

## Persistent pollutant may promote obesity

December 1 2008

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Tributyltin, a ubiquitous pollutant that has a potent effect on gene activity, could be promoting obesity, according to an article in the December issue of *BioScience*. The chemical is used in antifouling paints for boats, as a wood and textile preservative, and as a pesticide on high-value food crops, among many other applications.

Tributyltin affects sensitive receptors in the cells of animals, from water fleas to humans, at very low concentrations—a thousand times lower than pollutants that are known to interfere with sexual development of wildlife species. Tributyltin and its relatives are highly toxic to mollusks, causing female snails to develop male sexual characteristics, and it bioaccumulates in fish and shellfish.

The harmful effects of the chemical on the liver and the nervous and immune systems in mammals are well known, but its powerful effects on the cellular components known as retinoid X receptors (RXRs) in a range of species are a recent discovery. When activated, RXRs can migrate into the nuclei of cells and switch on genes that cause the growth of fat storage cells and regulate whole body metabolism; compounds that affect a related receptor often associated with RXRs are now used to treat diabetes. RXRs are normally activated by signaling molecules found throughout the body.

The *BioScience* article, by Taisen Iguchi and Yoshinao Katsu, of the Graduate University for Advanced Studies in Japan, describes how RXRs and related receptors are also strongly activated by tributyltin and similar chemicals. Tributyltin impairs reproduction in water fleas

through its effects on a receptor similar to the RXR. In addition, tributyltin causes the growth of excess fatty tissue in newborn mice exposed to it in utero. The effects of tributyltin on RXR-like nuclear receptors might therefore be widespread throughout the animal kingdom.

The rise in obesity in humans over the past 40 years parallels the increased use of industrial chemicals over the same period. Iguchi and Katsu maintain that it is "plausible and provocative" to associate the obesity epidemic to chemical triggers present in the modern environment. Several other ubiquitous pollutants with strong biological effects, including environmental estrogens such as bisphenol A and nonylphenol, have been shown to stimulate the growth of fat storage cells in mice. The role that tributyltin and similar persistent pollutants may play in the obesity epidemic is now under scrutiny.

Source: American Institute of Biological Sciences

Citation: Persistent pollutant may promote obesity (2008, December 1) retrieved 23 April 2024 from <https://medicalxpress.com/news/2008-12-persistent-pollutant-obesity.html>

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