

Dust on office surfaces can be a source of exposure to PBDEs

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In a study of 31 Boston offices, polybrominated diphenyl ether (PBDE) flame retardants now banned internationally by the Stockholm Convention on Persistent Organic Pollutants were detected in every office tested. The research, published online June 30 ahead of print in the peer-reviewed journal *Environmental Health Perspectives (EHP)*, links concentrations of PBDEs in office dust with levels of the chemicals on the hands of the offices' occupants.

The study authors also found the amount of PBDEs on workers' hands to be a good predictor of how much was measured in their blood. However, frequent handwashing appeared to reduce exposure to certain PBDEs. This is the first peer-reviewed research to correlate levels of PBDEs on people's hands to concentrations in their blood, says lead author Deborah Watkins, a Ph.D. candidate at the Boston University School of Public Health's Department of Environmental Health.

PBDEs were once widely used in computers and other electronics as well as the polyurethane foam padding in office chairs, furniture, and carpeting, so the chemicals are likely to be found in offices throughout the United States. In recent years, epidemiologic studies have linked exposure to constituents of the PBDE formulation penta-BDE, which was used in polyurethane foam, with changes in people's thyroid hormones, impaired fertility in women, lowered levels of testosterone in men, neurodevelopmental deficits in children, and undescended testicles in babies.

U.S. manufacturers voluntarily discontinued production of penta-BDE and another PBDE formulation known as octa-BDE at the end of 2004. These formulations are also banned in the European Union.

Manufacturers of a third formulation, deca-BDE, have agreed to discontinue production by the end of 2013. However, because of the typically slow turnover of products containing PBDEs and the long half-lives of these compounds in the environment, people will continue to be exposed to the compounds for many years, Watkins and her colleagues note in their paper.

Although scientists don't know exactly how people accumulate high concentrations of PBDEs in their bodies, hand-to-mouth exposure is thought to play a significant role. In this study, workers who reported washing their hands with soap and water four or more times per day tended to have lower levels of penta-PBDEs on their hands than those who washed their hands less often. They also had, on average, three times lower concentrations of penta-PBDEs in their blood.

"This suggests that people's hands play a key role in how they are exposed to PBDEs," Watkins says. "This could be through hand-to-mouth behaviors such as eating oily food without washing your hands, or because the PBDEs are absorbed into the blood from the skin."

Whatever the source, Watkins stresses that "good old-fashioned soap and water may be needed to remove the PBDEs." The authors did not study whether use of alcohol-based hand sanitizers also was linked to lower hand levels of the compounds.

The concentrations of the PBDEs in the tested office dust varied dramatically, which Watkins says is consistent with other studies. The apparent effect of more frequent handwashing was particularly pronounced for people who had the highest concentrations of PBDEs in their office dust.

The study authors did not investigate the sources of the PBDEs they detected, but Watkins notes that even offices in a new building with brand-new furniture had compounds associated with PBDEs in their dust. The 31 offices tested in the study, each housing one worker, were located in eight different buildings.

The city of Boston requires that all office furniture meet California's TB-117 fire safety standard, which is the strictest in the country. Some other cities also have similar requirements, and office furniture is often manufactured to meet the California standard, Watkins says. "Instead of producing two different kinds of office chairs, manufacturers often made just one chair model that met the code," she explains. New office furniture meeting the standard (using fire retardants other than PBDEs) has a TB-117 label on it, but these labels can often be found on older furniture made with PBDEs.

More information: The article "Exposure to PBDEs in the Office Environment: Evaluating the Relationship between Dust, Hand Wipes, and Serum," will be available June 30 free of charge at ehponline.org/article/info:doi/10.1289/ehp.1003271

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