Forever chemicals: their health impact and the benefits of blood testing

Known as "forever chemicals" because they don't naturally break down, per- and polyfluoroalkyl substances (PFAS) are a class of man-made chemicals that have been used in industry and consumer products since the 1940s.[1]

Because PFAS are prevalent in numerous daily household items, from some dental floss to nonstick cookware to clothing, as well as almost half of the nation's tap water, nearly everyone in the US has been exposed to them.[1-3] This is problematic, because PFAS can cause health issues and are linked to cancer, kidney disease, liver conditions, immune disorders, and birth defects.[1]

The good news? The Centers for Disease Control and Prevention (CDC) supports the use of PFAS blood testing to guide clinical management. Results can inform conversations about risk factors for associated health outcomes and help people reduce PFAS exposure.[2]

What are PFAS?

A class of ~15,000 man-made chemicals that don't break down easily in the environment and can build up over time in the blood and organs.

The prevalence of PFAS

While exposure to PFAS is widespread and variable by geography and occupation, most people have some PFAS exposure due to contaminated drinking water and their use in[3,4]:

- **Nonstick cookware**
- **Water-resistant clothing**
- **Stain-resistance fabrics and carpets**
- **Some cosmetics**
- **Industrial agents, like firefighting foams**

Because of their ubiquitous use, PFAS have been found to contaminate everything around us: water, food, soil, and air. Various studies and reports have **found PFAS in 45% of US tap water**, contaminating drinking water for more than 200 million Americans.[1,3,5] Additionally, one report reviewed by the CDC, using data from the National Health and Nutrition Examination Survey (NHANES), **found PFAS in the blood of 97% of Americans**.[6]

Unfortunately, PFAS will continue to be a concern, especially for those with occupational and environmental exposure. In early 2024, the Food and Drug Administration (FDA) announced that substances containing PFAS were no longer being sold into the US for use as grease-proofing agents on paper food packaging.[7] However, this was the result of voluntary market phaseouts made by manufacturers—and industries such as paper and packaging still struggle to phase out PFAS.[8]

But the phaseout process with manufacturers is only a first step. PFAS must also be removed from the environment, in which they're constantly cycling and accumulating. Removing PFAS is challenging, however, especially from water. These chemicals are highly mobile, meaning they can slip through many filtration systems.[1] And cost is yet another hurdle that must be overcome. In 2023, for example, settlements over PFAS contamination in US water systems with a number of corporations totaled more than $13 billion. But an estimated $400 billion is needed to clean and protect the country's drinking water.[1] Additionally, once new filtration systems are in place, they can cost millions more annually to operate than previous systems.[1]

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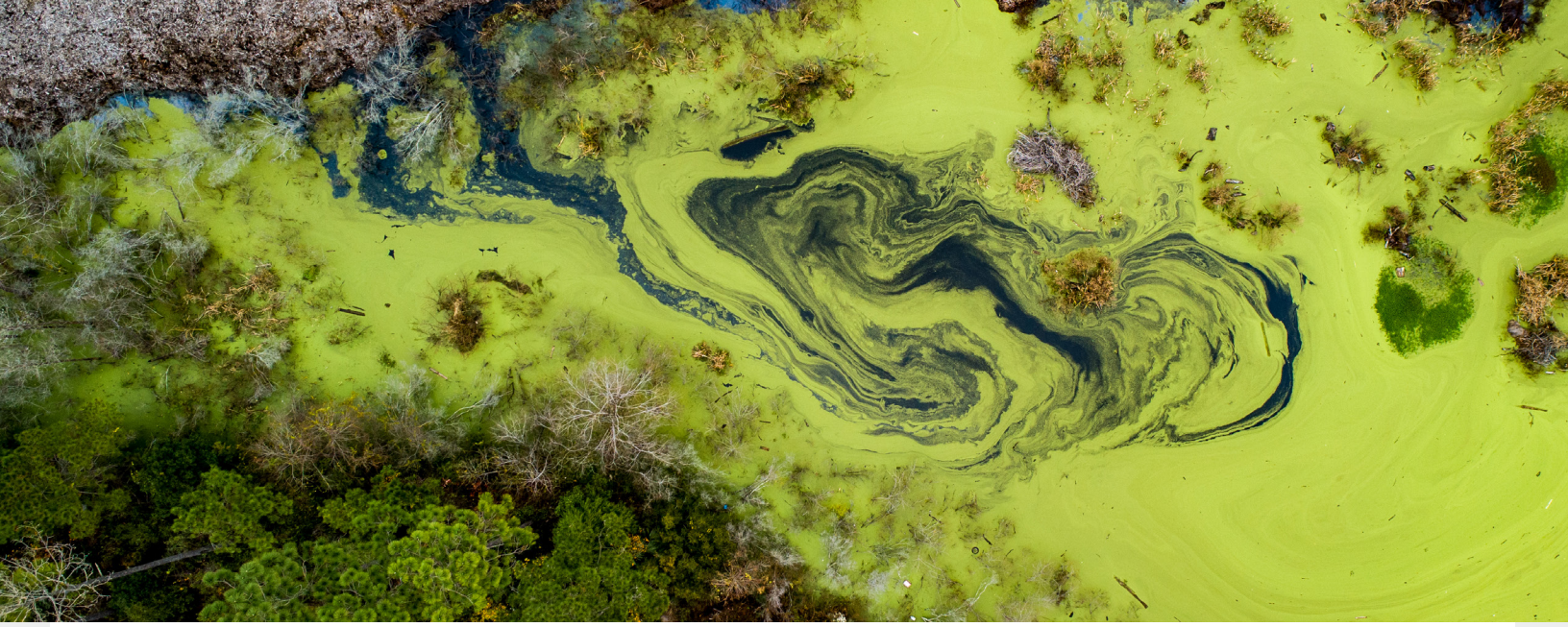

Health problems associated with PFAS

While the science around the impacts of PFAS exposure is still emerging, evidence suggests that high PFAS exposure is associated with certain health conditions.[9] According to the National Academies of Sciences, Engineering, and Medicine (NASEM), there is a link between PFAS exposure and the following health problems, among others.[6]

- **Decreased response in immune system**
- **Higher-than-normal lipid levels, or dyslipidemia**
- **Decreased growth in unborn babies and infants**
- **Increased risk of kidney cancer in adults**

Certain groups of people may be at higher risk of health impacts from elevated PFAS levels, including those who[6]:

- **May have been exposed on the job, such as firefighters**
- **Use a water supply near a commercial or industrial location, including airports, military bases, manufacturing plants, or sewage plants**
- **Live near a facility that manufactures fluorochemicals**
- **Live near areas of documented PFAS environmental contamination**

Children can also have higher PFAS exposures through ingestion than adults, since they eat and drink more relative to their body weight and are more likely to ingest dust or dirt containing PFAS.[6]

Using PFAS blood testing to detect risk

In January 2024, the CDC recognized the value of PFAS blood testing when conducted by a CLIA-certified laboratory.[2] Residents of communities with local sources of contamination and people who may have been exposed to high levels of PFAS at their workplace may seek a PFAS blood test to learn more about their exposure.[2]

In deciding whether to order PFAS testing, clinicians can consider[10]:

- A patient's exposure history
- Results of PFAS testing from the patient's water supply, food sources, or other exposure routes
- Whether results can inform exposure reduction and health promotion

A PFAS blood test measures the levels of certain PFAS chemicals in a patient's blood at the time of the test. Results can provide:

- An indication of how much PFAS has entered a patient's body over time, as measured from an initial baseline test
- A baseline to monitor changes over time
- Insights to support conversations about risk factors for associated health outcomes as well as ways to reduce PFAS exposure and monitor a patient's health

However, a PFAS blood test can't tell you:

- Where the PFAS in a patient's body came from
- How long a patient has been exposed to PFAS
- Whether any health condition was directly caused by PFAS exposure
- Whether a person is likely to develop certain health problems in the future

97% of Americans have PFAS in their blood.[6]

A diagnostic offering from Quest

Quest Diagnostics offers a test for PFAS: the PFAS (Forever Chemicals) 9 Panel. It measures the levels of 9 PFAS chemicals associated with certain health risks, per NASEM recommendations, providing the overall level and each of the 9 PFAS individual levels. The results indicate how much PFAS has entered a patient's body over time. For patients with elevated PFAS, Quest also offers follow-up testing to assess dyslipidemia, thyroid function, and kidney disease.

Risks increase with exposure

>2 ng/mL	2 ng/mL–20 ng/mL	>20 ng/mL
No adverse effects expected from PFAS exposure	• Reduce exposure • Screen for dyslipidemia, HT disorders of pregnancy, and breast cancer	• Reduce exposure • Screen for dyslipidemia, HT disorders of pregnancy, breast cancer, thyroid function, signs and symptoms of kidney cancer (including urinalysis), signs and symptoms of testicular cancer, and ulcerative colitis

~9% of Americans have PFAS levels of 20 ng/mL or higher.[6]

Conclusion

Nearly all people in the US have measurable amounts of PFAS in their blood.[2] The risk of health issues linked to PFAS exposure depends on exposure factors such as frequency, route, and duration; individual factors such as chronic disease burden; and other determinants of health such as access to safe water.[2]

As communities across the US look to healthcare providers for support, blood testing can help patients and clinicians monitor PFAS levels and assess whether there may be any potential health risks associated with high exposure. While not everyone needs a PFAS test, those at high risk can benefit from greater access to the insights provided by testing.

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