

PCBs are everywhere: Problem exists in industrial city and rural community

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An University of Iowa study has found that people living in urban and rural areas have the same PCB levels in their blood. Researchers are trying to understand why. Credit: Tim Schoon, University of Iowa

(Phys.org) —Since polychlorinated biphenyls (PCBs) are produced through industrial processes or activities, it is assumed that people living in industrial cities will have higher concentrations of these toxic chemicals in their blood than people in rural communities.

Researchers at the University of Iowa say this isn't the case. In a paper

published in the journal *Environmental Science & Technology*, scientists report that mothers and children in East Chicago, Ind., and Columbus Junction, Iowa, had only subtle differences in their PCB blood levels. This analytical paper is the first to report such a comparison between two communities, between mothers and children, and including all 209 PCB compounds.

"This is not good news, and it certainly applies to all of us," says Keri Hornbuckle, professor of civil and environmental engineering in the UI College of Engineering and senior author on the paper. "I thought it would be worse in a very industrial city than in a rural community. Our results really shook us up. We all have PCBs in our blood, and they are coming from somewhere. We don't make them in our bodies."

Study subjects from Indiana live in a highly industrialized community of 32,400 people that is bisected by the Indiana Harbor and Ship Canal on the southern shore of Lake Michigan. In contrast, Columbus Junction is a rural community of 1,899 with no known current or historical PCB sources.

Serum samples were collected from junior high school-aged students and their mothers who were enrolled in the Airborne Exposures to Semivolatile Organic Pollutants (AESOP) study between April 2008 and January 2009. The AESOP study is directed by Peter Thorne, professor of occupational and environmental health in the UI College of Public Health and a project leader in the Iowa Superfund Research Program.

The serum analyzed was gathered from 41 mothers and their 44 children in East Chicago, and from 44 mothers and their 48 children in Columbus Junction. Researchers found a greater variety of PCBs in the blood of mothers and children in East Chicago. Despite the expectation of a large environmental exposure difference, East Chicago and Columbus Junction participants had similar concentrations of PCBs in their blood.

"We're looking for evidence of inhalation exposure. There are clearly big stores of PCBs in the environment," says Rachel Marek, graduate student in civil and environmental engineering and first author on the paper, published in March. "How can we reduce of the overall level of PCBs in the environment and therefore reduce exposure to PCBs? We need to be able to identify those sources and clean them up."

PCBs can enter the human body by eating or drinking contaminated food, through the air we breathe, or by skin contact. Hornbuckle, however, doesn't know why participants in East Chicago and Columbus Junction have similar PCB concentrations in their blood.

"What is probably going on is that these two communities eat similar things, because their demographics are similar, and they breathe similar air with respect to the total amount of PCBs in the air," says Hornbuckle, a project leader in the Iowa Superfund Research Program who analyzes PCBs in blood and air.

Ninety-two individual PCB compounds were detected in the samples. Researchers report the detection of PCB 11 and PCB 83, which, to their knowledge, have not been found previously in human blood.

The researchers detected the neurotoxic PCB 11 in more than 60 percent of participants—more East Chicago mothers than Columbus Junction mothers. This finding helps verify that the environment is a significant source of PCB exposure. In particular, recent studies found that PCB 11 has been an inadvertent byproduct of paint production. The compound has been found in the air and in a wide variety of organic paint pigments from multiple manufacturers.

"PCBs are everywhere and they are really high in building materials, especially for homes that were built between 1950 and 1970. Both communities have similar housing materials," Hornbuckle says. "We also

found that PCBs are in modern household paint, so it doesn't matter if you live in East Chicago or Columbus Junction."

According to the Environmental Protection Agency, PCBs have been shown to cause cancer, along with a variety of other adverse effects on the body's immune, reproductive, nervous, and endocrine systems. For more information, visit

<http://www.epa.gov/osw/hazard/tsd/pcbs/pubs/effects.htm>.

"These chemicals are known to be toxic to humans, and they are known to be toxic for developing humans, so we want them out," Hornbuckle says. "We don't want them in our paint. We don't want them in our indoor air. That's why there are fish consumption advisories on all the Great Lakes, because we don't want them in our food."

Provided by University of Iowa

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