

More than 900 chemicals, many found in consumer products and the environment, display breast cancer-causing traits

Berkeley Public Health scientist co-authors new study with Silent Spring Institute advancing understanding of how endocrine disrupting chemicals influence breast cancer risk

By Silent Spring Institute News

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With tens of thousands of synthetic chemicals on the market, and new ones in development all the time, knowing which ones might be harmful is a challenge both for the federal agencies that regulate them and the companies that use them in products.

Dr. Megan R. Schwarzman, project scientist and continuing lecturer at Berkeley Public Health, teamed up with researchers from the Silent Spring Institute to find a quick way to predict if a chemical is likely to cause breast cancer based on whether the chemical harbors specific traits.

Reporting January 10, 2024 in *Environmental Health Perspectives*, the scientists identified a total of 920 chemicals that could promote the development of breast cancer. Ninety percent of the chemicals are ones that people are commonly exposed to in consumer products, food and drink, pesticides, medications, and workplaces.

"Many chemicals on this list, like parabens and phthalates, are in dozens of different products used by children and young women," Schwarzman said. "And we're all exposed to multiple pesticides on the list. Understanding the ubiquity of chemicals that could increase the risk of breast cancer points directly to avenues for prevention."

Dr. Jennifer Kay, a research scientist at Silent Spring Institute, and lead author of the study, called it a roadmap for regulators and manufacturers to quickly flag chemicals that could contribute to breast cancer in order to prevent their use in consumer products and find safer alternatives.

Breast cancer remains the most commonly diagnosed cancer in the United States. Recent data show rates increasing in young women, a trend that can't be explained by genetics. "We need new tools to identify environmental exposures that could be contributing to this trend so we can develop prevention strategies and reduce the burden of the disease," said Kay.

Hormone signals

The researchers searched through multiple international and U.S. government databases to identify chemicals that have been found to cause mammary tumors in animals. The databases were from the International Agency for Cancer Research (IARC), the National Toxicology Program, the U.S. Environmental Protection Agency (EPA), and the National Cancer Institute, among others.

They also studied data from EPA's ToxCast program to identify chemicals that alter the body's hormones, or endocrine disruptors, in ways that could promote breast cancer. The team looked specifically for chemicals that activate the estrogen receptor—a receptor present in breast cells—as well as chemicals that cause cells to make more estrogen or progesterone, an established risk factor for breast cancer.

A breakdown of the list revealed 278 chemicals that cause mammary tumors in animals. More than half of the chemicals cause cells to make more estrogen or progesterone, and about a third activate the estrogen receptor.

Since damage to DNA can also trigger cancer, the researchers searched additional databases and found 420 of the chemicals on their list both damage DNA and alter hormones, which could make them riskier. What's more, the team's analysis found that chemicals that cause mammary tumors in animals are more likely to have these DNA damaging and hormone-disrupting characteristics than ones that don't.

"Historically, chemicals that cause mammary tumors in animals were seen as the best predictor of whether they might cause breast cancer in humans," said co-author Ruthann Rudel, director of research at Silent Spring. "But animal studies are expensive and time consuming, which is why so many chemicals have not been tested. Our findings show that screening chemicals for these hormonal traits could be an effective strategy for flagging potential breast carcinogens."

Schwarzman, who is also associate director of the Berkeley Center for Green Chemistry, hopes the study will push regulators to remove breast carcinogens from consumer products.

"Although the list is long," Schwarzman said, "keep in mind that only about 5% of the more than 40,000 chemicals active in commerce have been tested in ways that would flag them for the list. The true number of chemicals relevant to breast cancer is surely much higher. Safety data should be required for all chemicals in widespread use."

Julia Brody, of the Silent Spring Institute, was an additional co-author.

[Read the full paper here](#)

[Find list of chemicals and other supplementary materials here.](#)

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