

## HEALTH EFFECTS

### How do PFCs behave in our body?

Because of their widespread use, most people in the United States have some PFC/PFAS in their body. PFC/PFAS are not stored in body fat. Once the PFC/PFAS are in a person's body, it takes about two to four years before those PFC/PFAS levels go down by half, even if no more is taken in.

More information is available from ATSDR and the U.S. EPA.

Reference ATSDR:

<http://www.atsdr.cdc.gov/HAC/pha/decatour/Blood%20PFC%20Testing%20and%20Health%20Information.pdf>

### Why are PFC/PFAS of possible concern?

Since their introduction in the late 1940s, PFC/PFAS have entered and spread throughout the environment. Many PFC/PFAS, including PFOS and PFOA, breakdown slowly in the environment and can travel long distances over time. PFOS, PFOA and other PFC/PFAS have been found in animals in the Arctic and Antarctic, far removed from known sources of the chemicals. Because of their frequent use and presence in the environment, most people in the United States and in the industrialized world have measurable amounts of PFC/PFAS in their blood (at levels measured in microgram per liter (ug/l)). In addition, PFOS, PFOA and other PFC/PFAS can build up and remain in the human body. Once in the body, it can take a long time for them to leave. As a result of this bio-persistence and widespread detection, many people are concerned about the potential impacts of PFC/PFAS on human health.

Research is currently ongoing to evaluate the potential health impacts of PFOS, PFOA, and other PFC/PFAS. In many animal studies, exposure to PFC/PFAS has been shown to cause changes in the function of the liver, thyroid, pancreas, and hormone levels. The impacts of PFC/PFAS in humans are less well understood and considered uncertain, though studies of exposed populations have shown possible links between PFC/PFAS and some harmful health effects.

### What is known about the possible health effects of PFC/PFAS?

Scientists are not sure about the possible health effects of human exposure to PFC/PFAS. PFOS, PFOA, PFHxS and PFNA have been more widely studied than other PFC/PFAS. For the most part, studies have found that animals exposed to PFC/PFAS have shown changes in the function of the liver, thyroid, pancreas, and hormone levels. However, scientists are not sure how animal data applies to human exposure, because PFC/PFAS behave differently in humans than they do in animals and may be harmful in different ways.

PFC/PFAS build up and remain in the human body and the amount reduces very slowly over time. So scientists and doctors are concerned about their effects on human health. While the evidence is inconclusive, according to the Agency for Toxic Substances and Disease Registry (ATSDR) some studies in humans have shown that certain PFC/PFAS may be associated with developmental delays in the fetus and child, including possible changes in growth, learning, and behavior decreased fertility and changes to the body's natural hormones, increased cholesterol, changes to the immune system, increased uric acid levels, changes in liver enzymes, and prostate, kidney, and testicular cancer. More research is needed to confirm or rule out possible links between health outcomes of potential concern and exposure to PFC/PFAS.

Additional reference is available on: [http://www.atsdr.cdc.gov/pfc/health\\_effects\\_pfcs.html](http://www.atsdr.cdc.gov/pfc/health_effects_pfcs.html) and <https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>.

### **How likely are PFC/PFAS to cause cancer?**

Researchers and regulators continue to evaluate the likelihood of PFC/PFAS causing cancer. Neither the U.S. Environmental Protection Agency (EPA) nor the National Toxicology Program has made a final statement about the ability of any PFC/PFAS to cause cancer. However, both agencies are currently evaluating the cancer potential of PFOA. EPA is evaluating the cancer potential of PFOS. ATSDR and EPA have identified possible association of certain PFC/PFAS with prostate, kidney, and testicular cancer.

Additional reference is available on: [http://www.atsdr.cdc.gov/pfc/health\\_effects\\_pfcs.html](http://www.atsdr.cdc.gov/pfc/health_effects_pfcs.html) and <https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>.

### **What do we know about the effect of PFC/PFAS mixtures?**

At this time, there is not enough information to evaluate the health effects of exposures to mixtures of PFC/PFAS. We do not currently know how mixtures of PFC/PFAS may interact with the body, and few studies have compared the health effects of different mixtures of PFC/PFAS.

### **What are the potential health effects of PFC/PFAS exposure in children?**

Over the past few years, researchers have begun to examine the possible effects of PFC/PFAS exposures in children. Studies have shown that newborns can be exposed to PFC/PFAS through breast milk. Young children may be exposed to PFC/PFAS through food and water, similarly to adults. In addition, young children have a higher risk of exposure to PFC/PFAS through carpet cleaners and similar products, due to time spent lying and crawling on floors in their early years. As a result, most children in industrialized nations have at least some level of PFC/PFAS in their blood.

Researchers are studying whether childhood PFC/PFAS exposures may be linked to effects on the immune system, asthma, and behavioral effects. However, as with studies in adults, the evidence linking PFC/PFAS to health effects in children is inconclusive. Researchers acknowledge that the findings of many of the studies linking PFC/PFAS and health effects in children are limited and that more studies are needed. As a result, it is too soon to state whether or not there are special concerns for children.

### **If my child is sick, who will take responsibility? How do I get my child help?**

For questions about health care, you should consult your health care provider.

### **I drank the water, will I get sick?**

ATSDR says they cannot predict whether or not you will get sick. Whether someone will or will not develop health problems from exposure to any contaminant depends on several factors, including

- How much exposure you received
- How long you were exposed
- When you were exposed (e.g., as a fetus, a child, or an adult)
- Your genes
- Any other exposures to environmental or occupational hazards you have received during your lifetime
- Your lifestyle—for example, your diet, your tobacco or alcohol use, and your physical activity

- Illness you may have had from other causes, and medications you have taken during your lifetime.

#### **References on PFC/PFAS Health Effects**

- ATSDR: [http://www.atsdr.cdc.gov/pfc/health\\_effects\\_pfc.html](http://www.atsdr.cdc.gov/pfc/health_effects_pfc.html)
- EPA: <https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>