

# Flame retardants linked to neurodevelopmental delays in children

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Prenatal and childhood exposure to flame retardant compounds are linked to poorer attention, fine motor coordination and IQ in school-aged children, a finding by researchers at the University of California, Berkeley, that adds to growing health concerns over a chemical prevalent in U.S. households.

The new study, to be published in the Nov. 15 issue of the journal [Environmental Health Perspectives](#), focuses on PBDEs, or [polybrominated diphenyl ethers](#), a class of persistent, endocrine-disrupting compounds widely found in foam furniture, electronics, carpets, upholstery and other consumer products. The chemicals easily leach out into the environment and are inhaled or ingested through dust, then accumulate in human [fat cells](#).

The researchers collected blood samples taken from 279 women during pregnancy or at delivery, and from 272 of the [children](#) when they were 7 years old. Analyses of the blood samples were conducted at the U.S. [Centers for Disease Control and Prevention](#) (CDC) in Atlanta.

The children participated in a battery of standardized tests when they were 5 and 7 to assess their attention, fine [motor coordination](#) and IQ ([verbal comprehension](#), perceptual reasoning, working memory, processing speed). Mothers and teachers also completed assessment questionnaires to help evaluate the children's attention skills and behavior.

"This is the largest and most comprehensive study to date to examine neurobehavioral development in relation to body burden measures of PBDE flame retardants," said study lead author Brenda Eskenazi, Jennifer and Brian Maxwell Professor of [Maternal and Child Health](#) and Epidemiology. "We measured PBDEs both in the mothers during pregnancy and in the children themselves. It shows that there is a relationship of in utero and childhood levels to decrements in fine motor function, attention and IQ."

The new findings stem from a longitudinal study, the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS), which examines environmental exposures and reproductive health. The study participants are primarily Mexican-Americans living in an agricultural community in Monterey County. Earlier studies found that children from the CHAMACOS group had PBDE blood concentrations seven times higher than children living in Mexico.

Evidence of adverse human health effects from PBDE exposure has been steadily building over the past decade. Other CHAMACOS studies have also revealed links between flame retardant concentrations in mothers' blood and decreased fertility, lower birthweight babies and changes in thyroid hormone levels, even after controlling for exposure to pesticides and other environmental chemicals. And findings from other smaller studies have linked deficits in physical and mental development in young children to prenatal exposure to PBDEs.

"This new study is very important because it confirms earlier published research on the neurodevelopmental effects of PBDE exposure," said Heather Stapleton, associate professor of environmental chemistry at Duke University and one of the nation's leading experts on human exposure to flame retardant chemicals. Stapleton was not part of the UC Berkeley study.

Use of PBDEs increased in the 1970s in response to a California standard (Technical Bulletin 117) requiring that consumer furnishings be able to withstand a small open flame for 12 seconds without igniting.

Today, PBDEs can be found in the blood of up to 97 percent of U.S. residents, with those in California having levels nearly twice the national average, according to studies.

"Within the range of PBDE exposure levels, 5 percent of the U.S. population has very high exposure levels, so the health impact on children in these extremes could be even more significant," noted Stapleton.

There are three formulations of PBDEs—pentaBDE, octaBDE and decaBDE—that have been developed for commercial use as [flame retardants](#). Penta- and octaBDE have both been banned for use in several U.S. states, including California, but they are still present in products made before 2004. In addition, three major manufacturers have agreed to phase out production of decaBDE by 2013.

"Even though pentaPBDEs are not being used anymore, old couches with foam that is disintegrating will still release PBDEs," said Eskenazi, director of the Center for Environmental Research and Children's Health (CERCH) at UC Berkeley. "These chemicals will be in our homes for many years to come, so it's important to take steps to reduce exposure."

Examples of things that people can do at home include:

- Seal any tears in couches and upholstered furniture
- Damp mop and vacuum frequently
- Wash hands frequently (especially important for children)

**More information:** CERCH has also posted information about PBDEs online ( [cerch.org/environmental-exposure-reports/de-flame-retardants/](http://cerch.org/environmental-exposure-reports/de-flame-retardants/) ).

Provided by University of California - Berkeley

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