

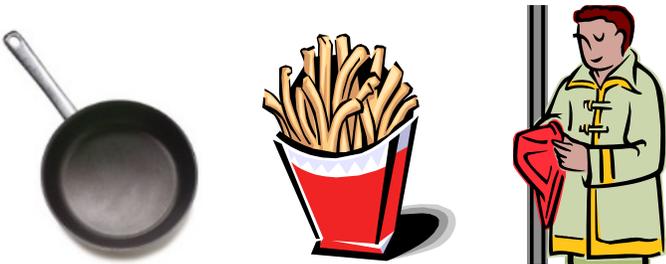
Perfluorochemicals (PFCs)

What are perfluorochemicals?

Perfluorochemicals (PFCs) are manmade chemicals that resist heat, water, oil, grease and stains. PFCs are found in common household items such as nonstick pots and pans, stain-resistant carpets and fabrics, stain-resistant paints, flame-resistant clothing, as a part of firefighting foam and are also found in other common items such as wire coating and fast-food cartons/containers and wrappers.

Some of the common chemicals in the PFC group are:

- Perfluorooctane sulfonate (PFOS)
- Perfluorooctanoic acid (PFOA also called C-8 or APFO)
- Perfluorohexane (PFHxS or sulfonic acid)
- Perfluorononanoic acid (PFNA)



How do PFCs get in the environment?

There are studies that show PFCs easily enter groundwater (underground drinking water) and can move long distances. Some experts suggest PFCs are released into the air, travel long distances and are washed out in the rain and deposited on soils or in surface waters (lakes, rivers and ocean), eventually making their way into the groundwater.

A Michigan State University study found PFCs in the blood of 400 different mammals, fish

and birds on all seven continents. Some of the highest concentrations have been found in bald eagles and mink in the Midwestern United States.

The scientific community does not yet fully understand all of the sources (where the chemical came from) and pathways (or how the chemicals move from one place to another) of PFCs in the environment.

Visit the U.S. EPA website to learn about their actions taken to investigate the health effects of PFC chemicals and their effort to reduce their emissions and use in products.

Where do you find PFCs in the body?

Studies show that nearly all people, regardless of age, have some PFCs in their blood. The way PFCs get into human blood is not known at this time. People could be exposed through food, water, by using commercial products that contain these chemicals or from the environment where the chemicals have been spilled or released.

Because of their chemical structures, PFOS and PFOA (C8) can stay in the human body for years. Because these chemicals stay in the body so long, it is very difficult to determine when the exposure occurred.

Small repeated doses to PFCs can build-up in the body over time to higher levels. So higher levels of the chemicals may be found in the human body than are found in the environment.

Do PFCs harm human health?

Because PFCs can build-up in the body, the U.S. EPA classifies PFCs as "likely carcinogens" (causing cancer substance).

Several studies have shown that C-8 and other PFC compounds can interfere with the body's ability to breakdown some fats and oils. Epidemiological studies (i.e., population based human studies) suggest that exposure to PFOA (C8) may be associated with increased cholesterol levels, increased risk of diabetes and an increased risk of heart disease. Human exposure to C8 has also been associated with effects of the reproductive and immune systems.

Note that associations between an exposure and a health outcome (or disease) do not mean that the exposure caused the adverse health effect. Epidemiological studies cannot account for all factors that play a role in the association. And although the scientific literature of evaluating the effects of PFCs is growing, there is still a lot that is unknown.

In November 2012, the C8 Science Panel completed its primary task, evaluating whether or not there is a "Probable Link" between exposure to C8 and a range of diseases among people living in the Mid-Ohio Valley.

The Science Panel reports can be found online at:
http://www.c8sciencepanel.org/study_results.html

An ODH quick-glance summary of the Science Panel Probable Link document can be found at:
www.odh.ohio.gov/odhprograms/eh/hlth_as/FactSheets.aspx

How can you avoid exposure to PFCs?

It is extremely difficult to completely avoid exposure to products that contain PFCs. However, you **may** be able to reduce your exposure by reducing the use of products that use PFC chemicals in their manufacturing process and/or by reducing your consumption of water known to be contaminated with a PFC chemical. Water filters containing activated carbon or reverse osmosis membranes have been shown to be effective at removing PFCs from

contaminated water supplies.

Important Note: The Ohio Department of Health (ODH) is not suggesting the public stop using products that use or contain PFCs. There is currently no solid scientific data to make those recommendations at this time.

Note: Not all soil and stain resistance treatments are fluoro-based.



Where can you get more information?

Ohio Department of Health
Bureau of Environmental Health and Radiation Protection
Radiological Health and Safety Section
246 N. High Street
Columbus, Ohio 43215
Phone: (614) 644-2727

References:

Perfluorochemicals and Health, Environmental Health Information, Minnesota Department of Health, 2005
<http://www.health.state.mn.us/divs/eh/hazardous/topics/pfcshealth.html>

Perfluorooctanoic Acid (PFOA), U.S. Environmental Protection Agency (EPA), 2005
<http://www.epa.gov/oppt/pfoa/>

"The long reach of perfluorochemicals," Minnesota Public Radio, 2005
<http://minnesota.publicradio.org/features/>
(type "The long reach of perfluorochemicals" in the search menu)

C8 Science Panel Website. *C8 Science Panel Website*. N.p., n.d. Web. 18 Apr. 2013
www.c8sciencepanel.org/study_results.html

Erikson, K.T., *et al.*, "Association between Plasma PFOA and PFOS Levels and Total Cholesterol in a Middle-Aged Danish Population," *PLoS ONE* 8(2) (doi: 10.1371/journal.pone.0056969)

Shankar, A. & Ducatman, A., "Perfluoroalkyl Chemicals and Chronic Kidney Disease in US Adults," *Am. J. Epidemiol.* (doi: 10.1093/aje/kwr171) (Aug. 26, 2011)

Shankar, A., Xiao, J., & Ducatman, A., "Perfluorooctanoic Acid and Cardiovascular Disease," *Arch. Internal Med.* (doi: 10.1001/archinternmed.2012.3393)