

Prenatal DDT exposure tied to nearly four-fold increase in breast cancer risk

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Mammograms showing a normal breast (left) and a breast with cancer (right).
Credit: Public Domain

Women who were exposed to higher levels of the pesticide DDT in utero were nearly four times more likely to be diagnosed with breast cancer as adults than women who were exposed to lower levels before birth, according to a new study published in the Endocrine Society's *Journal of Clinical Endocrinology and Metabolism (JCEM)*. A more estrogenic form of DDT that is found in commercial DDT, o,p'-DDT, was largely

responsible for this finding.

Despite being banned by many countries in the 1970s, DDT remains widespread in the environment and continues to be used in Africa and Asia. Many [women](#) who were exposed in utero in the 1960s, when the pesticide was used widely in the United States, are now reaching the age of heightened [breast cancer](#) risk.

DDT was among the first recognized endocrine disruptors, according to the introductory guide to endocrine-disrupting chemicals published by the Endocrine Society and IPEN. DDT and related pesticides can mimic and interfere with the function of the hormone estrogen. Past studies have found DDT exposure is linked to birth defects, reduced fertility and increased risk of Type 2 diabetes.

"This 54-year study is the first to provide direct evidence that chemical exposures for pregnant women may have lifelong consequences for their daughters' [breast cancer risk](#)," said one of the study's authors, Barbara A. Cohn, PhD, of the Public Health Institute in Berkeley, Calif.

"Environmental chemicals have long been suspected causes of breast cancer, but until now, there have been few human studies to support this idea."

The case-control study is prospective, having tracked the daughters of women who participated in the Child Health and Development Studies (CHDS) for 54 years beginning in utero. CHDS studied 20,754 pregnancies among women who were members of the Kaiser Foundation Health Plan from 1959 through 1967. CHDS participants gave birth to 9,300 daughters during that period.

For the analysis published in JCEM, researchers used state records and a survey of CHDS participants' grown daughters to determine how many were diagnosed with breast cancer by age 52. To determine levels of

DDT exposure in utero, the researchers analyzed stored blood samples from CHDS to measure DDT levels in the mothers' blood during pregnancy or in the days immediately after delivery. The researchers measured DDT levels in mothers of 118 women who were diagnosed with breast cancer. The scientists identified 354 daughters who did not develop cancer to use as controls and tested their mothers' blood for comparison.

The researchers found that independent of the mother's history of breast cancer, elevated levels of o,p'-DDT in the mother's blood were associated with a nearly four-fold increase in the daughter's risk of breast cancer. Among the women who were diagnosed with breast cancer, 83 percent had estrogen-receptor positive breast cancer, a form of cancer that may receive signals from the [hormone estrogen](#) to promote tumor growth.

Researchers also determined that exposure to higher levels of o,p'-DDT was associated with women being diagnosed with a more advanced stage of cancer. In addition, the scientists found women with greater exposure to o,p'-DDT were more likely to develop HER2-positive breast cancer, where the cancer cells have a gene mutation that produces an excess of a specific protein. Basic research studies where [breast cancer cells](#) were exposed to DDT have found the pesticide activated the HER2 protein.

"This study calls for a new emphasis on finding and controlling environmental causes of breast cancer that operate in the womb," Cohn said. "Our findings should prompt additional clinical and laboratory studies that can lead to prevention, early detection and treatment of DDT-associated breast cancer in the many generations of women who were exposed in the womb. We also are continuing to research other chemicals to see which may impact breast cancer risk among our study participants."

More information: The study, 'DDT exposure in utero and breast cancer,' will be published online at press.endocrine.org/doi/10.1210/jc.2015-1841 , ahead of print.

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