



Flame Retardants: Polybrominated Diphenyl Ethers (PBDEs)

What are PBDE flame retardants?

Polybrominated diphenyl ethers (PBDEs) are a group of chemicals used to reduce the flammability of items in our homes. Since the 1970's, PBDEs were added to textiles, foam in furniture, carpet padding, building materials, upholstery in cars and airplanes, and plastic housings for electronics. Most PBDEs are now banned from use in these products, but high levels of PBDEs are still in the environment. Recent evidence suggests PBDE exposure may harm human health. Different chemicals, including one identified as a carcinogen by the State of California, are now used as flame retardants instead of PBDEs.



How are we exposed to PBDEs?

As furniture and other products get old and slowly break down, flame retardants can get into the surrounding environment, where they may remain for many years – especially indoors. PBDEs have been found around the world in air, soil, dust, and food as well as in wildlife and humans. Dust containing PBDE particles is one of the main pathways for human exposure to PBDEs, especially for young children who put their hands or toys in their mouth a lot.

PBDEs last a long time: they accumulate in fatty tissues in humans and are detectable in the blood of almost all Americans. Most people around the world have some PBDEs in their bodies. The highest human levels have been found in the United States, especially California, compared with Europe and Asia.

What are the health effects of PBDEs?

PBDEs have been linked to unhealthy changes in hormones and development in humans and animals. In one study, women with higher exposures took longer to get pregnant, suggesting that PBDEs may affect fertility. We also found that children of mothers with higher exposures during pregnancy had poor attention, motor coordination, and IQ when they reached school age. PBDEs have a similar structure to thyroid hormones, which are very important for normal growth of the brain and nervous system. Interfering with thyroid hormones may be one way PBDEs cause health problems.

Are children at a higher risk to PBDEs?

Children have been found to have higher levels of PBDEs in their bodies than adults. We think this is because they play more on the floor, get PBDE-containing house dust on their hands, and then put their hands in their mouths without washing them first. Also, because PBDEs concentrate in breast milk, babies are exposed when nursing. PBDE flame retardants were added to many infant products, such as strollers, representing another potential source of exposure. Also, compared with adults, children eat, drink, and breathe more for their body weight, which may also contribute to their higher levels of PBDEs compared to adults. Exposure to chemicals like PBDEs, when children's brains are developing, such as before they are born and when they are very young, can cause more harm than exposures to adults, whose nervous systems are already developed.

Why are exposures higher in California?

Californians have higher exposure to flame retardants because these chemicals are used to meet California's unique furniture flammability standard, titled Technical Bulletin 117. The California standard requires foam inside furniture to resist an open flame for 12 seconds without catching fire. Cigarettes in California and many other states are now required to be made to go out by themselves when they are not being puffed. Thus, cigarettes, the main cause of fire-related injuries involving furniture, are causing fewer fires than they used to. Overall, fire injuries and deaths have been decreasing throughout the U.S., including states where flame retardant chemicals are not required to be used. These statistics suggest that use of chemical flame retardants in California is not necessary to ensure fire safety.



CERCH studies on PBDE exposure and health in Salinas Valley

The Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) study found that higher PBDE exposures during pregnancy were associated with:

- Decreased female fertility. ([Go to publication](#))
- Altered maternal thyroid hormone levels during pregnancy. ([Go to publication](#))
- Lower infant birth weight. ([Go to publication](#))
- *But* not with newborn thyroid hormone. ([Go to publication](#))

How can you prevent exposure to flame retardants?

There are several ways of reducing the amount of flame retardants that you family come in contact with:

- Repair or replace furniture, mattresses, car upholstery and children's car seats that have a torn cover or exposed foam. If you buy used furniture and children's products, make sure they are in good shape.
- Thoroughly wash both your hands and your child's hands, especially before preparing food or eating.
- Take off shoes before coming indoors to avoid tracking chemicals into the home.
- Use a damp mop or dust cloth to control household dust. If you can, use a vacuum with a HEPA filter. A HEPA filter traps the smallest pieces of dust so they don't go through the vacuum and into the air where they can get into your body when you breathe.
- Open a window regularly to ventilate your home with fresh air.
- Choose baby products and furniture that contain polyester, down, wool or cotton which are less likely to contain flame retardant chemicals often used in foam.



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