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[Flame Retardants: Extinguishers of Brain Development?](#)

This week firefighters and health groups pushed the Maryland legislature to ban a class of flame retardants called deca BDE. Manufacturers counter that the flame retardants, widely used over the past 25 years on everything from home furnishings to electronics, save lives. It seems odd that firefighters who are dedicated to saving lives should be lobbying against flame retardants. What does the scientific literature say about the effects of these chemicals on the brain?

Polybrominated biphenyl ether (PBDE) flame retardants are widespread environmental pollutants on a global scale, but the contamination is greatest in the United States. These chemicals are found in wildlife, human food, household dust, indoor air, and in humans themselves (both human tissue and mother's milk). The concentration is particularly high in infants and toddlers who are exposed through mother's milk and household dust. Levels of these compounds in the environment are four times higher in the United States than in Europe.

These chemicals mimic thyroid hormones and they can damage or kill cells by oxidative injury, the same chemical reaction that turns steel to rust, only in this case the reaction is applied to the body's proteins. Prenatal exposure to PBDEs interferes with neural development in experimental animals. Rats exposed to flame retardants during fetal development have a weakened ability to strengthen synaptic connections in the hippocampus of the brain, which is the fundamental cellular mechanism of forming long-term memory.

In a study conducted in the Netherlands and published in 2009, researchers measured the concentration of flame retardants in pregnant mothers in their 35th week of pregnancy, and then tested the 62 offspring after they reached five to six years of age using standardized neuropsychological tests for motor performance, cognition, and behavior. The results showed that

children from mothers with higher levels of flame retardants in their bodies during pregnancy had worse fine motor skills and poor attention, but the effects depended on the particular kind of flame retardant chemical in the mother's body. A recent paper published by A. Messer in *Physiological Behavior* (January 2010), implicates PBDEs in autism.

Interestingly, the oxidative damage caused by these compounds can be counteracted by glial cells, called astrocytes. Astrocytes are known to release powerful antioxidants. When neurons were exposed to PBDE flame retardants in cell culture they were killed, but if astrocytes were added to the cultures, the neurons were protected. These findings are published by G. Giordano and colleagues in the March, 2009 issue of the journal *Neurotoxicology*. Firefighters may be willing to fight fire with fire, but they are reluctant to fight fire with something that might stifle development of a child's brain.