Emerging Health Threats Forum
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# Chemicals linked with liver-disease markers

**Organic pollutants and metals may have a role in disease development, study suggests**

Image credit: SXC/ Thoursie

People exposed to ubiquitous pollutants at levels typically found in the environment could be at higher risk for developing liver disease, according to research published this month in *Environmental Health Perspectives*.

Analysis of data representative of the US population revealed that the chances of having elevated blood concentrations of alanine aminotransferase (ALT), a clinical marker indicating non-alcoholic fatty liver disease (NAFLD), increased with exposure to higher levels of heavy metals and polychlorinated biphenyls (PCBs). Analysis of individual chemicals, including lead and mercury, showed the same trend.

"PCBs, lead, and mercury are present in all US adults," write Matt Cave, of the University of Louisville, USA, and colleagues. "These common pollutants are associated with significant dose-dependent increased odds ratios for ALT elevations... not explained by viral hepatitis, hemochromatosis, or alcohol abuse."

Both NAFLD and nonalcoholic steatohepatitis, the more severe form of the disease, are becoming more common in the USA. In this study, about 10% of the population sampled had elevated ALT in their blood, double the prevalence estimated about a decade ago. This proportion corresponds to nearly two million people living in the country.

The study is the first to assess the risk of liver disease from low-level exposure to these environmental pollutants, according to the authors. Exposure to chemicals at higher levels typical of certain industrial jobs is a known risk factor for NAFLD and other types of liver disease.

Cave and colleagues found an association after analysing data available from the US National Health and Nutrition Examination Survey 2003–2004. They grouped just over 4500 adults without liver disease of known causes into four categories of exposure to 196 pollutants, which were divided into 17 chemical classes.

After adjusting for other factors that can affect the statistical relationship, they estimated that the odds of having elevated markers of liver disease increased significantly with higher levels of three pollutant classes: dioxins, furans and coplanar PCBs, non-dioxin-like PCBs, and lead, mercury, and cadmium.

With a similar analysis the authors also estimated the risk of exposure to 45 individual pollutants that were detected in at least 60% of the participants. "Blood lead (99.6%) and total mercury (92.5%)... were positively associated with ALT elevation," they write. "Twenty-five dioxin-like PCBs were present with detection rates ranging from 65.5%–100%, and eleven of these were positively associated with ALT elevation with significant trends."

Cave and colleagues call for future research to probe the link, pointing to limitations of their study including the uncertain role of ALT in liver disease, and being unable to determine whether the exposure preceded a rise in concentrations of the clinical marker. That these chemicals might play a role in the development of some cases of NAFLD is biologically plausible, they point out.

Levels of many pollutants are decreasing but some are still being produced or persist in the environment, finding their way into the human body. The authors note that "even though PCBs were banned in 1977, 100% of subjects in this study had detectable PCB levels".

**Reference and link**

1. Cave M, Appana S, Patel M, Falkner KC, McClain CJ, Brock G. Polychlorinated biphenyls, lead, and mercury are associated with liver disease in American adults: NHANES 2003–2004. *Environ Health Perspect* 2010. **doi**: 10.1289/ehp.1002720

**US National Institutes of Health information** about nonalcoholic steatohepatitis

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