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Perfluorooctanoic Acid (PFOA), Teflon, and Related Chemicals

What are Teflon and PFOA? Where are they found?

Teflon[®] is a brand name used for a group of man-made chemicals, the most common of which is polytetrafluoroethylene (PTFE). PTFE has been in commercial use since the 1940s. It has a wide variety of uses because it is extremely stable (it doesn't react with other chemicals) and can provide an almost frictionless surface. Most people are familiar with it as a non-stick coating surface for pans and other cookware. It is also used in many other products, such as fabric protectors.

Perfluorooctanoic acid (PFOA), also known as C8, is another man-made chemical. It has been used in the process of making Teflon and similar chemicals (known as fluorotelomers), although it is burned off during the process and is not present in significant amounts in the final products.

PFOA has the potential to be a health concern because it can stay in the environment and in the human body for long periods of time. Studies have found that it is present worldwide at very low levels in just about everyone's blood. Higher blood levels have been found in community residents where local water supplies have been contaminated by PFOA. People exposed to PFOA in the workplace can have levels many times higher.

PFOA and some similar compounds can be found at low levels in some foods, drinking water, and in household dust. Although PFOA levels in drinking water are usually low, they can be higher in certain areas, such as near chemical plants that use PFOA.

People can also be exposed to PFOA from ski wax or from fabrics and carpeting that have been treated to be stain resistant. Non-stick cookware is not a significant source of PFOA exposure.

Do Teflon and PFOA cause cancer?

Whether Teflon and other non-stick coatings themselves cause cancer has not been the main focus of concerns. The main concerns have been with PFOA, as well as with similar polyfluoroalkyl substances (PFAS), such as perfluorooctane sulfonate (PFOS), perfluorobutane sulfonate (PFBS), and “GenX” chemicals.

Many studies have looked at the possibility of PFOA causing cancer. Researchers use 2 main types of studies to try to figure out if such a substance might cause cancer.

Studies in the lab

In studies done in the lab, animals are exposed to a substance (often in very large doses) to see if it causes tumors or other health problems. Researchers might also expose human cells in a lab dish to the substance to see if it causes the types of changes that are seen in cancer cells.

Studies in lab animals have found exposure to PFOA increases the risk of certain tumors of the liver, testicles, mammary glands (breasts), and pancreas. In general, well-conducted studies in animals do a good job of predicting which exposures might cause cancer in people, too.

Studies in humans

Some types of studies look at cancer rates in different groups of people. These studies might compare the cancer rate in a group exposed to a substance to the cancer rate in a group not exposed to it, or compare it to the cancer rate in the general population. But sometimes it can be hard to know what the results of these types of studies mean, because many other factors might affect the results.

Studies have looked at cancer rates in people living near or working in PFOA-related chemical plants. Some of these studies have suggested an increased risk of [testicular cancer](#)¹ with increased PFOA exposure. Studies have also suggested possible links to [kidney cancer](#)² and [thyroid cancer](#)³, but the increases in risk have been small and could have been due to chance.

Other studies have suggested possible links to other cancers, including [prostate](#)⁴, [bladder](#)⁵, and [ovarian cancer](#)⁶. But not all studies found such links, and more research is needed to clarify these findings.

What expert agencies say

In most cases, the American Cancer Society does not determine if something causes cancer (that is, if it is a *carcinogen*). Instead, we look to other respected organizations that classify potentially cancer-causing exposures.

The **International Agency for Research on Cancer (IARC)** is part of the World Health Organization (WHO). One of its goals is to identify causes of cancer. IARC has classified PFOA as “possibly carcinogenic to humans” (Group 2B), based on limited evidence in humans that it can cause testicular and kidney cancer, and limited evidence in lab animals.

(For more information on the classification system IARC uses, see [Known and Probable Human Carcinogens](#)⁷.)

The US **Environmental Protection Agency (EPA)** maintains the Integrated Risk Information System (IRIS), an electronic database that contains information on human health effects from exposure to various substances in the environment. The EPA has not officially classified PFOA as to its carcinogenicity.

In a draft (not final) report, the EPA’s Scientific Advisory Board examined the evidence on PFOA, mainly from studies in lab animals, and stated that there is “suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential.” The board agreed that new evidence would be considered as it becomes available.

Other agencies have not yet formally evaluated whether PFOA can cause cancer.

What is being done about PFOA (and PFOS)?

The long-term effects of PFOA and similar chemicals are largely unknown, but there has been enough concern to prompt an attempt to phase out industrial emissions of them.

While the possible long-term health effects of PFOA are not well established, in 2006, the EPA and the 8 US manufacturers who used PFOA at the time agreed to a “stewardship program.” The goal was for the companies to eliminate PFOA from emissions and product contents by the end of 2015. PFOA and some closely related chemicals (such as PFOS) are now no longer made in the US, although they are still made in some other countries and could potentially reach US consumers in certain types of products. In addition, many other PFAS are now in use, and new ones are still being developed.

The EPA does not have enforceable limits on the levels of PFOA or related chemicals (such as PFOS) in drinking water at this time. However, the EPA has established **health**

advisories for PFOA and PFOS in drinking water, based largely on the health effects of PFOA and PFOS seen in studies of lab animals (rats and mice). The health advisory level for both of these chemicals (alone or combined) is set at 70 parts per trillion over the course of a person's lifetime. These advisories are not legally enforceable federal standards. They are meant to provide drinking water system operators, as well as state and other agencies who are responsible for overseeing these systems, with information on the health risks of these chemicals, so they can take appropriate actions to protect their residents.

In addition, the EPA is now considering establishing **drinking water standards** for PFOA and PFOS, which, if enacted, would set legally enforceable maximum contaminant levels (MCLs) of these substances in drinking water.

Should I take measures to protect myself, such as not using my Teflon-coated pans?

Other than the possible risk of flu-like symptoms from breathing in fumes from an overheated Teflon-coated pan, there are no proven risks to humans from using cookware coated with Teflon (or other non-stick surfaces). While PFOA was used in the past in the US in making Teflon, it is not present (or is present in extremely small amounts) in Teflon-coated products.

Because the routes by which people may be exposed to PFOA are not known, it is unclear what steps people might take to reduce their exposure. According to the US Centers for Disease Control and Prevention (CDC), people whose regular source of drinking water is found to have higher than normal levels of PFOA or similar chemicals might consider using bottled water or installing activated carbon water filters.

For people who are concerned they might have been exposed to high levels of PFOA, blood levels can be measured, but this is not a routine test that can be done in a doctor's office. Even if the test is done, it's not yet clear what the results might mean in terms of possible health effects.

Hyperlinks

1. www.cancer.org/cancer/testicular-cancer.html
2. www.cancer.org/cancer/kidney-cancer.html
3. www.cancer.org/cancer/thyroid-cancer.html
4. www.cancer.org/cancer/prostate-cancer.html
5. www.cancer.org/cancer/bladder-cancer.html
6. www.cancer.org/cancer/ovarian-cancer.html

7. www.cancer.org/cancer/cancer-causes/general-info/known-and-probable-human-carcinogens.html
8. <http://www.atsdr.cdc.gov/>
9. <http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=1116&tid=237>
10. www.epa.gov/
11. <http://www.cancer.gov/>

Additional resources

Along with the American Cancer Society, other sources of information and support include:

Agency for Toxic Substances and Disease Registry (ATSDR) Toll-free number: 1-888-422-8737 (1-888-42-ATSDR) Website: www.atsdr.cdc.gov
(<http://www.atsdr.cdc.gov/>)⁸ ToxFAQs for
perfluoroalkyls: www.atsdr.cdc.gov/toxfaqs/tf.asp?id=1116&tid=237
(<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=1116&tid=237>)⁹

Environmental Protection Agency (EPA) Toll-free number (Safe Drinking Water Hotline): 1-800-426-4791 Website: www.epa.gov (www.epa.gov/)¹⁰

National Cancer Institute (NCI) Toll-free number: 1-800-422-6237 (1-800-4-CANCER)
Website: www.cancer.gov (<http://www.cancer.gov/>)¹¹

**Inclusion on this list does not imply endorsement by the American Cancer Society.*

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at 1-800-227-2345 or visit www.cancer.org.

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