



## Flame retardant linked to altered thyroid hormone levels during pregnancy

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**Pregnant women with higher blood levels of a common flame retardant had altered thyroid hormone levels, a result that could have implications for fetal health, according to a new study led by researchers at the University of California, Berkeley.**

"This is the first study with a sufficient sample size to evaluate the association between PBDE flame retardants and [thyroid function](#) in pregnant women," said the study's lead author, Jonathan Chevrier, a UC Berkeley researcher in epidemiology and in environmental health sciences. "Normal maternal thyroid hormone levels are essential for normal [fetal growth](#) and [brain development](#), so our findings could have significant public health implications. These results suggest that a closer examination between PBDEs and these outcomes is needed."

PBDEs, or polybrominated diphenyl ethers, are a class of organobromine compounds found in common household items such as carpets, textiles, foam furnishings, electronics and plastics. U.S. fire safety standards implemented in the 1970s led to increased use of PBDEs, which can leach out into the environment and accumulate in human [fat cells](#).

Studies suggest that PBDEs can be found in the blood of up to 97 percent of U.S. residents, and at levels 20 times higher than those of people in Europe. Because of California's flammability laws, residents in this state have some of the highest exposures to PBDEs in the world.

"Despite the prevalence of these flame retardants, there are few studies that have examined their impact on human health," said the study's principal investigator, Brenda Eskenazi, UC Berkeley professor of epidemiology and of maternal and child health. "Our results suggest that exposure to PBDE flame retardants may have unanticipated human health risks."

The new study, to be published June 21 in the journal [Environmental Health Perspectives](#), is the second study to come out this year from Eskenazi's research group linking PBDEs to human health effects. Eskenazi was the principal investigator on the earlier study that found that women with higher exposures to flame retardants took longer to get pregnant.

In the new study, the researchers analyzed blood samples from 270 women taken around the end of their second trimester of pregnancy. The women in the study were part of a larger longitudinal study from the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) that examines environmental exposures and reproductive health.

The researchers measured concentrations of 10 PBDE chemicals, two types of thyroxine (T4) and thyroid-stimulating hormone (TSH). They controlled for such factors as maternal smoking, alcohol and drug use, and exposure to lead and pesticides.

Analysis focused on the five PBDE chemicals that were detected most frequently and are components of a mixture called pentaBDE. The researchers found that a 10-fold increase in each of the PBDE chemicals was associated with decreases in TSH ranging from 10.9 percent to 18.7 percent. When the five PBDEs were analyzed together, a tenfold increase was linked to a 16.8 percent decrease in TSH.

The study did not find a statistically significant effect of PBDE concentrations on levels of T4. With one exception, all the women in the study with low TSH levels had normal free T4 levels, which corresponds to the definition of subclinical hyperthyroidism. The study found that odds of subclinical hyperthyroidism were increased 1.9 times for each tenfold increase in PBDE concentrations.

"Low TSH and normal T4 levels are an indication of subclinical hyperthyroidism, which is often the first step leading toward clinical hyperthyroidism," said Chevrier. "Though the health effect of subclinical hyperthyroidism during pregnancy is not well understood, maternal clinical hyperthyroidism is linked to altered fetal neurodevelopment, increased risk of miscarriage, premature birth and intrauterine growth retardation."

Exactly how flame retardants influence TSH levels is unclear, the researchers said, but animal studies have shown that certain PBDEs can mimic thyroid hormones.

In addition to the commercial mixture pentaBDE, octaBDE and decaBDE have been developed for use as commercial [flame retardants](#). PentaBDE and octaBDE have both been banned for use by the Stockholm Convention on Persistent Organic Pollutants, the European Union and eight U.S. states, including California, but they are still present in products made before 2004.

The production of decaBDE by major manufacturers is scheduled to be phased out in the United States by 2013. However, pentaBDE and decaBDE are being replaced by new brominated and chlorinated compounds whose impact on human health is not yet clear, the researchers noted.

**More information:** The study is available for free online: [http://ehponline.o ... /ehp.1001905](http://ehponline.org/docs/2010/06/ehp1001905)

Provided by University of California - Berkeley

"Flame retardant linked to altered thyroid hormone levels during pregnancy." June 21st, 2010. <http://www.physorg.com/news196255783.html>



## Study links reduced fertility to flame retardant exposure

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**Women with higher blood levels of PBDEs, a type of flame retardant commonly found in household consumer products, took longer to become pregnant compared with women who have lower PBDE levels, according to a new study by researchers at the University of California, Berkeley.**

The study, to be published Jan. 26 in the journal *Environmental Health Perspectives*, found that each 10-fold increase in the blood concentration of four PBDE chemicals was linked to a 30 percent decrease in the odds of becoming pregnant each month.

"There have been numerous animal studies that have found a range of health effects from exposure to PBDEs, but very little research has been done in humans. This latest paper is the first to address the impact on human fertility, and the results are surprisingly strong," said the study's lead author, Kim Harley, adjunct assistant professor of maternal and child health and associate director of the Center for Children's Environmental Health Research at UC Berkeley's School of Public Health. "These findings need to be replicated, but they have important implications for regulators."

PBDEs, or polybrominated diphenyl ethers, are a class of organobromine compounds that became commonplace after the 1970s when new fire safety standards were implemented in the United States. The [flame retardants](#) are used in foam furniture, electronics, fabrics, carpets, plastics and other common items in the home.

Studies have found widespread contamination of house dust by PBDEs, which are known to leach out into the environment and accumulate in human [fat cells](#). Studies also suggest that 97 percent of U.S. residents have detectable levels of PBDEs in their blood, and that the levels in Americans are 20 times higher than in their European counterparts. According to the researchers, residents in California are among those experiencing the highest exposures, most likely due to the state's relatively stringent flammability laws.

The researchers measured PBDE levels in blood samples from 223 pregnant women enrolled in a longitudinal study at the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) that examines environmental exposures and reproductive health.

The median concentrations of the four PBDE chemicals in the analysis were slightly lower in this study population than in the general U.S. population, possibly because many of the participants had grown up in Mexico where PBDE exposures are limited, said the authors of the study. The median number of months it took to get pregnant was three, with 15 percent of the participants taking longer than 12 months to conceive.

When the analysis was limited to women who were actively trying to become pregnant, the researchers found that they were half as likely to conceive in any given month if they had high levels of PBDE in their blood. "We aren't looking at infertility, just subfertility, because all the women in our study eventually became pregnant," said Harley. "Had we included infertile couples in our study, it is possible that we

would have seen an even stronger effect from PBDE exposure."

It is not entirely clear how PBDEs might impact fertility. A number of animal studies have found that PBDEs can impair neurodevelopment, reduce thyroid hormones, and alter levels of sex hormones. Both high and low thyroid hormone levels can disrupt normal menstrual patterns in humans, but this study did not find a link between PBDE exposure and irregular menstrual cycles.

Because the participants were mostly young, Mexican immigrant women who lived in an agricultural community, the researchers controlled for exposure to pesticides in their analysis. The researchers also controlled for other variables known to impact fertility, such as irregularity of menstrual cycles, frequency of intercourse, pre-pregnancy body mass index, use of birth control pills in the year before conception, smoking, and alcohol and caffeine consumption.

There are some 209 different possible formulations of PBDEs, but only three mixtures - pentaBDE, octaBDE and decaBDE - have been developed for commercial use as flame retardants. The mixtures are distinguished by the average number of bromine atoms attached to each molecule. Like many other studies, the most prevalent PBDEs in the blood of women participating in the UC Berkeley study were four components of the pentaBDE mixture.

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. Last month, the U.S. Environmental Protection Agency (EPA) announced an agreement with three major manufacturers of decaBDE to phase out its production by 2013.

"Although several types of PBDEs are being phased out in the United States, our exposure to the flame retardants is likely to continue for many years," said the study's principal investigator, Brenda Eskenazi, UC Berkeley professor of epidemiology and of maternal and child health at the School of Public Health. "PBDEs are present in many consumer products, and we know they leach out into our homes. In our research, we have found that low-income children in California are exposed to very high levels of PBDEs, and this has us concerned about the next generation of Californians."

Keeping up with the ever-expanding range of chemicals in our environment is challenging, the researchers noted. As PBDEs are being phased out, they are being replaced with other brominated compounds. "We know even less about the newer flame retardant chemicals that are coming out," said Harley. "We just don't have the human studies yet to show that they are safe."

A 2007 state assembly bill that would have banned all brominated and chlorinated chemical flame retardants from household furniture and bedding sold in California failed to pass.

Provided by University of California - Berkeley

"Study links reduced fertility to flame retardant exposure." January 26th, 2010. <http://www.physorg.com/news183731384.html>



## Prenatal exposure to flame-retardant compounds affects neurodevelopment of young children

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**Prenatal exposure to ambient levels of flame retardant compounds called polybrominated diphenyl ethers (PBDEs) is associated with adverse neurodevelopmental effects in young children, according to researchers at the Columbia Center for Children's Environmental Health (CCCEH) at Columbia University's Mailman School of Public Health.**

The study is online in [Environmental Health Perspectives](#) and will be released in the April 2010 print issue.

PBDEs are endocrine-disrupting chemicals and widely used flame-retardant compounds that are applied to a broad array of textiles and consumer products, including mattresses, upholstery, building materials, and [electronic equipment](#). Because the compounds are additives rather than chemically bound to consumer products, they can be released into the environment. Human exposure may occur through dietary ingestion or through [inhalation](#) of dust containing PBDEs.

The researchers found that children with higher concentrations of PBDEs in their umbilical cord blood at birth scored lower on tests of mental and physical development between the ages of one and six. Developmental effects were particularly evident at four years of age, when verbal and full IQ scores were reduced 5.5 to 8.0 points for those with the highest prenatal exposures.

"The neurodevelopmental effects of [prenatal exposure](#) to PBDEs have not previously been studied among children in North America, where levels are typically higher than in Europe or Asia," said Julie Herbstman, PhD, first author on the paper and a research scientist in Environmental Health Sciences at the Mailman School of Public Health. "The findings are consistent with effects observed in animal studies and, if replicated in other North American populations, they could have important public health implications."

Frederica Perera, DrPh, professor of Environmental Health Sciences at the Mailman School, CCCEH Director, and coauthor added, "These findings are of potential concern, because IQ is a predictor of future educational performance; and the observed reductions in IQ scores are in the range seen with low level lead exposure." This research underscores the need for preventive policies to reduce toxic exposures occurring in utero."

The investigators controlled for factors that have previously been linked to neurodevelopment in other studies, including ethnicity, mother's IQ, child's sex, gestational age at birth, maternal age, prenatal exposure to environmental tobacco smoke, maternal education, material hardship, and breast feeding.

The study is part of a broader project examining the effects of chemicals released by the World Trade Center's destruction on pregnant women and their children. However, residential proximity to the World Trade Center site did not affect levels of PBDE exposure.

Provided by The Earth Institute at Columbia University

"Prenatal exposure to flame-retardant compounds affects neurodevelopment of young children." January 19th, 2010.

<http://www.physorg.com/news183127197.html>