

Study finds flame retardants at high levels in pet dogs

April 26 2011

Indiana University scientists have found chemical flame retardants in the blood of pet dogs at concentrations five to 10 times higher than in humans, but lower than levels found in a previous study of cats.

Their study, "[Flame Retardants](#) in the [Serum](#) of [Pet Dogs](#) and in their Food," appears this month in the journal *Environmental Science & Technology*. Authors are Marta Venier, an assistant research scientist in the School of Public and Environmental Affairs, and Ronald Hites, a Distinguished Professor in SPEA.

Venier and Hites explore whether pets could serve as "biosentinels" for monitoring human exposure to compounds present in the households that they share. Dogs may be better proxies than [cats](#), they say, because a dog's metabolism is better equipped to break down the chemicals.

The study focuses on the presence of polybrominated diphenyl ethers (PBDEs) in the blood of dogs and in commercial [dog food](#). PBDEs have been widely used as flame retardants in household furniture and electronics equipment. The compounds can migrate out of the products and enter the environment.

"Even though they've been around for quite awhile, we don't know too much about these compounds' toxicological effects on humans or animals," Venier said. "The bottom line is that we still need to keep measuring them, particularly in homes."

PBDE mixtures made up of less-brominated compounds are regarded as more dangerous because they bioaccumulate in animal tissues. These mixtures were banned by the European Union and were voluntarily removed from the U.S. market in 2004, but remain in the environment. Mixtures with more-brominated compounds remain in use in the U.S. but will be phased out by 2013.

Venier and Hites report on an analysis of flame retardants in blood from 17 pet dogs, all of whom live primarily indoors. They also examined samples of the dry dog food that made up the pets' diet, attempting to determine if food was a major source of PBDE exposure.

The average concentration of PBDEs in blood from the dogs was about 2 nanograms per gram, about five to 10 times higher than the levels found in humans in the few studies of human exposure that have been done in North America.

In dog food samples, the researchers found PBDEs at levels averaging about 1 nanogram per gram. That is much higher than levels found in meat and poultry sold as food for humans, suggesting the PBDEs in dog food may result from processing rather than from the food sources.

A 2007 study by Venier, Hites and several co-authors found concentrations of PBDEs in house cats that were 20 to 100 times higher than levels found in humans. A 2010 article by Venier, Hites and two Clemson University researchers also reported high levels of PBDEs in nesting bald eagles.

Venier said the evidence shows dogs metabolize the compounds more rapidly than cats. A previous study showed that dogs produce an enzyme that breaks down organochlorine pesticides, and a similar mechanism may be at work with brominated compounds.

The current study also detected newer flame retardants that have come onto the market as PBDEs have been removed, including Dechlorane Plus, decabromodiphenylethane, and hexabromocyclododecane. The chemicals are largely unregulated but pose concerns because they are structurally similar to organic pollutants that have been linked to environmental and human health effects.

"The concentrations of these newer flame retardants were relatively low compared to the PBDEs," Venier said, "but the fact that they are new and not regulated suggests their levels are going to increase in the future."

More information: pubs.acs.org/doi/full/10.1021/es1043529

Provided by Indiana University

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