens used for menopausal therapy; X-ray and gamma radiation; alcoholic beverages; tobacco smoking; and ethylene oxide, a sterilizing agent.

After conducting cancer assessments for working at night, NTP found that persistent night shift work that disrupts circadian rhythms can cause breast cancer in women. This type of work is considered frequent and long-term, especially beginning in early adulthood.

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