Industrial chemical PFBA does not accumulate excessively in lungs and kidneys

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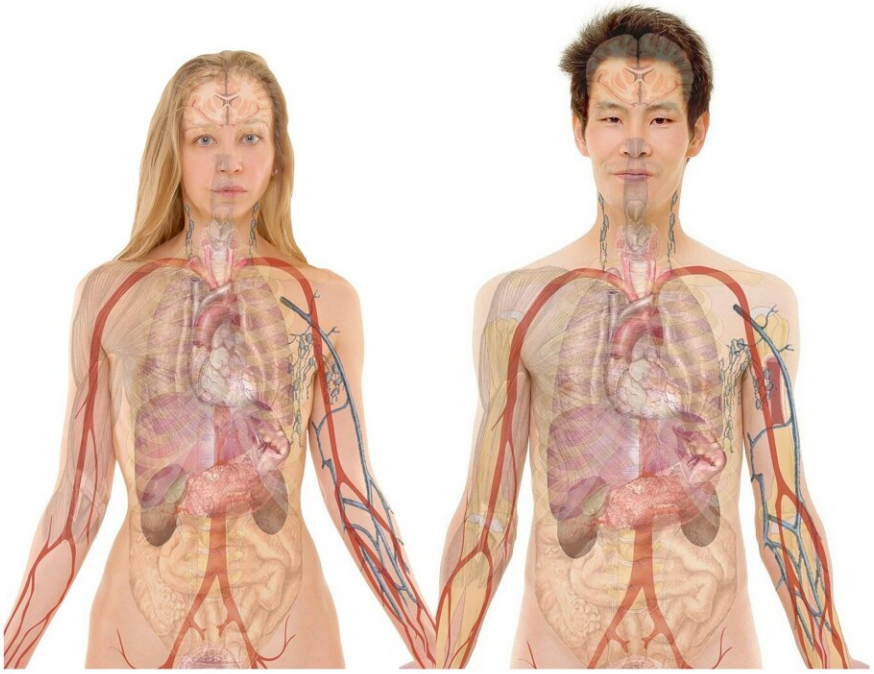

http://commons.wikimedia.org/wiki/File:Female_with_organs.png
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A 2013 study by Pérez et al. reported a very high accumulation of the industrial chemical perfluorobutanoic acid (PFBA) in human lungs and kidneys. The German Federal Institute for Risk Assessment (BfR)

checked these results using a more precise quantification method. The result: Only one sample contained a quantifiable PFBA value of 0.17 nanograms (ng) per gram (g) of lung tissue. The BfR comes to the conclusion that PFBA is very unlikely to accumulate strongly in human lung and kidney tissue. This is supported by the short half-life of PFBA in the blood, which was determined in another study.

The BfR study was published in the *International Journal of Hygiene and Environmental Health*.

Perfluorobutanoic acid—PFBA for short—belongs to the complex group of per- and polyfluoroalkyl substances (PFAS). PFAS are industrial chemicals that are widely used in industrial processes and are found in numerous consumer products such as paper, textiles, cooking pans and cosmetics. While some long-chain PFAS accumulate in the human body due to their long half-lives, short-chain PFAS compounds such as PFBA have a relatively short half-life in the blood.

Correspondingly, blood concentrations of less than 0.1 nanograms (ng) per milliliter (ml) were found in several studies. Surprisingly, however, a 2013 study by Pérez et al. reported very high median concentrations of PFBA of 807 ng/g and 263 ng/g (≈ng/ml) in human lung and kidney tissue. To verify these results, the BfR examined the PFBA content of seven lung and nine kidney samples from tumor operations between 2011 and 2014. The concentrations were predominantly below the quantification limit; it was only possible to quantify a PFBA level of 0.17 ng/g of lung tissue in just one sample.

The great challenge in the mass spectrometric analysis of PFBA is the presence of only one fragmentation which can lead to incorrect measurements. Therefore, the current BfR study employed a high-resolution mass spectrometer that enables more precise quantification by using the exact mass. On the basis of the measurement results, the BfR

has concluded that PFBA is unlikely to accumulate excessively in human lung and kidney tissue. The BfR recommends further studies to confirm these results.

A 2020 study by Grandjean et al. reported a connection between higher PFBA blood plasma concentrations and more severe cases of COVID-19. However, measured PFBA concentrations were very low. The hypothesis that high PFBA concentrations in the lungs could be the cause of the elevated severity in COVID-19 cases was put forward on the basis of the results of Pérez et al. In view of the results of the currently available BfR study, such a connection is considered less plausible.

The European Food Safety Authority (EFSA) reassessed the health risks posed by PFAS in food in September 2020. In this opinion, EFSA derived a tolerable weekly intake (TWI) of 4.4 nanograms (ng) per kilogram (kg) bodyweight per week. This TWI applies for the first time to the sum of four PFAS: Perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA) and perfluorohexanesulfonic acid (PFHxS). It is based on an epidemiological study in which children who had higher blood serum concentrations of certain PFAS were observed to have a lower level of antibody formation after usual vaccinations.

More information: Klaus Abraham et al, Perfluorobutanoic acid (PFBA): No high-level accumulation in human lung and kidney tissue, *International Journal of Hygiene and Environmental Health* (2021). DOI: 10.1016/j.ijheh.2021.113830

Francisca Pérez et al, Accumulation of perfluoroalkyl substances in human tissues, *Environment International* (2013). DOI: 10.1016/j.envint.2013.06.004

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