Easier way to test for PFAS could help detect dangerous levels earlier

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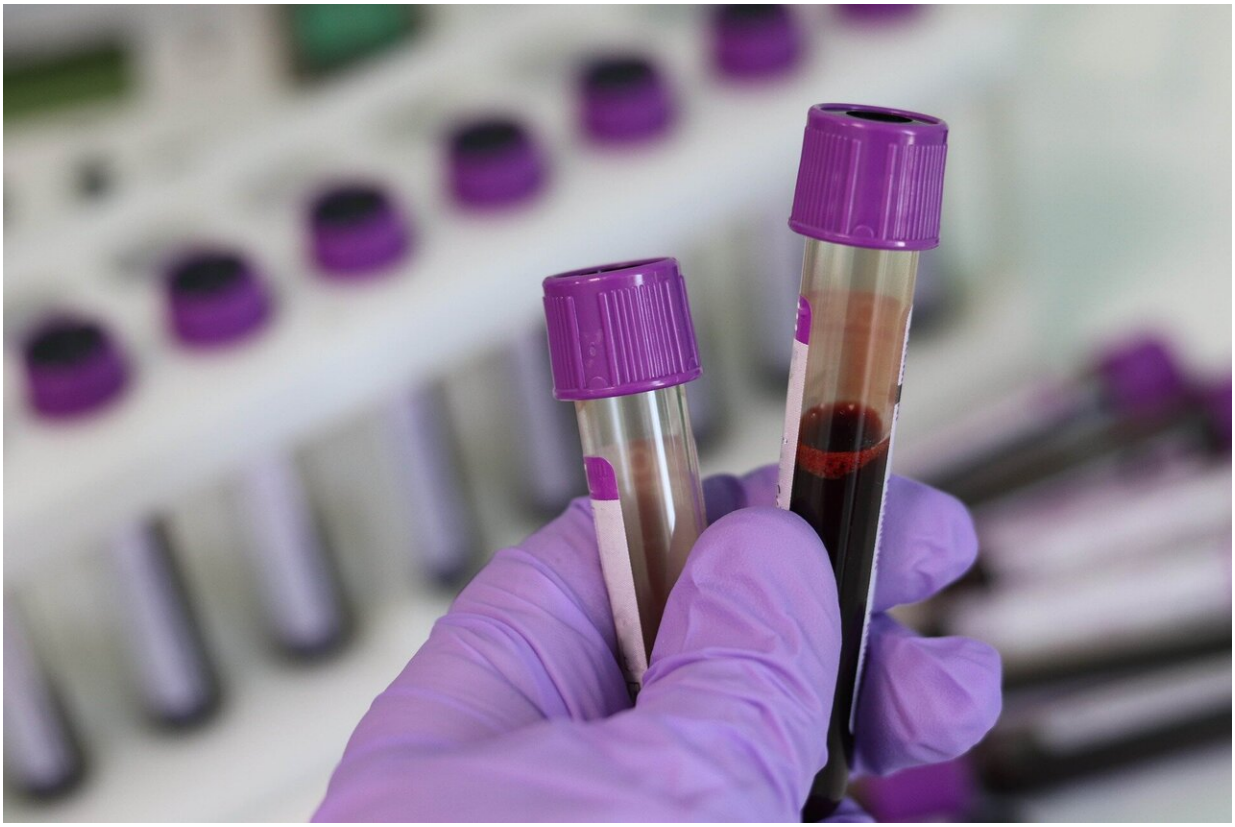

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Giving people at high risk of PFAS exposure the opportunity to easily self-test could improve access to testing for these "forever chemicals" and lead to the early detection of detrimental health conditions,

according to a new Michigan State University study. The study tested an improved approach for people to collect their own blood samples to test for PFAS without being part of an academic research study.

PFAS, short for per- and polyfluoroalkyl substances, are a class of more than 9,000 chemicals that are used widely to produce industrial and consumer products. They are commonly known as "forever chemicals" due to their extreme persistence in the environment as well as in the human body, where they can remain for many years.

For individuals with elevated exposure, either through drinking water or occupational hazard, early detection of elevated PFAS blood levels can inform exposure reduction and medical screening to protect against associated harm to the liver, kidneys and thyroid; immune system; reproduction and development; and the risk of several cancers.

Interventions are especially important to protect infants, children and pregnant women, as PFAS accumulate in the body over the lifespan, cross the placenta and accumulate in the fetus, and pass into breast milk. They have been linked to a wide range of health effects including high cholesterol, several cancers, infertility and low birth weight.

Additionally, PFAS have contaminated drinking water for millions of Americans, and the U.S. Environmental Protection Agency recently proposed enforceable drinking water standards for six types of PFAS.

"People with drinking water contamination often want to know their PFAS blood levels but have trouble gaining access to a blood draw and testing," said Courtney Carignan, assistant professor in MSU's colleges of Agriculture and Natural Resources and Veterinary Medicine and lead author of the study. "Blood test results can be used to document exposure, compare with levels in the general populations, inform exposure reduction and take health protective action."

Published in *Environmental Science & Technology*, the authors examined PFAS exposure measured by self-collection of blood using both the new finger prick and traditional blood draw methods among 53 people with prior history of PFAS drinking water contamination.

Participants first provided a blood sample collected by a blood draw and then pricked their finger using a lancet—commonly used for diabetic blood testing—to collect a precise amount of blood onto a new sampler. The blood samples were analyzed by the laboratory Eurofins for 45 specific PFAS varieties, five of which were detected frequently enough in the samples for the comparison.

In the analyses, the authors reported similar detection frequencies and high correlations between the two approaches.

"Results indicate that the new approach can work as well as the traditional approach among our highly exposed population," Carignan said. "Since the traditional approach uses the serum component of blood and our new approach relies on whole blood, we also confirmed an approximate 2:1 ratio of PFASs in serum compared to whole blood."

"In addition, we found that the whole-blood approach may offer a more comprehensive picture of the PFAS in our blood, including compounds such as FOSA," said Christopher Higgins of the Colorado School of Mines and a co-author of the study. FOSA, technically known as perfluorooctane sulfonamide, is a PFAS that was detected in approximately half of the whole-blood samples but not in any of the serum samples.

While the authors concluded that the new approach is promising, they cautioned that users should take care to ensure proper self-collection and use sufficiently sensitive analytical methods. Also, the appropriate conversion must be applied when comparing with levels in serum, which

some labs like Eurofins will do but others may not. The authors reported that simply multiplying the whole-blood concentration by two provides a good estimate of the serum equivalent. Carignan also noted that future studies should test the new approach in the general population prior to broad adoption in PFAS exposure and health research.

"The ability to use a finger-prick device to measure PFAS exposure opens up new research opportunities, and importantly, allows people in the general public to test their own blood without having to be part of an academic research study," said co-author and environmental chemist, Heather Stapleton, Duke University.

Study authors include Courtney Carignan and Rachel Bauer of MSU; Andrew Patterson, Thep Phomsopha and Eric Redman of Eurofins Environment Testing; Heather Stapleton of Duke University; and Christopher Higgins of the Colorado School of Mines.

More information: Courtney C. Carignan et al, Self-Collection Blood Test for PFASs: Comparing Volumetric Microsamplers with a Traditional Serum Approach, *Environmental Science & Technology* (2023). DOI: 10.1021/acs.est.2c09852

Visit the PFAS Exchange for information on PFAS blood testing and guidance on medical screening.

Provided by Michigan State University