

### About this guidance document

The guidance summarized here is to help inform discussion and decision making for physicians and their patients. Many of the tests and screenings noted are part of basic primary care annual appointments. In 2019, the American Medical Association (AMA) resolved to support research and policy to address the effects of PFAS exposure.

We based the following suggestions for medical screening tests on those previously developed and implemented for a PFAS-impacted community as well as peer-reviewed research and scientific assessments using weight of evidence approaches from:

- Agency for Toxic Substances and Disease Registry (2021)
- Centers for Disease Control and Prevention (2019)
- C8 Science and Medical Panels (2005-2013)
- European Environment Agency (2019)
- International Agency for Research on Cancer (2017)
- National Toxicology Program (2016)

These recommendations are for those living in communities with contaminated water or who are exposed to other sources of PFAS that substantially increases their internal burden of PFAS. These recommendations are not targeted to those with average levels of PFAS exposure.

### Guidance for adult patients

#### Laboratory tests

- **Lipid panel (cholesterol, LDL, HDL, triglycerides).** PFAS exposure has been associated with higher total and LDL cholesterol and fatty liver.
- **Liver function tests**, such as ALT, AST, and GGT. PFAS exposure has been associated with higher-than-normal liver function tests, as well as hepatotoxicity, including hepatocyte and liver architecture damage.
- **Serum creatinine and urine protein and urine albumin.** PFAS exposure is associated with chronic kidney disease and kidney cancer. An important note for researchers is that there is enhanced excretion of PFAS in moderate-to-severe kidney disease, especially if there is albuminuria. Reduced serum PFAS concentrations for those individuals introduces a bias towards the null if not controlled for in epidemiologic studies.
- **Thyroid tests**, such as TSH with or without FT4. PFAS exposure has been associated with thyroid disease.

#### Clinical examinations

- **Regular testicular examinations.** Exposure to high levels of PFAS has been associated with increased risk of testicular cancer.

#### Counseling topics

- **Vaccine response.** There is currently no consensus on revaccinating patients with low vaccine titer when tested a month following vaccination (i.e., Tdap, MMR); more research is needed.
- **Home blood pressure monitoring during pregnancy.** PFAS are associated with elevated blood pressure during pregnancy and with preeclampsia.
- **Breastfeeding.** Babies can be exposed to PFAS during pregnancy since PFAS can cross the placenta. PFAS chemicals also accumulate in breast milk. However, the benefits of breastfeeding are clear, and include benefits to maternal as well as child health. There is insufficient evidence to recommend against breastfeeding based on maternal PFAS exposure.

## Guidance for pediatric patients

### Laboratory tests

- **Lipid panel (cholesterol, LDL, HDL, triglycerides).** PFAS exposure has been associated with higher total and LDL cholesterol and fatty liver.
- **Liver function tests,** such as ALT, AST, and GGT. PFAS exposure has been associated with higher-than-normal liver function tests, as well as other evidence of hepatotoxicity, including hepatocyte and liver architecture damage.
- **Thyroid test,** such as TSH with or without FT4. PFAS exposure has been associated with thyroid disease.

### Clinical examinations

- **Regular testicular examinations.** Children have a longer duration of exposure and therefore may have greater risk for development of the presumed long-term effects of PFAS exposure, such as testicular cancer.

### Counseling topics

- **Vaccine response.** There is currently no consensus on revaccinating pediatric patients with low vaccine titer when tested a month following vaccination (i.e., DTaP, MMR); more research is needed.
- **Endocrine disruption.** PFAS exposure has been associated with lower levels of sex hormones in young children.

## References

**Agency for Toxic Substances and Disease Registry (ATSDR).** Toxicological Profile for Perfluoroalkyls. U.S. Department of Health and Human Services. 2021. <https://www.atsdr.cdc.gov/ToxProfiles/tp200.pdf>.

**American Medical Association.** Memorandum from the Speaker of the House of Delegates. Resolutions 901 and 922. 2019. <https://www.ama-assn.org/system/files/2019-11/i19-handbook.pdf>

**C8 Medical Panel.** Information on the C-8 (PFOA) Medical Monitoring Program Screening Tests Prepared by the Medical Panel for the C-8 Class Members. 2013. [http://www.c-8medicalmonitoringprogram.com/docs/med\\_panel\\_education\\_doc.pdf](http://www.c-8medicalmonitoringprogram.com/docs/med_panel_education_doc.pdf).

**Centers for Disease Control and Prevention (CDC).** CDC Public Health Grand Rounds: PFAS and Protecting Your Health. 2019. <https://www.cdc.gov/grand-rounds/pp/2019/20191119-pfas-health.html>.

**European Environment Agency.** Emerging chemical risks in Europe – 'PFAS.' 2019. <http://dx.doi.org/10.2800/486213>.

**International Agency for Research on Cancer (IARC).** IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. Some Chemicals Used as Solvents and in Polymer Manufacture. Lyon (FR): International Agency for Research on Cancer; 2017. PMID: [31829531](https://pubmed.ncbi.nlm.nih.gov/31829531/).

**National Toxicology Program (NTP).** 2016. Systematic Review of Immunotoxicity Associated with Exposure to Perfluorooctanoic Acid (PFOA) or Perfluorooctane sulfonate (PFOS); Office of Health Assessment and Translation, Division of the National Toxicology Program, National Institute of Environmental Health Sciences: Research Triangle Park, NC. [https://ntp.niehs.nih.gov/ntp/ohat/pfoa\\_pfos/pfoa\\_pfosmonograph\\_508.pdf](https://ntp.niehs.nih.gov/ntp/ohat/pfoa_pfos/pfoa_pfosmonograph_508.pdf).

## Acknowledging stress & addressing uncertainty

Uncertainty about long-term health effects can cause stress among patients who have been exposed to PFAS contamination.

Previous studies have shown that providing results of chemical exposure tests, along with contextual information and steps for action, can make people feel empowered.<sup>1</sup>

ATSDR has developed resources for medical professionals to address concerns of residents in communities impacted by contamination: [www.atsdr.cdc.gov/stress/resources/clinicians-tip-sheet.html](http://www.atsdr.cdc.gov/stress/resources/clinicians-tip-sheet.html)

<sup>1</sup> JG Brody et al. (2006). <https://doi.org/10.2105/AJPH.2006.094813>

## Contributors

### PFAS-REACH partners



TESTING for PEASE



### Medical partner organization



Thank you to the researchers, medical professionals, and community members who reviewed this document.