

Flame-retardant chemicals linked to lower fertility

The substances cited in a study, which are banned in California, are used in electronics, fabrics and plastics.

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Flame-retardant chemicals found in many household consumer products may reduce fertility in women, researchers reported Tuesday. Their study joins several other papers published in the last two years suggesting that the chemicals, polybrominated diphenyl ethers, or PBDEs, affect human health.

PBDEs have been used as flame retardants for four decades and are found in foam furniture, electronics, fabrics, carpets and plastics. The chemicals are being phased out nationwide, and certain PBDEs have been banned for use in California. But they are still found in products made before 2004. Californians may have higher exposures compared with residents of other states because of the state's strict flammability laws, according to the study authors, from UC Berkeley.

Most of the previous research on the chemicals has been in animals. But a 2008 study linked the chemicals to disrupted thyroid levels in men, and a study published this month tied PBDE exposure in pregnancy to neurodevelopmental delays in young children.

"These are association studies. You can't show cause and effect," said Dr. Hugh Taylor, an expert on endocrine-disrupting chemicals at Yale University who was not involved in the new study. "But we have cause-and-effect studies in animals, and we have association studies in humans. I think that is fairly convincing."

In the study, published Tuesday in the journal *Environmental Health Perspectives*, researchers measured PBDE levels in blood samples from 223 pregnant women. The women, who were primarily Mexican immigrants living in an agricultural community, were asked to recall how long they had been trying to become pregnant, which was defined as being sexually active without the use of birth control.

Women with the highest concentrations of the chemicals experienced a longer delay before pregnancy. Each tenfold increase in blood concentration of PBDEs was linked to a

30% decrease in the likelihood of becoming pregnant each month.

"It's a pretty strong effect," said Kim Harley, the lead author of the study and associate director of the Center for Children's Environmental Health Research at UC Berkeley's School of Public Health. "They can all become pregnant, but they all had very different amounts of time it took them to become pregnant."

Previous studies suggest that 97% of Americans have detectable levels of the substances in their blood. PBDEs are also found in some foods, particularly dairy products and higher-fat meat and fish, but household products are considered a major source of exposure.

"PBDEs have the ability to just leach out of these products into our environment," Harley said. "We're thinking the routes are probably ingestion or hand to mouth. But it seems that the larger route of exposure is house dust."

How the chemicals might impair fertility is unclear, she said.

"One of the strongest associations of PBDEs is with thyroid hormone," Harley said. "Thyroid hormone does seem to play an important role in fertility. Either too low or too high levels can impair fertility. PBDEs also seem to mimic estrogen. It could be through a hormonal mechanism. But we need more research on that."

Fertility may be one of the first biological processes affected by chemical exposures, said Taylor, director of reproductive endocrinology and infertility at Yale.

"Fertility is easy to perturb," he said. "Miscarriage is another thing that may be related to environmental exposures. We also have to ask: What are the effects on the next generation? We know these endocrine-disrupting chemicals can affect the next generation's fertility. Is it due to the mother's exposure?"

Last month, the Environmental Protection Agency and the two largest manufacturers of one type of PBDE agreed to phase out the chemical. However, the substances will be in the environment a long time, Harley said. And understanding their effects is important.

"The thing is, they are used in these durable goods that we have in homes," she said. "Couches, chairs, TVs, carpet padding. These are things that will stay in our house for years to come."

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