In lab tests, the antimicrobial ingredient triclosan spurs growth of breast cancer cells

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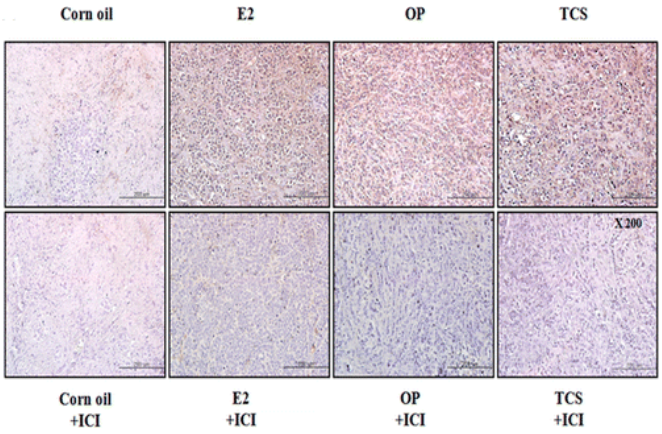

Some manufacturers are turning away from using triclosan as an antimicrobial ingredient in soaps, toothpastes and other products over health concerns. And now scientists are reporting new evidence that appears to support these worries. Their study, published in the ACS journal *Chemical Research in Toxicology*, found that triclosan, as well as another commercial substance called octylphenol, promoted the growth of human breast cancer cells in lab dishes and breast cancer tumors in mice.

Kyung-Chul Choi and colleagues note that hormonal imbalances seem to play a role in the development of breast cancer. Given that link, researchers are investigating whether endocrine-disrupting chemicals (EDCs), which are compounds that act like hormones, might spur cancer cell growth. EDCs have become ubiquitous in products, in the environment and even in our bodies. Research has found that two EDCs—triclosan, an antimicrobial ingredient in many products, including soaps, cosmetics and cutting boards; and octylphenol, which is in some paints, pesticides and plastics—have accumulated in the environment. Additionally, triclosan is reportedly in the urine of an estimated 75 percent of Americans. Choi's team wanted to see what effect the two compounds have on breast cancer cells.

In tests on human breast cancer cells and in special immunodeficient mice with tissue grafts, the scientists found that both agents interfered with genes involved with breast cancer cell growth, resulting in more cancer cells. Mice that were exposed to the two compounds had larger and denser breast cancer tumors than the control group. "Although the doses of EDCs were somewhat high, we did this to simulate their effects of daily exposure, as well as body accumulation due to long-term exposure, simultaneously in animal experiments," said Choi. "Thus, exposure to EDCs may significantly increase the risk of breast cancer development and adversely affect human health," the researchers state in the paper.

More information: "Progression of Breast Cancer Cells Was Enhanced by Endocrine-Disrupting Chemicals, Triclosan and Octylphenol, via an Estrogen Receptor-Dependent Signaling Pathway in Cellular and Mouse Xenograft Models" *Chem. Res. Toxicol.*, Article ASAP. DOI: 10.1021/tx5000156

Abstract

In the present study, we determined whether two endocrine-disrupting chemicals (EDCs), triclosan (TCS) and octylphenol (OP), are able to alter the expression of two cell cycle regulators, cyclin D1 and p21, in both in vitro and mouse breast cancer models. In addition, we determined whether the stimulatory effects of OP or TCS on breast cancer progression may be associated with an estrogen receptor (ER)-mediated signaling pathway. Altered

expressions of cyclin D1 and p21 were observed in MCF-7 human breast cancer cells treated with TCS and OP, which is linked to the G1/S transition of cell cycle, leading to cell proliferation. In a xenograft mouse model, breast tumor masses were established following exposure to TCS and OP for 8 weeks. In these animals, the tumor cells with BrdU-positive nuclei were increased by treatment with 17?-estradiol (E2), OP, and TCS compared to that of a control (corn oil), suggesting that TCS and OP increase DNA synthesis during the S phase in tumor cells. Increased level of cyclin D1 protein by TCS and OP was also observed in vivo, implying that the effects of these EDCs possessing estrogenic activity alter the expression of genes related to cancer progression. It was of interest that the effects of TCS and OP were reversed by ICI 182,780, an ER antagonist, indicating that EDC-induced activities are mediated by an ER-dependent signaling pathway. Taken together, these results suggest that TCS and OP may promote breast cancer progression, via an ER-mediated signaling cascade.

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