



Drinking Water Facts: Perfluorinated Chemicals(PFCs)



Key Points

- Perfluorinated chemicals (PFCs) are a group of chemicals with many commercial and industrial uses.
- PFCs have been associated with a variety of adverse health effects in humans but it has not been established that PFCs directly cause these effects.
- PFCs are not regulated in drinking water but their occurrence in drinking water is being studied to determine if future regulation is needed.

What are perfluorinated chemicals (PFCs)?

Products made from man-made perfluorinated chemicals (PFCs) can repel water and oil, and are resistant to heat and chemical reactions. They therefore have important industrial and commercial uses. PFCs are used in production of waterproof and stain proof fabric, in some stick-free cookware, in “leak-proof” coatings on packaging materials, in fire-fighting foams, and in other uses.

These compounds are not broken down in the body. Four types of PFCs have been found in the blood (serum) of greater than 98% of the United States population. These four PFCs stay in the body for many years.

- **PFOS** – perfluorooctane sulfonate
- **PFOA** – perfluorooctanoic acid
- **PFNA** – perfluorononanoic acid
- **PFHxS** – perfluorohexane sulfonate

PFCs can enter drinking water through industrial release to water or air, discharges from sewage treatment plants, land application of contaminated sludge, and use of fire-fighting foam.

Where can PFCs be found?

Because PFCs do not break down, they remain in the environment for a long time. They have been found in water, air, soil, house dust, wildlife, and polar ice caps. Some PFCs, including PFOS and PFNA, accumulate in fish living in contaminated waters.

Some PFCs can dissolve in water. Therefore drinking water may be a major source of exposure to PFCs for people living in communities with contaminated drinking water.

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Other sources of PFC exposure include food, food packaging, consumer products, house dust, indoor and outdoor air, and at workplaces where PFCs are made or used.

How can I be exposed to PFCs?

Exposure to PFCs in drinking water is primarily from ingestion. Exposure to PFCs through other household uses of water such as showering, bathing, laundry and dishwashing is not significant.

Are PFCs harmful to my health?

Much of the information on the health effects of PFCs in humans and animals is recent and new studies are continually becoming available. More data about possible health effects are available for PFOA and PFOS than for PFNA, PFHxS, and other PFCs.

In experimental animals, PFCs cause developmental, immune, neurobehavioral, liver, endocrine, and metabolic toxicity, generally at levels well above human exposures. Studies of the general population, communities with drinking water exposures, and exposed workers suggest that PFCs increase the risk of a number of health effects. The most consistent human health effect findings for PFOA – the most well-studied of the PFCs – are increases in cholesterol and uric acid levels.

PFOA and PFOS caused tumors in rodent studies. In a community exposed to PFOA through drinking water, individuals with higher PFOA blood concentrations had increased risk of kidney and testicular cancer.

How can PFCs affect children?

Infants and children consume more water per body weight than older individuals, so their exposures may be higher than adults in communities with PFCs in drinking water.

In experimental animals, PFCs cause developmental effects. In humans, exposure to PFCs before birth or in early childhood may result in decreased birth weight, decreased immune responses, and hormonal effects later in life. More research is needed to understand the role of PFCs in developmental effects.

PFCs are present in breast milk. However, since the benefits of breast-feeding are well-established, infants should continue to be breast-fed. When PFCs are elevated in a drinking water supply, it is advisable to use bottled water to prepare infant formula for bottle-fed babies. Beverages for infants, such as juice made from concentrate, should also be prepared with bottled water.

What levels of PFCs found in drinking water are harmful to my health?

PFCs are **not** regulated drinking water contaminants. However, increased attention to these compounds in drinking water has resulted in federal and state guidance.

USEPA developed Provisional Health Advisory levels protective for **short-term** exposures:

- **PFOA** – 400 ppt (ng/L)
- **PFOS** – 200 ppt (ng/L)

The New Jersey Department of Environmental Protection (NJ DEP) set a health-based drinking water concentration protective of **chronic (lifetime)** exposures:

- **PFOA** - 40 ppt (ng/L)

What is the government doing about PFCs in drinking water?

Contaminant Candidate List 3 (CCL3): The USEPA has added both PFOA and PFOS to the Contaminant Candidate List 3 (CCL3). This is a list of contaminants which are currently not regulated but are known or expected to occur in public water systems, and which may require future regulation.

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Unregulated Contaminant Monitoring (UCM) program: The USEPA is currently requiring large public water systems to test for PFOA, PFOS, PFNA, PFHxS, and two other PFCs (PFHpA and PFBS) as part of the Unregulated Contaminant Monitoring (UCM) program. This information on occurrence will assist in determining whether future regulation is needed.

EPA 2010/2015 Stewardship Program: In cooperation with USEPA, major manufacturers have agreed to phase out the production of PFOS, PFOA, PFNA and certain other PFCs with the goal of elimination of their use by 2015.

Is there a medical test to see if I have been exposed to PFCs?

PFCs can be measured in your blood serum, but this is not a routine test. Having PFCs in your blood does not mean that you will experience adverse health effects. Since 2003, a national biomonitoring program performed by the Centers for Disease Control and Prevention (CDC) has been measuring levels of 12 types of PFCs in a representative sample of the U.S. population. This information establishes background levels of PFC concentrations in blood and allows public health agencies to monitor levels over time.

What can I do to remove PFCs from my drinking water?

PFCs are **not** removed from water by boiling.

Available home water treatment devices are not designed or certified for removal of PFCs. Granular activated carbon filters or reverse osmosis water treatment devices may reduce the level of PFCs in drinking water. However, neither the effectiveness of these units for PFC removal nor the requirements for proper maintenance have been established.

Families concerned about PFCs in their drinking water may choose to drink and cook with bottled water.

More information and resources about PFCs can be found at:

<http://nj.gov/health/eohs/index.shtml>