

Emerging Health Threats Forum

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Exposure to fluorochemicals higher by air

Inhaling polluted air linked with significant exposure near a chemical plant in Japan



Settsu, Osaka.

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Most people are exposed to perfluoroalkyl chemicals through water and food, but air may be a more significant route for communities near facilities that produce the hazardous chemicals, suggests research from Japan published this month in *Environmental Science and Technology*.

Tamon Niisoe and colleagues found that for perfluorooctanoic acid (PFOA) and perfluorooctanoate (PFO), airborne levels were the main source of exposure for people living within 4.5 km of a chemical plant in the city of Settsu, in Osaka district — but not in two other urban areas without the facility.

“The atmospheric contributions [to serum levels of PFO(A)] are dominant in Settsu... but negligible in Kyoto and Nishinomiya,” they write. “In 2008, that contribution was about 70%.”

The study is the first to evaluate exposure through inhalation for this group of chemicals, co-author Akio Koizumi told EHTF News in an email.

PFOA and other chemicals in this group persist in the environment and are used extensively in industry and consumer products such as non-stick pans and paints. This has raised concerns over potential health risks associated with them. Recent research has linked blood concentrations of these chemicals with health problems ranging from **attention deficit disorder** to **cholesterol levels**, deficits in foetal growth and **fertility**.

Niisoe and colleagues focused their study on Keihanshin, a part of Settsu city where there was prior evidence of PFO(A) contamination from a fluoropolymer production plant. They estimated levels of these chemicals and their effect on human exposure in three urban areas using data on atmospheric concentrations from 1983 to 2008, combined with modelled concentrations in the blood of local residents.

To estimate any contribution to exposure through the diet, the authors also collected information about the food and water local residents consumed in a typical day. They found that for most of the 25-year period covered by their study, and particularly until 2005, residents of Settsu took up more PFO(A) through air than they did through their diet.

“The model results reveal that the high PFO(A) level of 31.4 ng mL⁻¹ observed in Settsu in 2004 is attributed mainly to the atmospheric component,” write Niisoe *et al*.

By contrast, people living in other parts of Osaka, as well as Kyoto and Nishinomiya, took up insignificant amounts of the chemicals through inhalation, according to the model.

For both air and blood levels of PFO(A), the model predictions agreed with actual measurements — confirming that modelling results were a good reflection of exposure conditions in the study areas.

The authors suggest that exposure through inhalation is significant only in certain cases, and note that the area they studied is small, with a “strong point source” of PFO(A). They add that future research into this route of exposure should include more detailed modelling of airborne levels and the distribution of these chemicals in the body.

Reference and link

1. Niisoe T, Harada KH, Ishikawa H, Koizumi A. Long-term simulation of human exposure to atmospheric perfluorooctanoic acid (PFOA) and perfluorooctanoate (PFO) in the Osaka urban area, Japan. *Environ Sci Technol* 2010. doi: [10.1021/es101948b](https://doi.org/10.1021/es101948b)

US Environmental Protection Agency information on perfluorooctanoic acid (PFOA) and fluorinated telomers

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