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## The risk of PBDEs in dust

### New research confirms that people can take up brominated flame retardants from the dust in their homes.

Scientists have long suspected that dust can play a major role in people's uptake of [polybrominated diphenyl ether](#) (PBDE) flame retardants. **New research published today on *ES&T's* Research ASAP website (DOI: 10.1021/es0620282) is the first to definitively link the PBDE concentrations found in people with the quantities of the persistent, bioaccumulative, and toxic (PBT) contaminants in dust from their homes. When considered in tandem with the U.S. EPA's new assessments of PBDEs and data on the high concentrations of the contaminants in the dust of some U.S. homes, the findings suggest that children could be exposed to levels that put them at risk of developing neurological problems.**



Tom Webster

Investigators captured samples of dust containing PBDEs from commonly used rooms in people's homes using a vacuum cleaner with this cellulose thimble inserted after the crevice tool.

**Tom Webster and Nerissa Wu of Boston University's School of Public Health led the international study, which involved collecting breast milk samples from 46 first-time mothers in the Boston area. Although the researchers obtained dust samples from only 11 homes, they found statistically significant correlations between the levels of PBDEs in the dust from women's homes and the concentrations of the contaminants in their milk.**

EPA released its long-awaited [draft PBDE assessments](#) for its Integrated Risk Information System (IRIS) on December 22, 2006. EPA's [IRIS](#) is an electronic database with information on the human health effects that may result from exposure to chemicals found in the environment. The assessments calculate safe doses for human exposure to four PBDE compounds, or congeners. The lowest doses were 0.1 microgram per kilogram per day ( $\mu\text{g}/\text{kg}/\text{day}$ ) for two of the brominated diphenyl ether (BDE) compounds most commonly found in house dust, human blood, and breast milk, BDE-47 and BDE-99. The current safe dose for BDE-99 is 20 times higher, and BDE-47 was not previously assessed for safety.

The levels of PBDEs reported in [previous studies](#) of house dust vary widely—as do the amounts of PBDEs that studies have shown can be taken up by [North American citizens](#), which have the highest levels of PBDEs in the world. [Heather Stapleton](#) of Duke University, who is a [pioneer](#) in this research, says that people living in U.S. homes with the mean and median levels of PBDEs in their dust could be taking up within an order of magnitude of the new IRIS reference doses.

**Particularly concerning is the fact that “we are seeing such high levels in some homes,” Stapleton says. She**

calculates that children living in these homes could be “getting [PBDE] levels higher than the IRIS estimates.” The IRIS doses for BDE-47 and BDE-99 were based on research showing neurotoxic effects on developing animals. This suggests that growing children may be especially susceptible.

Many of the scientists interviewed for this article expressed surprise that EPA’s draft assessments were formulated on the basis of the doses of the PBDEs administered to the test animals, rather than the “[comparable body burdens](#)” approach now used for dioxins and PCBs. Because that approach compares the concentrations of PBT compounds in experimental animals with those found in people, it is more appropriate for compounds such as BDE-47, BDE-99, and BDE-153, which tend to have long half-lives in humans, on the order of years, Webster explains. The public comment period for the PBDE IRIS documents ends on February 5.

What the new research does not show is the source of the PBDEs found in the dust. Webster's questionnaire included detailed questions about potential sources of PBDEs, such as electronics, and furniture likely to contain foam-padding. He says he and his colleagues were "surprised . . . that we couldn't find any relationship based on what we know about how PBDEs are used in household products."

The paper also raises questions about how much dust people take up. “In our review of the literature we found more than 100-fold difference in estimated dust ingestion,” points out [Arnold Schechter](#), professor of environmental sciences at the University of Texas–Houston School of Public Health. “Obviously, as the authors indicate, it is quite important for this key uncertainty to be resolved by further research, which should include various age groups from infancy through adult life.” —[KELLYN S. BETTS](#)

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