

## DFES Voluntary Blood Testing Program for PFAS

The Department of Fire and Emergency Services is making blood testing for *Poly-fluoroalkyl Substances* (PFAS), including Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) available on a voluntary basis to all current and past staff and volunteers (including Bush Fire Brigades) who may have used or been in contact with Aqueous Film Forming Foam (AFFF). All personnel requesting blood testing need to be made aware of significant limitations in interpreting the results of these tests, as set out below.

There is currently no consistent evidence that exposure to PFAS causes adverse human health effects. However, because these chemicals persist in humans and the environment, human exposure to these chemicals should be minimised as a precaution<sup>1</sup>.

### *Possible exposure*

PFOS and PFOA were used in B Class firefighting foams by fire services nationally from the late 1950's. These foams were used primarily at incidents involving flammable liquids and for training purposes because of their chemical stability and their oil, water and fire resistant properties. The Western Australian Fire Services ceased purchasing foam containing PFOS/PFOA in 2003. **Limitations of PFAS blood testing**

Because there is currently no consistent evidence that exposure to PFAS causes adverse human health effects, there is at present insufficient 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. That is, PFAS blood tests currently have no diagnostic or prognostic value and cannot be used to guide clinical management.

The blood test can be compared with the level seen in the general Australian population (see below), but no other inference can be drawn. The following points need to be considered:

- All Australians are expected to have detectable levels of PFAS in their blood. A broad range of levels would be expected in all communities due to background exposures.
- PFAS have a very long half-life in humans and persist in the body for many years. The blood level will usually reflect cumulative exposure over this extended period.
- A PFAS blood test cannot tell you when exposure occurred. Nor is it possible to determine the source of PFAS found in an individual's blood. Therefore, any levels detected cannot be attributed directly to exposure in the Fire and Emergency Service.
- A "normal" PFAS range for an individual is not available in Australia or internationally.
- Blood levels are not predictive of health problems in individuals. There is no consistent evidence of PFAS resulting in health impacts therefore levels considered higher than the Australian general population may have no clinical relevance to the individual. For this reason, a "minimal risk" level also does not exist in Australia.
- There is no practical treatment available to lower levels of PFAS in the blood.
- The PFAS blood test does not measure the blood level precisely. Tests taken from the same person at the same time show variability as a result of the test methodology.
- The same level in two different individuals may not mean the same level of exposure, due to toxicokinetic differences.
- There are no specific biomarkers to look at effects of PFAS exposure.

### Interpretation of results

No valid reference ranges exist for PFAS in humans. The results will be reported in terms of comparison with the previously published general population data from Australia (Table 1 and Table 2).

**Table 1: Estimated 95th percentile for the Australian population, 2011–2012<sup>1</sup>**

Compound	Age group	PFOS ng/mL	PFOA ng/mL
	0–4 years	13	9
	5–15 years	18	8
	16–30 years	20	8
	31–45 years	25	8
	46–60 years	29	8
	61+ years	37	10

**Table 2: Interpretation of individual results**

Compound	Interpretation	
PFOS and PFOA	≤95th percentile by age range	This is consistent with background exposure in the general population of that specific age-group. Patient should be reassured.
	>95th percentile by age range	Suggestive of previous exposure to PFOA/PFOS at levels higher than the general population — educate on precautionary strategies to limit exposure, noting no conclusive evidence of adverse health effects
PFHxS, PFBS, 6:2FTS, PFHxA, PFHpA, PFNA PFUdA PFDoA 8:2FTS PFDA	Several additional fluoroalkyl substances were measured in the current panel. The toxicology of these compounds in humans is not well studied, and only reported here for research purposes.	

Note: A PFAS blood test does not measure the blood level precisely. Two tests taken from the same person at the same time may report levels that differ by up to 20% or more as a result of the test methodology.

### Testing Frequency

- The half-life for various PFAS compounds varies depending on the compound and the animal species. For humans, studies suggest that the elimination half-life of PFOS is 8.5 years and PFOA 3.5 years so frequent blood monitoring is of no clinical value and should be discouraged. Population blood level tests will sometimes be undertaken to monitor the

<sup>1</sup> Aylward LL, Green E, Porta M, Toms LM, Den Hond E, Schulz C, et al. Population variation in biomonitoring data for persistent organic pollutants (POPs): an examination of multiple population-based datasets for application to Australian pooled biomonitoring data. *Environ Int.* 2014;68:127-38. Epub 2014/04/15.

exposure of a community over time to determine if exposure reduction measures are working.

- If individuals present with test results which have been repeated, these should be interpreted in the context of the analytical variability of the test, which may differ by plus or minus 20%.

## Examples

### Scenario

A 47 year old firefighter with a serum PFOS of 25 ng/mL.

A 35 year old adult with a serum PFOS of 210 ng/mL.

### Interpretation

This is within the range of levels expected in any Australian community as a result of non-specific background PFOS exposures.

Most Australian adults in the age range 46-60 years will have blood levels less than 29 ng/mL.

This is higher than the range of levels expected as a result of non-specific background PFOS exposures, therefore; additional specific exposure sources are likely.

Most adults in the 31 to 45 year age group will have blood levels under 25 ng/mL.

Similar and higher levels have been noted in Australian adults who have had occupational exposures or lived in contaminated environments.

### Discussion Points

Most Australian adults would be expected to have detectable levels of PFOS in blood, acquired from various sources.

This blood level is unlikely to cause harm.

Additional specific exposure(s) have likely occurred at some stage during the previous 10 or more years. There may or may not be recent exposure.

The most significant exposure pathways for adults are the consumption of water and food containing PFOS.

Evidence concerning elevated levels is still being evaluated but currently no consistent or conclusive findings of harm in humans have been reported.

There is currently no specific treatment recommended.

Repeat blood testing is of no clinical value.

In the absence of ongoing exposure, blood levels of PFOS will fall slowly over many years.

I acknowledge that I have read the information above, and clearly understand that the result of the testing will not provide any information about potential health effects, or about the source of any exposure detected

Name: ..... date: .....

Signature: .....