

LAY ABSTRACT

TITLE: Molecular Mechanisms of Polybrominated Diphenyl Ethers (BDE-47, BDE-100, and BDE-153) in Human Breast Cancer Cells and Patient-Derived Xenografts

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Polybrominated Diphenyl Ethers (PBDEs) are a group of chemicals added to plastics, clothing, carpeting and furniture to act as a fire retardant. These chemicals can be absorbed in human tissue and stay in the body for a long time. They have been reported to affect the normal biological functions of hormones by interacting with the hormone receptor proteins, but their activities in breast cancer cells have not been clearly defined. Three of them (BDE-47, -100, and -153) are commonly found in human blood. We studied the action of these PBDEs using a breast cancer cell line which requires estrogen for growth and tested their abilities to interact with hormone receptors and change the expression of genes. We learned that these fire retardants change the

activity of the estrogen receptor, a hormone receptor that plays key roles in breast cancer and controls other receptors which interact with additional chemicals present in our environment. Importantly, we used an animal model to confirm the activities of these PBDEs inside the body. To improve our understanding of the effects of exposure of PBDEs in the environment, we fed mice a diet containing the chemicals at levels ten times to human exposure for one week. The results from our animal studies confirm what we learned from breast cancer cell-based experiments.