MERCOLA
Take Control of Your Health

Are These Chemicals Causing Infertility and Stillbirths?

Analysis by Dr. Joseph Mercola ✔ Fact Checked | April 12, 2023

STORY AT-A-GLANCE

- Per- and polyfluoroalkyl substances (PFAS) are widely used in grease- and stain-resistant products, including food packaging, clothing, personal care products and household items
- A study in children and young adults found an association between PFAS exposure and alterations in amino acid metabolism and lipid metabolism pathways
- PFAS exposure may be causing inflammation and oxidative stress in youth, thus contributing to a variety of diseases
- PFAS has been linked to declines in fertility and fecundability, the probability of getting pregnant within one menstrual cycle
- When the combined effects of PFAS exposure were accounted for, exposure was associated with 30% to 40% lower chances of becoming pregnant within one year and delivering a live baby

Per- and polyfluoroalkyl substances (PFAS) are known as "forever chemicals" because they don't break down easily in the environment and bioaccumulate in people and wildlife. In the human body, PFAS have half-lives of two to five years.[1]

Because the chemicals repel oil, dirt and water, they're widely used in consumer products ranging from cookware and food packaging to carpets, cleaners and firefighting foam.[2] There are more than 9,000 PFAS, and exposure is so widespread that PFAS has been found in 97% of Americans.[3]

The chemicals are linked to significant human health effects, including increased risk of cancer and decreased immune system function. They're also known to affect hormones and metabolism, interfering with fertility, growth and development,[4] raising concerns that the chemicals are now putting future generations at risk.

PFAS Alters Metabolic Pathways in Youth

A study in children and young adults found an association between PFAS exposure and alterations in amino acid metabolism and lipid metabolism pathways.[5] The association persisted even though the children had varying levels of PFAS and were exposed to a variety of the chemicals, including PFOS, PFOA, PFHxS, PFNA, PFHpS and PFDA.

Notably, children exposed to six PFAS had more significant alteration to metabolism and hormone function than children exposed to fewer.[6] Amino acids are involved in the production of hormones, enzymes and proteins while lipids play a role in hormone production and fat metabolism. PFAS exposure also altered thyroid function in the children.[7]

The researchers suggested that PFAS exposure may be causing inflammation and oxidative stress in youth, thus contributing to a variety of diseases. PFAS exposure was also positively associated with arachidonic acid, which is known to play a role in cancer and heart disease, as well as aminoadipic acid, an amino acid that's been linked to Type 2 diabetes.[8]

David Andrews, a senior scientist at the Environmental Working Group (EWG), who was not involved in the study, told CNN:[9]

> *"This study is doing an in-depth analysis of how PFAS exposure is not just impacting hormone levels in humans, but impacting different metabolic pathways as well … Changes in these metabolic markers can be indicative of a number of different health outcomes in the future for the children, such as an increased susceptibility to obesity, insulin resistance, increased risk for fatty liver disease and potentially cancer."*

PFAS May Slash Fertility by 40% in Women

Also concerning, PFAS has been linked to declines in fertility and fecundability, the probability of getting pregnant within one menstrual cycle. In a study of 382 women of reproductive age trying to conceive, a 5% to 10% reduction in fecundability per quartile increase of exposure to PFAS was found, specifically from exposure to PFDA, PFOS, PFOA and PFHpA.[10]

PFDA (perfluorodecanoic acid), for example, is a breakdown product often found in food packaging, especially those made to be grease-resistant, such as microwave popcorn bags and fast-food wrappers.[11]

When the combined effects of PFAS exposure were accounted for, the outcomes became even more dire — again signaling the steep risks that come from exposure to multiple toxic chemicals from different sources.

This was associated with 30% to 40% lower chances of becoming pregnant within one year and delivering a live baby. Senior study author Dr. Damaskini Valvi, assistant professor of environmental medicine and public health at Icahn Mount Sinai, explained in a news release:[12]

> *"PFAS can disrupt our reproductive hormones and have been linked with delayed puberty onset and increased risks for endometriosis and polycystic ovary syndrome in few previous studies. What our study adds is that PFAS may also decrease fertility in women who are generally healthy and are naturally trying to conceive.*
>
> *We also know that PFAS exposure begins in utero and transfers from the mother to the fetus, as many PFAS have been detected in cord blood, the placenta, and breast milk. Preventing exposure to PFAS is therefore essential to protect women's health as well as the health of their children."*

Higher exposures to PFAS thus appear to be associated with decreased fertility in women, at a rate significant enough to prompt a warning for those trying to conceive.

Nathan Cohen, Ph.D., a postdoctoral research fellow with the department of environmental medicine and public health at the Icahn School of Medicine at Mount Sinai further noted:[13]

> *"Our study strongly implies that women who are planning pregnancy should be aware of the harmful effects of PFAS and take precautions to avoid exposure to this class of chemicals, especially when they are trying to conceive …*
>
> *Our findings are important because they add to the growing body of knowledge implicating PFAS in the development of adverse health conditions, with children being especially vulnerable … The results of our study should serve as a warning to women everywhere about the potentially harmful effects of PFAS when they are planning to conceive."*

Your Clothes May Be Coated in Toxic PFAS

PFAS is commonly used to coat fabrics used to make raincoats or sandwiched between layers of material to create a waterproof layer — as is the case with Gore-Tex products. Children's school uniforms are another significant route of exposure. About 3 tons of PFAS are used in U.S. school uniforms annually and may expose children to 1.03 ng/kg bw/day of PFAS exposure, via skin absorption.[14]

"This was concerning to us because these uniforms are on up to eight or 10 hours a day, every day, by children during their school year," study author Marta Venier, assistant professor at Indiana University-Bloomington, told CBS News. "Children are particularly susceptible to exposure to chemicals because their organs are still developing."[15]

CBS News highlighted several lawsuits that have been filed against companies producing PFAS-contaminated clothing while marketing them as environmentally friendly:[16]

- Thinx period underwear settled a lawsuit for $5 million, after being accused of marketing their products as healthy and sustainable, even though they contain PFAS.[17]

- A class-action lawsuit was filed against retailer REI, alleging the company's waterproof apparel, such as raincoats, contain unsafe levels of PFAS.[18]

PFAS from clothing may also migrate into water during washing, household air and dust, and it can also shed form other fabrics, such as furniture or carpeting. A 2022 study from Toxic-Free Future found 72% of products labeled stain- or water-resistant contained PFAS, including hiking pants, mattress pads, comforters, cloth napkins and tablecloths.[19]

New EPA Rule Proposed for PFAS in Drinking Water

The U.S. Environmental Protection Agency proposed its first drinking water standard for six types of PFAS. If finalized, the proposal would establish legally enforceable levels for six PFAS found in drinking water and would require public water systems to monitor for these chemicals.

PFOA and PFOS would be regulated as individual contaminants while PFNA, PFHxS, PFBS and GenX Chemicals would be regulated as a mixture. If levels of the forever chemicals are found to exceed limits proposed by the regulation, public water systems would be required to notify the public and reduce PFAS levels.

Once the regulation is finalized, public water systems would have three years to install filters to remove PFAS or find alternative PFAS-free water sources.[20] According to the EPA:[21]

> *"EPA anticipates that if fully implemented, the rule will, over time, prevent thousands of deaths and reduce tens of thousands of serious PFAS-attributable illnesses. This action establishes nationwide protection from PFAS pollution for all people, including environmental justice communities."*

The U.S. Department of Defense reported that at least 126 drinking water systems near military bases have been contaminated with PFAS, due to their use in firefighting foam.[22] According to a Harvard study, meanwhile, 16.5 million Americans have detectable levels

of at least one kind of PFAS in their drinking water, and about 6 million Americans are drinking water that contains PFAS at or above the EPA safety level.[23]

Yet, according to EWG, more than 200 million Americans may be drinking water containing PFAS at a concentration of 1 part per trillion (ppt) or higher.[24,25] EWG has endorsed making 1 ppt the standard upper safe level for PFAS in drinking water. The proposed EPA rule would regulate PFOA and PFOS at 4 ppt.[26]

"We know drinking water is a major source of exposure of these toxic chemicals," Olga Naidenko, Ph.D., vice president for science investigations at EWG said. "… PFAS pollution is affecting even more Americans than we previously estimated. PFAS are likely detectable in all major water supplies in the U.S., almost certainly in all that use surface water."[27]

PFAS Danger in Freshwater Fish

Bodies of freshwater are also contaminated with PFAS, to the extent that consuming a single serving of freshwater fish annually equates to a month of drinking water contaminated with PFOS at a concentration of 48 parts per trillion.

Given that people in many vulnerable U.S. communities depend on freshwater fish as a key part of their diets, public health could be at risk. "These test results are breathtaking," Scott Faber, EWG's senior vice president for government affairs, said in a news release. "Eating one bass is equivalent to drinking PFOS-tainted water for a month."[28]

While you can avoid PFAS-contaminated freshwater fish by avoiding this food source, your choices are limited when it comes to avoiding PFAS in drinking water. Either you must filter your water or get water from a clean source. PFAS is not regulated in bottled water, either, so there's absolutely no guarantee that it'll be free of these or other chemicals.

Unlike a high-quality carbon filtration system, most common water filters available in supermarkets will not remove PFAS. The New Jersey Drinking Water Quality Institute

recommends using granulated activated carbon “or an equally efficient technology” to remove chemicals such as PFOA and PFOS from your drinking water.

Activated carbon has been shown to remove about 90% of these chemicals.[29] Reverse osmosis can also remove some — but not all — PFAS.[30]

How to Reduce Your PFAS Exposure

You can cut down on PFAS exposure by making informed decisions about your food, cookware, housewares and more. “We can minimize PFAS exposure by avoiding foods that are associated with higher levels of these chemicals and by purchasing PFAS-free products,” Cohen said.[31] “It is also important to advocate for policies that ban the use of toxic chemicals, such as PFAS, from everyday products,” notes Valvi.[32]

Here are several strategies that can help in your everyday life. You can find additional helpful tips in EWG’s “Guide to Avoiding PFAS.”[33]

Pretreated or stain-repellent treatments — Opt out of these treatments on clothing, furniture and carpeting. Clothing advertised as "breathable" is typically treated with polytetrafluoroethylene, a synthetic fluoropolymer.

Products treated with flame-retardant chemicals — This includes furniture, carpet, mattresses and baby items. Instead, opt for naturally less flammable materials such as leather, wool and cotton.

Fast food and carry-out foods — The containers are typically treated.

Microwave popcorn — PFAS may be present in the inner coating of the bag and may migrate to the oil from the packaging during heating. Instead, use “old-fashioned” stovetop non-GMO popcorn.

Nonstick cookware and other treated kitchen utensils — Healthier options include ceramic and enameled cast iron cookware, both of which are durable, easy to clean

and completely inert, which means they won't release any harmful chemicals into your home.

Personal care products containing PTFE, "fluoro" or "perfluoro" ingredients such as Oral B Glide floss — The EWG Skin Deep database is an excellent source to search for healthier personal care options.[34]

Sources and References

- [1, 2] Science of the Total Environment June 25, 2023, Volume 879, 163081
- [3] NIH, National Institute of Environmental Health Sciences, PFAS
- [4, 6, 7, 9] CNN March 20, 2023
- [5, 8] Environmental Health Perspectives February 22, 2023
- [10] Sci Total Environ. 2023 May 15;873:162267. doi: 10.1016/j.scitotenv.2023.162267. Epub 2023 Feb 17
- [11] Salon March 23, 2023
- [12, 13, 31, 32] Mount Sinai March 17, 2023
- [14] Environ. Sci. Technol. 2022, 56, 19, 13845–13857
- [15, 16] CBS News March 30, 2023
- [17] NPR January 19, 2023
- [18] Class Action Complaint, Filed October 28, 2022
- [19] Toxic-Free Future, Toxic Convenience
- [20, 30] TIME March 15, 2023
- [21, 26] U.S. EPA March 14, 2023
- [22] ProPublica June 20, 2018
- [23] Environmental Science and Technology Letters August 9, 2016, Results and Discussion, Abstract
- [24, 27] EWG October 14, 2020
- [25] Environ. Sci. Technol. Lett. 2020, 7, 12, 931–936
- [28] EWG January 17, 2023
- [29] New Jersey Drinking Water Quality Institute, Recommendation on Perfluorinated Compound Treatment Options for Drinking Water, June 2015
- [33] EWG's Guide to Avoiding PFAS
- [34] Environmental Working Group Skin Deep Database