

Per- and poly- fluoroalkyl substances (PFAS) Factsheet

What are per- and poly- fluoroalkyl substances?

Per- and poly- fluoroalkyl substances, also known as 'PFAS', are a large group of manufactured chemicals. This group of chemicals includes perfluorooctanesulfonic acid (PFOS) and the related chemicals perfluorooctanoic acid (PFOA) and perfluorohexanesulfonic acid (PFHxS).

PFAS have been used since the 1950s in a range of common household products and in some specialty applications. These include the manufacture of non-stick cookware; fabric, furniture and carpet stain protection applications; food packaging; some industrial processes; and some types of fire-fighting foam.

Why are these chemicals being phased out?

Many countries have already phased out, or are in the process of phasing out, the use of PFOS and PFOA due to concerns about the persistence, bioaccumulation and potential toxicity of these chemicals. As PFAS break down very slowly in the environment under naturally occurring conditions, they tend to accumulate in the food chain and in human tissue. The international scientific community has identified this characteristic as undesirable because of the potential for unforeseen effects resulting from accumulating levels, and the difficulty in removing these chemicals from the environment once they are released.

How are people exposed to PFAS?

All over the world, PFAS are found at very low levels in the blood within the general population. The general public are exposed to small amounts of PFAS in everyday life through exposure to dust, indoor and outdoor air, food, water and contact with consumer products that contain these chemicals. For most people, food is thought to be the major source of exposure. Treated carpets and floors treated with waxes and sealants that contain PFAS can be an important source of exposure for babies and infants.

PFAS may be readily absorbed through the gut and are not metabolised or broken down in the body. These chemicals are eliminated very slowly from the body. Studies have shown that because of their widespread use, people in Australia commonly have some PFOS, PFOA and PFHxS in their blood. PFAS can also be found in urine and breast milk.

Some people may be exposed to higher levels than the general public. These include those who work in industries that use PFAS or use products containing these chemicals and people located near sites where larger quantities of PFAS have been released into the environment. It is important to understand how they may come into contact with PFAS so that exposure to it may be minimised. This could include examining in detail the different ways in which people could be exposed to these chemicals, e.g. via contaminated water, soil, food, etc.

Are there any health effects linked to PFAS in humans?

The potential effects of PFAS on human health continue to be studied. These studies involve laboratory animal studies, as well as occupationally exposed workers (i.e. manufacturing workers), residents of PFAS contaminated areas and studies of the general population in the USA and other countries.

Research into the long-term exposure of laboratory animals to PFOS and PFOA has shown adverse effects on the liver, gastrointestinal tract and thyroid hormones. However, the applicability of these studies to humans is not well established. The existing limited studies on PFHxS suggest that this chemical can cause effects in laboratory animals similar to the effects caused by PFOS. However, based on available animal studies, PFHxS appears to be less potent than PFOS.

What is the evidence telling us so far?

The Expert Health Panel for PFAS¹ found that although the scientific evidence in humans is limited, reviews and scientific research to date have provided fairly consistent reports of an association with several health effects, as follows:

- increased levels of cholesterol in the blood
- increased levels of uric acid in the blood
- reduced kidney function
- alterations in some indicators of immune function
- altered levels of thyroid hormones and sex hormones
- later age for starting menstruation (periods) in girls, and earlier menopause
- lower birth weight in babies.

The health effects reported in these associations are generally small and within normal ranges for the whole population. While there may be an association between PFAS exposure and the above health effects, it does not necessarily mean that the PFAS exposure caused the health effect. Also, whilst early indications suggest PFAS has a minimal impact on human health we also cannot definitively rule out other important health effects.

Does PFAS exposure cause cancer?

There is no conclusive evidence that exposure to PFAS causes cancer in humans. Some studies have shown a possible link between kidney and testicular cancers and PFAS, but no overall increased risk of cancer. In these studies, other potential cancer-causing factors such as smoking were not considered. Other studies have not shown a link between cancers and PFAS.

Studies in rats have shown an increase in some types of thyroid cancer. However, the results were inconsistent and further studies would be required to confirm the results.

What treatment is available?

There is currently no accepted clinical treatment to reduce levels of PFAS in the human body. As a precaution, it is recommended exposure to PFAS be minimised wherever possible whilst further research is undertaken on the potential health effects of PFAS.

How long does it take for PFAS to leave my system?

The time it takes for PFAS to be excreted from the body is the same for adults and children. In humans, studies suggest that the half-life of PFAS could range from two to nine years.

Should I continue to breastfeed?

Yes. While some PFAS have been detected in breast milk, the proven health benefits associated with breastfeeding outweigh any potential health risk to an infant from the transfer of PFAS through breast milk. Breastfeeding mothers living in or around sites contaminated with PFAS do not need to stop breastfeeding.

How can I reduce my exposure to PFAS?

Although there is still uncertainty around the potential for PFAS to cause significant adverse human health effects, it is known that some long chain PFAS, such as PFOS and PFOA, can persist for a long time both in the environment and in humans. Therefore, it is prudent to reduce exposure to PFAS and action should be taken to eliminate and reduce sources of PFAS that may affect people.

¹ <http://www.health.gov.au/internet/main/publishing.nsf/Content/ohp-pfas-expert-panel.htm>

PFOS and PFOA are being withdrawn from service at commercial and industrial premises, and similar products are being phased out and replaced with more sustainable alternatives. However, PFAS chemicals may be present in the environment due to historic use or release from pre-treated articles imported into Australia.

The Australian and Queensland governments are investigating potential sources of PFAS pollution. Where elevated levels are detected, a human health risk assessment may be done to identify the main ways people may be exposed to the PFAS, so action can be taken to help prevent further exposure to it.

In Queensland, if you live in or near a contaminated area, advice will be provided to your community on possible exposure. The advice will include information on how you may be exposed, and what actions you can take to reduce your exposure. This advice will be specific to the site, and information provided to communities in other areas may not apply to you. The extent of contamination, the movement of the chemicals in the environment, and likely routes of exposure will be different at different sites.

In areas where contamination of water (e.g. in underground springs, water bores, dams, ponds or creeks) has been identified, human exposure can be minimised by:

- not drinking the water, or using it to prepare food
- not consuming food products (e.g. eggs, milk, meat, fish, fruit or vegetables) grown or produced using, or in, contaminated water
- avoiding or minimising the use of the water for showering/bathing, sprinklers or to fill swimming pools or paddling pools due to the possibility of unintentionally drinking the water.

If people are concerned about use of contaminated water, an alternative water source should be used, if available, especially for drinking, food preparation, raising animals for home consumption, raising poultry for their eggs and use on homegrown crops.

What are the reference values for PFOS, PFOA and PFHxS?

On 3 April 2017, the Australian Government Department of Health published health-based guidance values, in the form of a tolerable daily intake (TDI), for use in site investigations across Australia for PFOS, PFOA and PFHxS. A TDI is an estimate of the amount of a chemical in food or drinking water, expressed on a body weight basis, that can be ingested daily over a lifetime without appreciable health risk to the consumer. TDIs are not useful for interpreting the level of PFAS in people's blood.

These values replaced the interim human health reference values adopted by enHealth in June 2016 and are available at www.health.gov.au/internet/main/publishing.nsf/Content/ohp-pfas-hbgv.htm.

Should I get my blood tested?

Given the uncertainty as to whether PFAS are directly linked to adverse health outcomes, blood tests cannot determine if the PFAS levels in a person's blood will make them sick now or later in life. Therefore, blood tests are not recommended to determine whether any medical condition is attributable to exposure to PFAS and have no current value in informing clinical management, including diagnosis, treatment or prognosis in terms of increased risk of particular conditions over time.

Blood testing will provide information on whether you have been exposed to a higher level of these chemicals than the rest of the Australian population.

It takes a very long time for levels of these chemicals to reduce in humans, with the levels of some people taking two to nine years to reduce by half if there is no ongoing exposure. This means that levels in the blood now may reflect exposure from years ago, not necessarily recent exposure. For these reasons, it is considered that there is no value in frequent blood monitoring.

Anyone concerned about their own health or that of family members should talk to their GP or call 13HEALTH (13 43 25 84).