

enHealth Guidance Statements on per- and poly-fluoroalkyl substances

Context:

Per- and poly-fluoroalkyl substances, or “PFAS”, are a class of manufactured chemicals that have been used since the 1950s to make products that resist heat, stains, grease and water.

Products that may contain PFAS include furniture and carpets treated for stain resistance, foams used for firefighting, fast food or packaged food containers, make up and personal care products and cleaning products. Other chemicals used in these applications may be precursors to PFAS, and the PFAS are formed when these chemicals are released into the environment.

PFAS are of concern around the world because they are not readily broken down in the environment and so can persist for a long time. Their widespread use and persistence means that many types of PFAS are ubiquitous global contaminants.

The PFAS of most concern are perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). Perfluorohexane sulfonate (PFHxS) is another chemical of the PFAS group and is present in some firefighting foams. PFHxS has also been used as a raw material or precursor to produce PFAS-based products. Many countries have 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.

Because of their widespread use, people in Australia commonly have some PFOS, PFOA and PFHxS in their body. PFOS, PFOA and PFHxS are readily absorbed through the gut, and once these chemicals are in a person’s body it takes about two to nine years, depending on the study, before those levels go down by half, even if no more is taken in.

The Australian Government has been working since 2002 to reduce the importation of some PFAS. In Australia and internationally, a general trend towards lower PFAS levels in people’s blood has been observed, following the implementation of actions to phase out use of some PFAS.

Outside the occupational setting, exposure to PFAS can occur from the air, indoor dust, food, water and various consumer products. For most people food is expected to be the primary source of exposure to these chemicals. Human breast milk may contribute to an infant’s exposure since some PFAS have been detected in human breast milk. However, as noted further in this guidance, the benefits of breastfeeding outweigh the potential risks associated with passing PFAS from mother to baby through breastmilk.

For some communities near facilities where PFAS have been extensively used, higher levels may be found in the surrounding environment and human exposure may occur through other means, including drinking water supplied from groundwater.

In chronic exposure studies on laboratory animals, research into 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 studies, PFHxS appears to be less potent in animal studies than PFOS.

In human studies, the Expert Health Panel for PFAS¹ found that a number of health effects (such as slightly high blood cholesterol) have been associated with PFAS exposure but these health effects are generally small and have not been shown to be clinically significant. More research is required before definitive statements can be made on causality or risk but, currently, there is no evidence of a significant impact on human health.

Although there is still uncertainty around the potential for PFAS exposure to cause significant adverse human health effects, we do know 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 as far as is practicable. Action should be taken to address the source of the exposure and interrupt known human exposure pathways. Determination of human exposure pathways is best achieved through a full human health risk assessment that examines all potential routes of exposure.

It is understandable that communities living in PFAS affected areas may want to know what their level of exposure to PFAS is and what this means for their health and the health of their families.

A blood test can measure the level of PFAS in a person's blood. If PFAS is detected, this tells a person that they have been exposed to PFAS. They could then compare their levels with the levels seen in the general Australian population or in other countries using published biomonitoring data. However, these tests are not routine and there is at present insufficient scientific evidence for a medical practitioner to be able to tell a person whether their blood level will make them sick now or later in life, or if any current health problems are related to the PFAS levels found in their blood.

As such, blood tests have no diagnostic or prognostic value and are not recommended for the purpose of determining whether an individual's medical condition is attributable to exposure to PFAS.

In the absence of any test, including a blood test, being definitive in informing individual risk and clinical management, exposure reduction is the key measure to reduce any possible risks posed by PFAS.

At a population level, blood tests can inform a community that they have been exposed to PFAS at a level above that of the general population. The monitoring of pooled community blood samples over time may help determine the success of exposure reduction measures.

Recognising the difficulty in assessing and communicating the risks posed by PFAS to the community, enHealth has developed these guidance statements on key health issues to support jurisdictional responses to incidents of environmental PFAS contamination.

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

Environmental Health Standing Committee (enHealth) Guidance Statements:

1. Health effects from exposure to PFAS – what is the evidence telling us?

The Expert Health Panel for PFAS 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; and
- lower birth weight in babies.

The health effects reported in these associations are generally small and within normal ranges for the whole population. There is also limited to no evidence of human disease or other clinically significant harm resulting from PFAS exposure at this time.

An association means that there is a relationship between PFAS exposure and the above health effects; however, this does not necessarily mean that the PFAS exposure caused the health effect.

A causative relationship means that the thing measured, in this case PFAS exposure, directly causes a change in health status. A causative relationship between the above health effects and PFAS exposure has not been established.

However, the weaknesses in the scientific evidence mean that whilst early indications suggest that PFAS exposure has a minimal impact on human health, we also cannot definitively rule out other important health effects.

2. Health advice

As a precaution, enHealth recommends exposure to PFAS be minimised wherever possible whilst further research is undertaken on the potential health effects of PFAS exposure.

This precautionary advice takes into account the uncertainties in the current scientific evidence (i.e. the lack of causation data on human health effects) and the ability of these chemicals to persist in humans and in the environment.

If you live or work in a PFAS contaminated area, your State or Territory Health Department can provide you with local advice on how to minimise exposure to PFAS.

3. Human exposure pathways

enHealth considers ingestion of food and drinking water contaminated with PFAS to be the major human exposure pathways.

Inhalation of dust contaminated with PFAS and dermal (skin) contact with PFAS are considered to be minor exposure pathways.

4. Breast feeding

The significant health benefits of breast feeding are well established and far outweigh any potential health risks to an infant from any PFAS transferred through breast milk.

enHealth does not recommend that mothers living in or around sites contaminated with PFAS cease breast feeding.

5. Pregnancy

Foetuses can be exposed to PFAS when their mother's blood crosses the placenta during pregnancy. However, the scientific research to date does not indicate that PFAS exposure during pregnancy is a major contributor to poor health outcomes in pregnant women or their babies.

Nonetheless, enHealth recommends that pregnant women be considered a potentially sensitive population when investigating PFAS contaminated sites, with a view to minimising their exposure to PFAS as a precaution.

6. 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.

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

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.

7. Blood tests

There is currently no accepted clinical treatment to reduce levels of PFAS in the human body.

Given the uncertainty that 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.

It is noted that various organisations around the world, including Australia, have collected blood samples from people as part of ongoing investigations into PFAS contamination of soil and water. The purpose of these tests was either as part of a defined research program, including to measure the effectiveness of global restrictions under international treaties, or to determine how much of these chemicals may be entering a person's body. The value of blood testing is limited to assessing exposure, such as monitoring over time, which may help determine the success of exposure reduction measures. However, given the long biological half-life of PFAS, frequent blood monitoring is of limited value.

enHealth advises that:

- blood testing has no current value in informing clinical management; and
- the monitoring of pooled community blood samples over time can help determine the success of exposure reduction measures.