

Per- and Polyfluoroalkyl Substances (PFAS) Blood Level Estimation Tool

What are Per- and polyfluoroalkyl substances (PFAS)?

Per- and polyfluoroalkyl substances, or PFAS, are man-made chemicals that have been used in industry and consumer products since the 1940s. They have been used worldwide to make water-repellent clothing, stain resistant fabrics and carpets, some cosmetics, some firefighting foams, and products that resist grease, water, and oil.

Why was the PFAS Blood Level Estimation Tool developed?

Communities with exposure to PFAS through their drinking water would like more information regarding the levels of PFAS in their blood. However, there are barriers to conducting blood tests for everyone. This user-friendly tool is based on pharmacokinetic (PK) models. The tool allows the user more access to information about the individual's potential PFAS body burden.

What are pharmacokinetic (PK) models and how are they used?

Pharmacokinetic (PK) models are mathematical tools that simulate how a chemical moves throughout the body. They can be used to estimate the blood levels of a substance based on exposure.

How did ATSDR develop and evaluate the PK model used in the PFAS Blood Level Estimation Tool?

The PK model was developed using statistics (i.e., Bayesian analysis). Existing datasets, including paired blood levels and exposure history information, were used to create the model. ATSDR evaluated the model using recent data from the [ATSDR PFAS exposure assessments](#). The evaluation confirmed that the model could successfully predict blood levels using known drinking water exposure. A package that included the final model and all data, tools, source code, and documentation used to reproduce model parameters and model output was peer reviewed and published in the scientific literature.



Who is the PFAS Blood Level Estimation Tool's intended audience and what is the intended use?

The tool is intended for members of communities that have known exposure to PFAS through their drinking water.

This tool provides an accessible and user-friendly way to learn more about the levels of PFAS that may be in an individual's blood. Community members can use the personalized estimates of blood PFAS levels to better understand their exposures. The tool is not intended to replace actual PFAS blood testing.

What information is needed to use the PFAS Blood Level Estimation Tool?

To use the tool, the user must provide information about the concentrations of PFAS in their drinking water. The user may get this information from their water utility company or by having their water tested. The user must also provide personal background information such as birth date, sex assigned at birth, weight, and breastfeeding history (if applicable). Lastly, the user must provide an estimate of the percentage of water they consume from different water sources (e.g., tap water, bottled/filtered water).



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A person's measured PFAS blood levels may be higher or lower than the estimates generated by this tool.

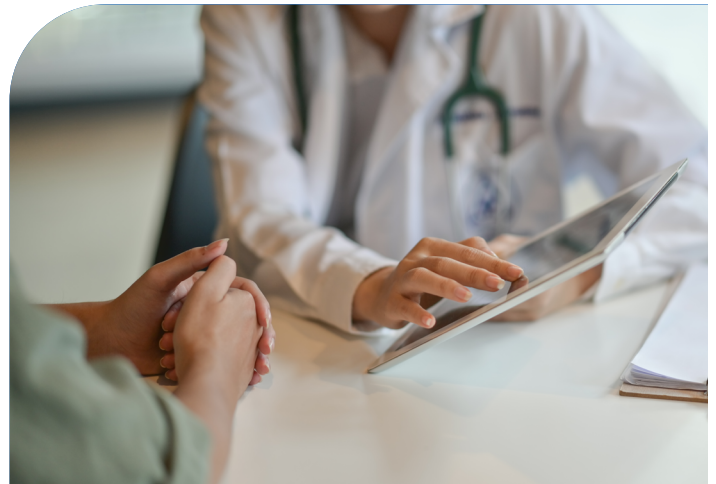
Finally, the tool is not designed or intended to assess any potential health risks resulting from PFAS exposure.

If a user is concerned about their estimated PFAS blood levels after using this tool, what should they do?

Users concerned about their estimated PFAS blood levels should talk with their healthcare providers, consider taking steps to reduce exposure, and learn more about PFAS in their community.

What are the limitations of the PFAS Blood Level Estimation Tool?

The tool cannot provide an exact measurement of the user's PFAS blood levels because certain information can't be captured by the tool. For example, each individual's body may excrete PFAS at a different rate, which affects how much PFAS is in their blood. Additionally, other PFAS exposure sources (food grown or raised in areas with PFAS contamination, certain consumer products, etc.) are captured with a generic background value. The value can't be modified to reflect each person's scenario.



For more information

- ◆ [Learn about PFAS | ATSDR \(cdc.gov\)](#)
- ◆ [Potential health effects of PFAS | ATSDR \(cdc.gov\)](#)
- ◆ [PFAS exposure | ATSDR \(cdc.gov\)](#)
- ◆ [PFAS in the US population | ATSDR \(cdc.gov\)](#)
- ◆ [Learn more about EPA's PFAS drinking water regulations](#)
- ◆ [Lynch MT, Lay CR, Sokolinski S, Antezana A, Ghio C, Chiu WA, Rogers R. Community-facing toxicokinetic models to estimate PFAS serum levels based on life history and drinking water exposures. Environ Int. 2023 Jun;176:107974. doi: 10.1016/j.envint.2023.107974. Epub 2023 May 13. PMID: 37245445.](#)
- ◆ [Chiu WA, Lynch MT, Lay CR, Antezana A, Malek P, Sokolinski S, Rogers RD. Bayesian Estimation of Human Population Toxicokinetics of PFOA, PFOS, PFHxS, and PFNA from Studies of Contaminated Drinking Water. Environ Health Perspect. 2022 Dec;130\(12\):127001. doi: 10.1289/EHP10103. Epub 2022 Dec 1. PMID: 36454223; PMCID: PMC9714558.](#)