enHEALTH
Environmental Health Standing Committee (enHealth) of the Australian Health Protection Principal Committee

Per- and Polyfluoroalkyl Substances (PFAS)

ENHEALTH GUIDANCE STATEMENT

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Introduction

Per- and poly-fluoroalkyl substances (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 (also known as aqueous film-forming foam [AFFF]), packaged food containers, make up and personal care products, and cleaning products. The range of PFAS used in these is complex, and these may degrade to form other PFAS when released into the environment.

PFAS are of concern around the world because they are not readily broken down in the environment nor are they readily eliminated from the body. This means they can persist for a long time in humans and in the environment. Their widespread use and persistence mean that many types of PFAS are global contaminants.

Recognising the difficulty in assessing and communicating the risks posed by PFAS to the community, the Environmental Health Standing Committee (enHealth) and the Australian Health Protection Principal Committee (AHPPC) have developed guidance statements on key health issues to support jurisdictional responses to incidents of environmental PFAS contamination.

This has included:

- Australian Health Protection Principal Committee (AHPPC) Per- and Poly-fluoroalkyl Substances Factsheet (2016)
- enHealth Guidance Statements on Per- and Poly- fluoroalkyl Substances (2016)
- Interim National Guidance on Human Health Reference Values for Per- and Poly-fluoroalkyl Substances for use in Site Investigations in Australia (2017)
- enHealth Guidance Statements on Per- and Poly- fluoroalkyl Substances (2019).

The purpose of this document is to consolidate and update this PFAS health guidance particularly in light of recently completed research into the human health effects of PFAS and exposure in Australia. Relevant studies include the Australian National University (ANU) PFAS Health Study and the 27th Australian Total Diet Study undertaken by Food Standards Australia New Zealand (FSANZ).

Human exposure pathways

Because of their widespread use, most people in Australia are expected to have some PFAS present in their body. Although there are many types of PFAS that exist, the most prevalent PFAS found in the Australian population to date have been perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS). PFAS exposure pathways to humans can include food, water, air, dermal (skin) contact and various consumer products. However, for most people ingestion of food and drinking water contaminated with PFAS is expected to be the primary source of exposure. PFAS are known to travel long distances via surface and groundwater and can accumulate in foods. These chemicals are also readily absorbed through the gut. Inhalation of dust contaminated with PFAS and dermal (skin) contact with PFAS, including from showering and bathing in contaminated recreational water, are minor exposure pathways.

Once these chemicals are in a person's body it takes a long time for those levels to substantially reduce, even if no more is taken in. Depending on the type of PFAS, studies indicate that the time taken for the levels to reduce by half can be from 2 to 8 years.

For most people the level of exposure is likely to be relatively small and no public health and safety concerns in relation to PFAS have been identified from the overall dietary exposure for the general Australian population. In locations where PFAS have been used as an active ingredient in AFFF firefighting foams, there may be higher PFAS levels in the local environment. In these communities, people may have increased exposure to certain PFAS, including PFOS and PFHxS, and have elevated blood concentrations above the general population of these PFAS. Potential key exposure pathways of PFAS in these communities may include regular consumption of contaminated groundwater from drinking water bores, certain locally grown food, or seafood sourced from PFAS impacted waterways. However, exposure pathways can differ between sites and state or territory health departments can provide local advice on how to minimise exposure to PFAS.

PFAS and the general food supply

Current evidence suggests PFAS levels in the general Australian food supply are very low and the regulation of PFAS chemical contaminants in the general food supply is therefore not required.

However, the Australian Government Department of Health and Aged Care has developed health-based guidance values in the form of a tolerable daily intake (TDI) for PFOS, PFOA, and PFHxS for use in human health risk assessments, including site investigations across Australia. A TDI is an estimate of the amount of a chemical, expressed on a body weight basis that can be ingested daily over a lifetime without appreciable health risk to the consumer. The TDI can then be used to work out safe guidance values of the chemicals in different types of items that people consume, such as food or drinking water.

FSANZ's 27th Australian Total Diet Study, found PFAS levels in the general food supply are well below Australian guidance values. Estimated dietary exposure to PFOS for the general Australian population is well below the TDI. No other PFAS were detected in the study. This indicates that there are no public health and safety concerns in relation to PFAS from overall dietary exposure for the general Australian population.

In some instances, advice is issued by local authorities in specific areas where PFAS contamination has been identified, as people within these areas may frequently consume food or water with some PFAS contamination. This local advice takes into consideration the Australian guidance values and specific local circumstances and may include encouraging people to consume produce from multiple sources, and in some cases, limiting consumption of home-grown produce, home-produced livestock, and locally harvested food such as fish, and PFAS contaminated water to reduce exposure.

In relation to the general population, it is considered extremely unlikely that specific foods consumed over a period would all be sourced from a contaminated site. Occasionally eating produce with low levels of PFAS is not considered to be a public health concern.

PFAS and drinking water supplies

To ensure safe drinking water and provide a basis for determining the quality of water to be supplied to consumers in all parts of Australia, the National Health and Medical Research Council (NHMRC) has developed the *Australian Drinking Water Guidelines (2011)* (the Guidelines). The Guidelines are underpinned by the available scientific evidence and are used by state and territory health departments, drinking water regulators, local health authorities and water utilities.

The Guidelines include maximum health-based guidance values for PFOA and PFOS plus PFHxS in drinking water. These were published in 2018 and were derived using the TDI values recommended by the Australian Government Department of Health and Aged Care.

enHealth notes that the science and our understanding of PFAS impacts on human health will continue to evolve. The Guidelines undergo rolling revisions to ensure they represent the latest scientific evidence on safe drinking water. enHealth continues to work with the Australian Government Department of Health and Aged Care and NHMRC to consider the latest evidence and ensure advice is consistent, feasible and appropriate for the Australian context.

The Chemical Fact Sheet: Per-fluoroalkyl and poly-fluoroalkyl substances (PFAS), in the Guidelines, provides more information on PFAS concerns in drinking water. The Guidelines can be accessed online from www.nhmrc.gov.au/about-us/publications/australian-drinking-water-guidelines.

What evidence is there of health effects from exposure to PFAS?

PFAS exposure has been associated with the following effects:

- 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.

However, these differences have generally been small and are unlikely to be important to health outcomes.

Potential associations between PFAS exposure and increased risk of two uncommon cancers, namely testicular and kidney cancer, have also been reported. enHealth notes that much of this evidence relates specifically to PFOA, and not PFOS or PFHxS which are more common in Australia. However, studies on these cancers remain conflicting and associations have only been observed in high exposure groups such as workers in international factories where PFOA is produced.

An association means that there is 4elationshipp between PFAS exposure and the above health effects. This does not mean that the PFAS exposure caused the health effect. A causative relationship between the above health effects and PFAS exposure has not been established to date.

A further finding from recently conducted research in Australia is that people living in PFAS affected communities are more likely to experience psychological distress, irrespective of the PFAS level in their blood.

Whilst PFAS has not definitely been shown to be a cause of disease in humans, enHealth notes that the science and our understanding of these issues will continue to evolve.

As a precaution, enHealth therefore continues to recommend exposure to PFAS be minimised wherever possible. This precautionary advice considers the current scientific evidence, including the lack of causation data on human health effects and the ability of these chemicals to persist in humans and in the environment. Governments are taking action to address the sources of PFAS, consistent with the Australian Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination, which will reduce human exposure to these chemicals.

If you live or work in a PFAS affected community, your state or territory health department can provide you with local advice on how to minimise exposure to PFAS.

Mental health and wellbeing

For some, knowing that their community is affected by PFAS may increase stress and worry. Findings from the PFAS Health study showed that people living in PFAS affected communities, irrespective of PFAS blood concentrations, are more likely than those who live in comparison areas to experience psychological distress.

Levels of concern can vary between individuals and for some it can add to the mental health burdens they may already be carrying. PFAS contamination can have a range of consequences for those affected including impacts on property values, produce, income, reputation and risks to health. Addressing concerns can therefore have a positive impact on wellbeing. Assistance should be tailored to the circumstances and include the full range of mental health and wellbeing supports available.

Individuals can access mental health support through a range of face-to-face, digital and enquiry services. The Australian Government Department of Health and Aged Care publishes information on the mental health supports available on its website.

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 either 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. Reducing exposure to any contaminant during pregnancy is important as it is a sensitive period in growth and development.

Breast feeding

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

PFAS have been detected in human breast milk and breast feeding may contribute to an infant's exposure. enHealth does not recommend that mothers living in or around sites contaminated with PFAS cease breast feeding.

Blood tests

It is understandable that individuals living in PFAS affected communities 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. These results could then be compared with the levels seen in the general Australian population or in other countries using published biomonitoring data. However, 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.

Therefore, individual blood tests are not recommended as they cannot determine whether any medical condition is attributable to exposure to PFAS and these tests have no current value in informing an individual's 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. Blood testing remains important in research projects that try to investigate links between exposure and disease, as well as for monitoring projects that may help determine the success of exposure reduction measures. However, given the long biological half-life of PFAS, frequent blood monitoring of an individual is of limited value.

enHealth advises that:

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

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.

Additional Information

Further information on the Australian Government's response to PFAS, including information on site investigations and health advice and links to relevant government departments can be found on the Australian Information Portal on PFAS at https://www.pfas.gov.au/.

The contact information for each state and territory health department is:

State and Territories	Contact information for each state and territory
NSW	https://www.health.nsw.gov.au/Pages/contact.aspx
VIC	https://www.health.gov.au/about-us/contact-us
QLD	https://www.health.qld.gov.au/comments
SA	https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/contact+us/contact+us
WA	https://www.health.wa.gov.au/about-us/contact-us
TAS	https://www.health.tas.gov.au/contact-us
ACT	https://www.health.act.gov.au/contact-us
NT	https://health.nt.gov.au/contact