

Opinion 050/2024

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PFAS: Not all “forever chemicals” are persisting in the body

Per- and polyfluoroalkyl substances (PFAS) are long-lasting fluorine-containing industrial chemicals, which is why they are often referred to as “forever chemicals”. PFAS are distributed worldwide in the environment and are absorbed in small quantities through food and drinking water. Four long-chain compounds in particular can be detected in the organism, which are known to have very long residence times in humans. However, this is not the case for all substances, as a comparative study of 15 PFAS compounds shows. The study by a team of researchers from the German Federal Institute for Risk Assessment (BfR) is the first of its kind

(<https://www.sciencedirect.com/science/article/pii/S0160412024006330?via%3Dihub>).

The decisive factor is the length of the molecule's carbon chain: short-chain PFAS are excreted more quickly. They only have a half-life of days to weeks, whereas long-chain PFAS have a half-life of up to several years. The half-life indicates the time after which half of a substance is broken down or has left the body.

When it comes to the question of how quickly PFAS are excreted by the organism, animal experiments are only of limited value. A scientist from the BfR therefore carried out a self-experiment. He ingested a low-dose mixture of 15 PFAS chemicals. The special thing about the compounds was that they were labelled with (non-radioactive) carbon-13 (¹³ C). This carbon isotope made it possible to measure the ingested PFAS compounds independently of those already in the body.

In order to obtain a precise picture of the behaviour of PFAS in the organism, the concentrations of the substances in the blood and their excretion in faeces and urine were measured. This made it possible for the first time to directly compare the behaviour of 15 PFAS in the organism.

How are PFAS excreted? The study also provides interesting results in this regard. Short-chain PFAS leave the organism predominantly in the urine. Long-chain compounds, on the other hand, can be retrieved from the initially formed urine back into the body within the

kidneys by certain transport molecules (which was already known before). Their excretion via the urine is therefore very low, which explains their long retention time in the body.

Precise information on the half-life and distribution of PFAS compounds in the organism is of great importance. They are an important basis for estimating the uptake of the substances and thus enabling a health risk assessment.

Further information on PFAS can be found on the BfR website:

<https://www.bfr.bund.de/cm/349/self-experiment-body-can-absorb-fluorine-containing-chemical-pfoa-through-the-skin.pdf>

<https://www.bfr.bund.de/cm/349/residues-of-plant-protection-products-with-pfas-active-ingredients-in-fruit-and-vegetables-is-there-a-health-risk.pdf>

Questions and answers about PFAS:

<https://www.bfr.bund.de/cm/349/here-to-stay-per-and-polyfluoroalkyl-substances-pfas-in-food-and-in-the-environment.pdf>

About the BfR

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