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Basic Information about Per- and Polyfluoroalkyl Substances (PFASs)

Includes Information on Perfluorooctanoic Acid (PFOA), Perfluorooctyl Sulfonate (PFOS), and All Other PFASs, and on PFCs

Basic Information

How People are Exposed

Health Effects

Related Information from Other Sources

Health Effects

Why can exposure to these chemicals be a potential health concern?

Exposures to PFAS chemicals are known to have a number of adverse effects in laboratory animals and humans.

If humans or other animals ingest PFASs (by eating or drinking food or water than contain PFASs), the PFASs are readily absorbed, and can accumulate in the body. PFASs stay in the human body for long periods of time. As a result, as people get exposed to PFASs from different sources over time, the level of PFASs in their bodies may increase to the point where they suffer from adverse health effects.

Studies indicate that PFOA and PFOS can cause reproductive and developmental, liver and kidney, and immunological effects in laboratory animals. Both chemicals have caused tumors in animal studies. The most consistent findings from human epidemiology studies are increased cholesterol levels among exposed populations, with more limited findings related to:

- low infant birth weights,
- effects on the immune system,

- cancer (for PFOA), and
- thyroid hormone disruption (for PFOS).

Is cancer a concern?

The risk for cancer is characterized as *suggestive* for both PFOA and PFOS based on the animal data. Human epidemiology studies of one community identified an increased risk for kidney and testicular cancer in people who were highly exposed to PFOA. Chronic exposure to PFOA has been shown to lead to the development of testicular, pancreatic, and liver cancers in animals. Chronic exposure to PFOS has been shown to lead to liver tumors in animals.

What non-cancer health concerns are associated with PFASs?

Peer-reviewed studies of the effects of PFASs on laboratory animals (monkeys, rats and mice) and epidemiological studies of human populations that have been exposed to PFASs indicate that exposure to PFOA and PFOS over certain levels may result in adverse health effects, including:

- changes in cholesterol,
- developmental effects to fetuses during pregnancy or to breastfed infants (e.g., low birth weight),
- liver effects (e.g., tissue damage),
- immune effects (e.g., depressed antibody production in response to vaccination), and
- thyroid effects.

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