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Flame Retardants Linked to Lower IQs, Hyperactivity in Children

A new study confirms that exposure in the womb to fire-beating chemicals in furniture and carpet pads may hinder child development

By [Dina Fine Maron](#) | May 6, 2013 | 0

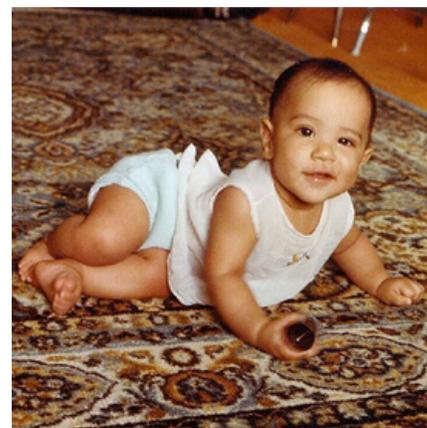
Almost a decade after manufacturers stopped using certain chemical flame retardants in furniture foam and carpet padding, [many of the compounds](#) still lurk in homes. New work to be presented today reaffirms that the chemicals may also still be hurting young children who were exposed before they were born.

Researchers investigating the health impacts of prenatal exposure to flame retardants collected blood samples from 309 pregnant women early in their second trimester. Spikes in the levels of one class of flame retardant, [polybrominated diphenyl ethers](#) (PBDEs) correlated with behavior and cognition difficulties during early childhood.

The researchers tracked children through the first five years of their lives, looking at a battery of tests for IQ and behavior. They found that children of mothers who had high PBDE levels during their second trimester showed cognition deficits when the children were five years old as well as higher rates of hyperactivity at ages two to five. If the mother's blood had a 10-fold increase in PBDEs, the average five-year-old had about a four-point IQ deficit. "A four-point IQ difference in an individual child may not be perceivable in...ordinary life. However, in a population, if many children are affected, the social and economic impact can be huge due to the shift of IQ distribution and productivity," says lead author Aimin Chen, an assistant professor of environmental health at the University of Cincinnati College of Medicine. The findings, based on women and children from Cincinnati, will be presented May 6 at the annual meeting of the Pediatric Academic Societies in Washington, D.C. The unpublished results have been submitted to a peer-reviewed journal, but the paper has not yet been accepted.

Chen's team did not track the children's PBDE blood levels after they were born, so the deficits could also have resulted, at least in part, from the additional exposures to the chemical that the children encountered directly after they were born. Chen says that although the lack of blood level data in the children is a limitation, other researchers have measured both mother and child PBDE levels and found similar deficits, strengthening his conclusions. The team also found that association of PBDEs and child IQ and behavior did not result from the mother's blood levels of lead, a well-known neurotoxic metal.

Although preliminary, Chen's findings are similar to two recent large U.S. studies that showed associations between prenatal exposure



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to flame retardants and developmental deficits and reduced IQ. One of those earlier studies, from the University of California, Berkeley, looked at children and PBDE levels through age seven, and was [published online last fall](#) in *Environmental Health Perspectives*. That study measured PBDEs both in pregnant women and in the children themselves. It showed that there is a relationship between high PBDE exposures in utero and deficits in children's IQ, fine motor function and attention. Though suggestive, none of the studies have proved a definitive cause-and-effect link in humans, however.

Scientists believe that in humans PBDEs can lodge themselves in bodily lipids when contaminated air is inhaled or tainted dust swallowed, although exactly how they may wreak havoc inside the body remains unknown. Tests on animals suggest that the chemicals disrupt the endocrine system. The chemical structure of PBDEs strongly resembles thyroid hormones, and they affect thyroid regulation and decrease the level of thyroid hormones in the blood of animals. These hormones drive growth and development—in particular, brain development. Animal studies have also found that exposure to PBDEs in the womb and via nursing may damage the thyroid system and alter newborns' brains.

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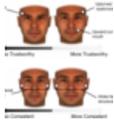
Children are considered to be at particular risk of encountering hazardous dust because they spend so much time close to the floor and often put their hands in their mouths. Moreover, “you are having an impact during critical windows of development, and if you mess up development when brain structures or neuropathways are forming there may not be an ability to repair them later on,” says Linda Birnbaum, director of the National Institute of Environmental Health Sciences. “We don't have data on whether or not the cognitive or behavioral impacts will reverse. We know from many other exposures to different kinds of environmental compounds that impact behavior or intelligence that [the impact] doesn't go away.” Chen plans to follow the kids in his study for the next few years to help glean any long-term effects.

The particular flame retardants investigated in Chen's study, which were typically used in polyurethane foams and carpet pads, were [phased out of manufacturing](#) in 2004, but they are still on old furniture, remain in the atmosphere and settle into dust in the home.

Furniture-makers have continued to use flame retardants because of a state law—the California Technical Bulletin 117. It says the furniture sold within state borders must withstand a 12-second exposure to a small flame without igniting. That state regulation has become the de facto law of the land as manufacturers have sought to comply with it so they can sell their wares throughout the U.S. But California is revising its standard so that products will only have to [pass a “smolder test”](#) that would prevent fires but would not require flame retardant use in manufacturing. State legislators may finalize [the revision](#) later this summer or in the fall.

Products treated with PBDE are not labeled as such, but Chen says parents can take precautions to reduce exposure by having children wash their hands to diminish dust ingestion, and by replacing old furniture and changing old carpet padding.

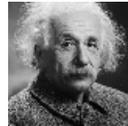
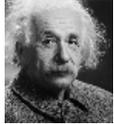
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