

LAY ABSTRACT

TITLE: Environmental Determinants of Breast Cancer

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Background

Breast cancer is complicated, including more than one type of disease and influenced by many different contributing factors. This article summarizes the scientific evidence from many different studies about the environmental causes of breast cancer. We defined “environmental” broadly as the non-genetic factors, including social and cultural factors as well as chemical exposures. We considered studies in humans and experiments in laboratory animals and cells. We evaluated many different factors, some of which are highlighted in this abstract.

Results

Breast cancer risk is higher in women with higher education and income, but our understanding of how early life social environments influence risk is incomplete. Neighborhood factors, such as the availability of fresh food, sidewalks and parks, may affect breast cancer risk by influencing weight-gain, physical activity, and, indirectly, age at puberty. Estrogen-progestin hormone therapy and oral contraceptives result in short-term increases in breast cancer risk. Diethylstilbestrol (DES), another hormonal drug, causes breast cancer in mothers who took it during pregnancy and in their daughters, who were exposed in the womb. Obesity is associated with higher breast cancer risk after menopause but lower risk in young women. Many studies show that alcohol consumption increases breast cancer risk. Several expert reviews conclude that tobacco smoke causes breast cancer, especially when exposure is early in life. Ionizing radiation causes breast cancer, and the most important current exposures are from medical uses, including x-rays and CT scans. Exposure to light at night and shift work are associated with higher risk, and scientists are studying these exposures to learn

why. Chemicals that mimic or disrupt natural hormones are suspected to cause breast cancer. These include consumer product chemicals that are found, for example, in personal care products, furniture, food packaging, drinking water, and clothing. Examples include parabens, phthalates, bisphenols, certain flame retardants, and highly fluorinated chemicals (PFAS). In addition, certain industrial chemicals and pollutants that cause mammary gland tumors in animal experiments likely cause breast cancer in women: benzene, ethylene oxide, 1,3-butadiene, polychlorinated biphenyls, polycyclic aromatic hydrocarbons (PAHs), dioxins. These chemicals are found, for example, in gasoline, industrial cleaners, sterilizing chemicals, and air pollution. In one of the most convincing studies of chemicals and breast cancer, the Child Health and Development Studies showed that exposure early in life to the pesticide DDT is associated with higher breast cancer risk.

Conclusions

Substantial evidence shows that many modifiable factors influence breast cancer. Many of the hazards are difficult for individuals to avoid on their own, so new public policies are needed to apply our knowledge about how to prevent breast cancer. In addition, new methods and studies are needed to better understand how multiple environmental and genetic factors together contribute to breast cancer.