

Should You Be Concerned About PFAS Chemicals?

These 'forever chemicals' are in our water supply—and in the body of nearly every American

By Kevin Loria
April 08, 2019



A group of substances known as PFAS chemicals are behind a variety of everyday conveniences that make our lives a little bit easier.

They line pizza boxes and fast-food packaging so grease doesn't seep through, form the nonstick coating on many pans, make fabrics and carpets stain-resistant, and help outdoor gear and clothing repel water.

If you live near industrial facilities where these products are produced or near places where PFAS-loaded fire-fighting foams are used, like airfields or military bases, these chemicals may also be in your water supply. And they can travel far from the original site of contamination. Once PFAS chemicals make their way into water, they can also be found in plants and animals, including humans.

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PFAS
chemicals
have been in
wide use
since at least
the 1950s,
and federal
studies of
the U.S.
population
have found
them in
nearly all
people
tested. At

high enough levels, some of these

chemicals can have serious health effects, according to the Centers for Disease Control and Prevention (CDC), including decreased fertility, hormonal changes, increased cholesterol, weakened immune system response, increased cancer risk, and growth and learning delays in infants and children.

“PFAS are materials of which the average person should be aware,” says James Dickerson, Ph.D., CR’s chief scientific officer. “CR has investigated the issue of chemical exposure for 80 plus years. PFAS and similar compounds have emerged as significant potential risks that should be mitigated.”

Recently, federal and state regulators have raised concerns about how many people are exposed to these chemicals and whether or not current levels of exposure are safe.

In February the Environmental Protection Agency (EPA) announced an Action Plan to better understand and address PFAS contamination. Soon

after, CDC officials announced plans to expand a program studying the PFAS levels in people near military bases, who may have absorbed high levels of these chemicals in drinking water. In March a bipartisan group in Congress introduced legislation declaring PFAS chemicals as hazardous substances eligible for cleanup funds under the Superfund law. Later that month, another bipartisan group of senators and congresspeople introduced a bill that would provide the U.S. Geological Survey with funding to develop new ways to detect PFAS and to conduct testing. And states around the country, including Michigan, New Jersey, and Washington, have all begun to take measures to limit or clean up PFAS contamination.

But there are still a lot of unknowns, including whether the PFAS chemicals most in use today are more or less harmful than those used in the past. Consumer Reports spoke with a number of experts to understand what

exactly these chemicals are, where most of us are exposed to them, why they may be risky, and what you can do to limit your exposure.

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What Are PFAS Chemicals?

There are more than 4,700 different PFAS chemicals, or per- and polyfluoroalkyl substances.

While there is a very specific chemical definition of PFAS, what's important to

know is that these substances have unique properties that make them heat-resistant, able to repel water, and close to indestructible. They have these properties because of the extremely strong and stable chemical bond formed between carbon and fluorine atoms, which is what makes them useful for a wide variety of industrial and commercial products.

“Within this really big family of chemicals, we have quite a bit of information about just a handful, two in particular—PFOS and PFOA,” says Laurel Schaidler, Ph.D., a research scientist at the Silent Spring Institute, a nonprofit that conducts research on the health effects of environmental chemicals.

Those two chemicals, which were used for a wide variety of purposes ranging from fire-fighting foam to creating consumer goods like nonstick pans and stain resistant textiles, are no longer produced in the U.S., in part because we’ve learned quite a bit about the negative health effects of

exposure to them. But Americans are still absorbing these chemicals today because they continue to be produced in other countries and because PFOS and PFOA produced decades ago linger in our soil and water.

While we don't know as much about other PFAS chemicals, they all have this feature in common: The chemical bonds that hold them together "don't break down" under normal circumstances, says Jamie DeWitt, Ph.D., an adjunct associate professor of biological sciences at North Carolina State University. Because of that, she says, some people call these substances "forever chemicals."

That's why it's especially important to be cautious about using them, says Arlene Blum, Ph.D., the founder and executive director of the Green Science Policy Institute and a research associate in chemistry at the University of California, Berkeley.

In addition to lining packaging and coating furniture and clothing, PFAS

chemicals are used in electronics, wires, and cables used to send data, and in the production of computer chips, among other things. The FluoroCouncil, an industry group that represents companies that produce and use PFAS chemicals, describes them as “integral to modern life.”

But while the chemicals may be necessary for some of these technological uses, experts and advocates are concerned that we don't know whether or not present levels of human exposure are safe, especially for people in communities with drinking water or food sources that contain high levels of PFAS.

Is Exposure to PFAS Chemicals Dangerous?

There's clear evidence that being exposed to high enough levels of PFOS and PFOA is linked to an elevated risk for a number of diseases, and experts

say it's possible that other PFAS chemicals could have similar health effects. But more research is needed—and it is unclear exactly what the threshold is for exposure that causes harm.

Because continuous exposure to high levels is what increases risk the most, however, people exposed through their drinking water are a particular source of concern, experts say. ([See below for information about water filters and other means of limiting exposure.](#))

These substances can build up in the human body over time. It takes three to five years for concentrations of older PFAS chemicals like PFOS and PFOA to drop by half in the human body, [according to the CDC](#). Newer replacement chemicals leave the human body much more quickly—sometimes in days or even hours—but like older chemicals, they don't break down in the environment and can travel great distances.

The EPA doesn't regulate the presence of PFAS chemicals in public water systems, but that's something that may change, according to the Action Plan announced earlier this year. Though the agency doesn't take any regulatory action, it has publicly flagged water tests that show levels of certain PFAS chemicals exceeding 70 parts per trillion. But many experts think that level is far too high—something supported by the publicly released draft of a new CDC toxicology analysis of PFAS. For example, New Jersey, one of the states leading the way toward protecting residents, has set far lower maximum contaminant levels of 13 or 14 parts per trillion for various PFAS chemicals.

Much of the research that revealed the harm of elevated levels of PFOS and PFOA comes from an environmental study of more than 69,000 people that was created in 2005 as part of a settlement agreement. That was sparked by a series of lawsuits in 2001 and 2002 that accused the DuPont

chemical company of contaminating drinking water in the Ohio River Valley.

That research found that people who'd been exposed to higher than normal levels of PFOA had an elevated risk of high cholesterol, ulcerative colitis, thyroid disease, testicular cancer, kidney cancer, and pregnancy-induced hypertension. Other studies in people and animals have shown that high enough doses of PFAS chemicals like PFOA can affect the immune system and have toxic effects on the liver and other organs.

Are Newer PFAS Chemicals Safer?

In 2006 the EPA asked eight leading companies in the PFAS industry to reduce their use of PFOA by 95 percent by 2010, which helped spur the development of some newer PFAS chemicals.

But the health effects of the PFAS

chemicals used instead of PFOS and PFOA are less known. As these newer chemicals accumulate in the drinking water in some areas of the U.S., scientists and state officials are trying to determine how they affect humans. At least some of them can be eliminated from the body more quickly than PFOS and PFOA and may be less toxic, according to DeWitt—but they still might cause problems, she cautions.

“Can we accept something that’s less toxic?” she asks, or “do we want something that’s safe?”

A FluoroCouncil representative told CR that the chemical alternatives that companies have developed to replace PFOS and PFOA are indeed well-studied and safe.

The group says that these substances have been adequately reviewed by regulatory agencies and that consumers should not be concerned. New chemicals introduced after the 2016 Toxic Substances Control Act

have been reviewed by the EPA based on reports submitted by manufacturers. The agency has reviewed hundreds of new PFAS substances since the PFOA phaseout began, but the experts we consulted call for tighter regulation from the EPA on these chemicals because they say the current review process doesn't guarantee safety.

“New FluoroTechnology products are based on different chemistry, and this new chemistry has a favorable health and safety profile,” Rob Simon, a spokesman for the FluoroCouncil, said in a statement. “It is critical to consider actual exposure to a chemical when assessing its safety. Any chemical—even water and oxygen—can be toxic if too much is ingested or absorbed into the body ... Unfortunately, the current public discussion about PFAS, and about chemicals in general, has defaulted to a conversation about the mere presence of a chemical—even at extremely low, barely detectable levels—rather than the safety of these

chemicals.”

Some experts, however, say there’s simply not enough data to assert that people exposed to these chemicals—at existing levels—are not at any risk of harm. “Because they have similar chemical properties [to PFOS and PFOA], there’s concern that [the newer PFAS chemicals] may raise similar health concerns,” Schaider says.

They also may be even more difficult to remove from drinking water, she says. Filters that efficiently remove PFOA and PFOS from water (see [below](#)) don’t work as well for new chemicals.

Plus, even if the new alternatives are safer than PFOA and PFOS, that doesn’t mean that chronic exposure to them is safe, Dickerson says. It takes time for agencies like the EPA and the Food and Drug Administration to evaluate chemicals thoroughly. And some chemicals in use for decades are only later found to be dangerous, he says—after we have enough long-term

data to assess them properly.

With thousands of different PFAS chemicals—hundreds of them in use—regulating or evaluating all of them individually is basically impossible, says Schaider, who adds that many scientists think we should regulate them as a broad class instead.

How Can Consumers Limit Exposure?

You can't avoid all exposure to PFAS, and in many cases, you may not necessarily need to, Dickerson says. But he says it's worth being aware of your exposure, especially for people who live in places with particularly high levels of PFAS chemicals, such as in the communities near military bases that the CDC is now studying.

We still don't know all potential sources of exposure, says Schaider, and it can be particularly hard to know how much your food sources have been contaminated by these

chemicals. But there are certain forms of common exposure that experts say you can avoid.

Check your drinking water. “The most dangerous way that people are exposed to PFAS is through drinking water,” says Don Huber, director of product safety at Consumer Reports.

Between 2013 and 2015, the EPA required that water systems test for six PFAS chemicals. If you have a public water system, you can check your annual water quality report from those years and see whether your levels of certain PFAS chemicals exceeded the EPA's advisory level. You can also [check data from the EPA testing results](#) or look at this [map created by researchers from the Environmental Working Group and Northeastern University](#) based on that data. The EPA doesn't currently require routine monitoring for PFAS, but some states do. Contact your local water utility to see whether there's ongoing testing for PFAS chemicals, which can also be called PFCs.

If your home is not on a public water system, you can have your water tested. To find a certified lab, contact your local health department or the EPA.

Consumers who learn that their water has high levels of PFAS chemicals in it should consider installing reverse-osmosis filters, says Huber, which are the most effective at filtering them out. Carbon filters that can be connected to faucets or installed where water enters your home are also effective, especially for PFOA and PFOS, says Schaider, though they may not work as well for some of the newer alternative chemicals. At times states have advised residents to drink bottled water until treatment is available.

Minimize use of stain-resistant fabric. It may be worth choosing carpet and furniture brands that don't use stain-resistant or water-resistant coating on fabric, according to Schaider.

Beware of certain food packaging.

Fast-food packaging and microwave popcorn bags often contain PFAS chemicals, according to DeWitt. “From a precautionary point of view, I think it makes sense to minimize our use [of these products],” says Schaidler.

Think big picture. Consider how you can reduce your overall exposure in ways that will have the most significant impact, Dickerson suggests.

Certain products are easy to replace, DeWitt says, such as a type of dental floss that was recently discovered to be a source of PFAS. But she says that for her, the water-resistance in outdoor gear, for example, is worth some potential exposure.

Dickerson says that products like nonstick pans shouldn't shed PFAS chemicals when they're used according to manufacturer specifications, but don't overheat them, scrape them excessively, or put them in a dishwasher if they're not meant to be cleaned that way. (CR's cookware ratings indicate when nonstick

cookware is PFOA-free, but these nonstick items—unlike stainless steel or cast iron cookware—probably contain other PFAS chemicals.)

While it may not be possible to remove PFAS from all consumer products, some companies have taken steps in that direction. Ikea started to phase out stain-resistant PFAS chemicals in 2009 and says that all of its textiles were PFAS-free by 2016. H&M says that since 2013 it has had a ban on PFAS within apparel, shoe, and household goods departments. And Schaider says that in many cases, alternatives are available—such as PFAS-free food wrappers—and consumers can push companies to use them.

There are still plenty of unknowns, she says, including how much we absorb PFAS from food sources. Making some of those unknowns public would be a key step.

“I’d like for people to know what types of products contain PFASs and that there are alternatives that are out

there,” she says. “Consumers can be vocal and shift manufacturing practices.”

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