

Study documents PBDE flame retardant levels in children

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(PhysOrg.com) -- A group of 264 Mexican-American children living in California had higher levels of polybrominated diphenyl ether (PBDE) flame retardants in their blood serum than 283 counterparts living in Mexico, according to research published online April 15 ahead of print in the peer-reviewed journal *Environmental Health Perspectives* (EHP).

The California children were participants in the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) study. Their Mexican counterparts, participants in the affiliated Proyecto Mariposa study, lived in the same Mexican states where the California children's mothers came from. Both studies assessed children's levels of PBDEs and the pesticide DDT, compounds that may affect hormones that can influence children's normal development, learning, and behavior.

The California children's levels of PBDEs were seven times higher, on average, than levels in the Mexican children. Moreover, the California children had PBDE levels higher than those reported for almost all other groups of children ever studied.

"Only Nicaraguan children who lived and worked on hazardous waste sites had higher reported levels of PBDEs in their bodies than the California children," says study leader Brenda Eskenazi of the University of California, Berkeley, School of Public Health's Center for Environmental Research and Children's Health (CERCH).

In contrast to the PBDE findings, levels of DDT and its breakdown product DDE were lower in the California children than in their Mexican counterparts, and levels decreased with the time their mothers had lived in the United States. Even children whose mothers had lived in the United States less than one year before they became pregnant had lower DDT levels than Mexican children. The California children were tested at age 7 years, while the Mexican children were tested at age 5 years.

Almost all of the children in the two studies were breastfed, and breastfeeding is a potentially important route through which children are exposed to both DDT and PBDEs. However, the new findings suggest that most of the PBDEs in the bodies of the California children were not a result of in utero or breastfeeding exposures.

Most importantly, these children's PBDE levels were three times higher than the levels documented in their mothers during pregnancy. This fact, together with the observation that Mexican-American children whose mothers lived in the United States for less than a year at the time of their pregnancy had higher PBDE levels than their Mexican counterparts, suggests house dust was the major source of these children's exposure to the [flame retardants](#).

"PBDEs are persistent pollutants that have been used in many consumer products and household materials, including foam padding in furniture, carpets, baby products, and in transportation, including automobiles," explains study co-author Asa Bradman of CERCH. "These products tend to have long lifespans, and the flame retardants are not chemically bound to the materials they're used with. As polyurethane foam and other materials containing the flame retardants age and degrade, they can release PBDEs into people's homes in the form of dust. And scientists know that when you have persistent pollutants in dust, they get into children. In some ways, PBDEs are like lead in this regard: although we

don't put lead in paint anymore, many houses still have lead in their paint."

In the new paper, Eskenazi and her co-authors point out that California's unique flammability standards, outlined in Technical Bulletin 117, resulted in the addition of millions of pounds of flame retardants to the polyurethane foam used in upholstered furniture, carpet pads, and infant products including car seats and portable crib mattresses. These standards may have had the unintended consequence of causing California homes to have the highest levels of PBDE flame retardants in the nation. Earlier this year, another CERCH scientist published a research paper documenting the highest level of PBDEs yet reported in U.S. house dust in the homes of Mexican immigrants in Salinas and Oakland, California. The levels of PBDEs in these homes were up to 20 times higher than elsewhere in the United States.

Until 2005, a mixture of PBDEs known as penta-BDE was the predominant chemical flame retardant used to comply with California's flammability standards. "Low-income families are more likely to have both older furniture and older infant products that may facilitate penta-BDEs' migration into household dust and indoor air," says co-author Laura Fenster of CERCH. She notes that young children are likely to be exposed to dust because of how often they touch objects and put things in their mouths.

Products made in compliance with California's standards are sold throughout the country. Tests of children living in other U.S. states show they also are exposed to penta-BDE flame retardants, the researchers say. Several of these other studies also document that children have higher penta-BDE levels than adults. People's exposure to higher levels of PBDEs has also been linked with impairments in fertility and alterations in thyroid hormone levels.

More information: The article, "A Comparison of PBDE Serum Concentrations in Mexican and Mexican-American Children Living in California" will be available April 15 free of charge at ehponline.org/article/info:doi/10.1289/ehp.1002874

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