

# How Many Forever Chemicals Are in Your Contact Lenses?

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✓ Fact Checked

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## STORY AT-A-GLANCE

- › Mamavation, in partnership with Environmental Health News, had 18 different brands of contact lenses tested for organic fluorine, a marker for PFAS
- › All the contact lenses tested positive for fluorine, at levels ranging from 105 to 20,700 parts per million (ppm)
- › While 44% of the contact lenses tested contained fluorine at a level over 4,000 ppm, 22% contained more than 18,000 ppm
- › A large population-based study conducted in China found exposure to PFAS increased the risk of visual impairment
- › PFAS is likely used in contact lenses to make them soft and allow oxygen to flow through, but the chemicals are linked to reproductive and developmental problems, cancer, liver disease and more

Toxic polyfluoroalkyl or perfluoroalkyl chemicals, collectively known as PFAS, may be lurking in your contact lenses. The compounds, which have been dubbed “forever chemicals” because they break down so slowly, have been linked to reproductive and developmental problems,<sup>1</sup> cancer, obesity,<sup>2</sup> nonalcoholic fatty liver disease (NAFLD)<sup>3</sup> and more.

PFAS is known for making surfaces slippery, hence their widespread use in nonstick cookware. They’re also found in many other consumer products, however, including food takeout containers, food packaging, stain- and grease-resistant products, furniture and

personal care products. Many people are unaware these chemicals are in products they use daily, including contact lenses, which may spend up to 16 hours next to your eye each day.

## Contact Lenses ‘Almost Pure PFAS’

Mamavation, in partnership with Environmental Health News, has been investigating PFAS in everyday products such as clothes, food and makeup.<sup>4</sup> Many social media users had asked the wellness blog if soft contact lenses contain PFAS, so they sent 18 different brands to a laboratory certified by the U.S. Environmental Protection Agency to test for organic fluorine, a marker for PFAS.

All the contact lenses tested positive for fluorine, at levels ranging from 105 to 20,700 parts per million (ppm). While 44% of the contact lenses tested contained fluorine at a level over 4,000 ppm, 22% contained more than 18,000 ppm.<sup>5</sup> The contact lenses with the highest organic fluorine levels were:<sup>6</sup>

- Alcon Air Optix Colors with Smartshield Technology (20,700 ppm)
- Alcon Total30 Contact Lenses for Daily Wear (20,400 ppm)
- Alcon Air Optix (No Hydraglide) for Astigmatism (20,000 ppm)

What does this mean in terms of your health? Pete Myers, chief scientist for Environmental Health Sciences, said:<sup>7</sup>

*“The presumption that these organic fluorine levels measured in contact lenses are safe is laughable. Last summer the EPA issued health advisories in drinking for four common PFAS, ranging from 0.004 parts per trillion (ppt) to 2000 ppt. EPA considers exposure beneath these thresholds to be safe for drinking water.*

*While comparing drinking levels in water to concentrations in contact lenses is like comparing apples to oranges, it’s worth noting that all of **the contact lenses tested exceeded 100 ppm, which is equivalent to 100,000,000 ppt, or 50,000 times higher than the highest level deemed safe in drinking water by the EPA.**”*

Manufacturers don't have to disclose when PFAS are used in their products. It's legal to claim the contents are a "trade secret."<sup>8</sup> But according to Scott Belcher, a North Carolina State University researcher and scientific adviser on the testing, fluoropolymers are likely.

He told The Guardian fluoropolymer PFAS "have the properties that your eyes want ... It wants to get oxygen and doesn't want bacteria to grow like crazy, and it wants lenses to be smooth and comfortable."<sup>9</sup> Fluoropolymers likely make contact lenses soft and allow oxygen to flow through them,<sup>10</sup> but the convenience of having smooth contact lenses comes at a price.

A 2020 review into the chemicals found "their production and uses should be curtailed except in cases of essential uses," given their extreme persistence in the environment, toxic emissions associated with their production and use, and a high likelihood that they contribute to human exposure to PFAS.<sup>11</sup>

## **PFAS Exposure May Harm Your Vision**

Little is known about how the eyes may absorb PFAS, but the chemicals are known to be absorbed via the skin, leading to immunotoxicity.<sup>12</sup> Further, The Guardian reported, "PFAS also break down into different types of PFAS once in the environment, so it is possible that the polymers turn into dangerous forms of the chemicals once in the eye or contact packaging, but no studies have been done."<sup>13</sup>

Linda Birnbaum, scientist emeritus and former director of the National Institute of Environmental Health Sciences and National Toxicology Program, further told Mamavation:<sup>14</sup>

*"Your eyes are one of the most sensitive parts of your body. Therefore, it's concerning to see the presence of organic fluorine, which is likely a type of PFAS, found in all soft contact lens products tested. What about the idea of doing no harm? Do we have proof these products are safe? A lack of safety studies does not qualify as 'safety,' which is what is happening here."*

Research that has been done on PFAS and vision is cause for concern. A large population-based study conducted in China found exposure to PFAS increased the risk of visual impairment.<sup>15</sup> The researchers suggested PFAS may induce oxidative stress, with a detrimental effect on the eyes.

“PFASs are proven pro-oxidants and exposure to these emerging pollutants elicits DNA damage, lipid peroxidation, generation of reactive of species (ROS), and inhibition of anti-oxidant enzymes, as well as triggers signaling cascades like apoptosis,” they explained.<sup>16</sup> Military members who were exposed to PFAS on military bases have also suffered from a number of eye conditions, including myopia, hyperopia, astigmatism and presbyopia.<sup>17</sup>

## **Using PFAS Contacts May Leave You ‘Permanently Contaminated’**

More than 98% of Americans have PFAS in their blood.<sup>18</sup> But using contacts made from the material daily could leave you permanently contaminated. According to Terrence Collins, director of the Institute for Green Sciences at Carnegie Mellon University:<sup>19</sup>

*“Fluoropolymers improve the technical performance of contact lenses at attractive price performances and customers are naturally attracted. But the other key performances for safe and sustainable chemical products, the health, environmental and fairness performances, are not given adequate attention by manufacturers, legislators, or regulators.*

*If you use fluoropolymer-containing contact lenses, you are likely to become permanently contaminated. No one today can tell you that fluoropolymer exposures are safe because no jurisdiction has been demanding the development and scrutiny of appropriate safety testing.*

*Your body cannot process fluoropolymers to safe products to protect you and nature is just as helpless when you throw the lenses away. But we know enough about PFAS chemicals to guess and fear that fluoropolymers in human cells or*

*in the environment are anything but a pretty safety picture. I advise that such contact lenses be rigorously avoided.”*

The environmental ramifications are also cause for alarm, considering more than 45 million Americans wear contact lenses – and up to 46% of them wear disposable varieties that are trashed daily. Every year, 2.5 billion contact lenses – about 44,000 pounds’ worth – are thrown away or end up in wastewater treatment plants after they’re flushed down a toilet or sink.<sup>20</sup>

In the environment, PFAS have devastating effects, to the extent that consuming a single serving of freshwater fish annually equates to a month of drinking water contaminated with PFOS – one type of PFAS – at a concentration of 48 parts per trillion.<sup>21</sup>

PFAS does not break down in water or soil and can be carried over great distances by wind or rain, according to the U.S. Department of Health and Human Services’ Agency for Toxic Substances and Disease Registry (ATSDR).<sup>22</sup>

## **PFAS Exposure Linked to Significant Health Risks**

If your contact lenses contain PFAS, you may want to reconsider using them. Exposure to high levels of PFAS is also known to affect the immune system, and evidence from both human and animal studies shows that such exposure may reduce your resistance to infectious disease.<sup>23</sup> The EPA also acknowledges that PFAS exposure is harmful and states that peer-reviewed scientific studies have shown exposure to PFAS may cause:<sup>24</sup>

Reproductive effects such as decreased fertility or increased high blood pressure in pregnant women

Developmental effects or delays in children, including low birth weight, accelerated puberty, bone variations or behavioral changes

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Increased risk of some cancers, including prostate, kidney and testicular cancers

Reduced ability of the body’s immune system to fight infections, including

reduced vaccine response

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Interference with the body's natural hormones

Increased cholesterol levels and/or risk of obesity

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Liver disease is another known risk. PFAS are endocrine-disrupting chemicals that accumulate in body tissues, such as the liver, and are known to accelerate metabolic changes that lead to fatty liver.

“This bioaccumulation,” researchers wrote in *Environmental Health Perspectives*, “coupled with the long half-lives of many PFAS, leads to concern about the potential for PFAS to disrupt liver homeostasis should they continue to accumulate in human tissue even if industrial use is abated.”<sup>25</sup>

## How Else Can You Be Exposed to PFAS?

In addition to contact lenses, PFAS can be found in water, soil, air and food. It's in your home, including in household products like stain- and water-repellant fabrics, cleaning products, nonstick cookware and paint – and likely in your drinking water.<sup>26</sup>

Fast food containers and wrappers, microwave popcorn bags, pizza boxes and candy wrappers<sup>27</sup> are also common PFAS sources. One study released by consumer watchdog groups Safer Chemicals, Healthy Families and Toxic-Free Future even revealed high levels of fluorine in five of 17 paper products that come in contact with food at Whole Foods Market – four of which were containers in the salad and hot food bar.<sup>28</sup>

Testing by Mamavation has also found evidence of PFAS in pasta and tomato sauces, sports bras, tampons and dental floss.<sup>29</sup> Since the chemicals migrate into food and contaminate compost piles and landfills after disposal, the use of PFAS leads to unnecessary long-term exposure to harmful chemicals for humans, wildlife and the environment, especially since PFAS-free packaging options are widely available.

## Tips for Avoiding PFAS

PFAS has no taste or smell but is widespread in the environment and in consumer products. You'll want to filter your drinking water to avoid this common route of exposure. Also avoid products that are stain-resistant, waterproof or nonstick, as most contain PFAS.

Regarding contact lenses, you can avoid PFAS exposure by using glasses instead. To further reduce your exposure, the Environmental Working Group recommends avoiding:<sup>30</sup>

**Items that have been pretreated with stain repellants** and opt out of such treatments when buying new furniture and carpets.

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**Water- and/or stain-repellant clothing.** One tipoff is when an item made with artificial fibers is described as "breathable." These are typically treated with PTFE.

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**Items treated with flame retardant chemicals,** which includes a wide variety of baby items, padded furniture, mattresses and pillows. Instead, opt for naturally less flammable materials such as leather, wool and cotton.

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**Fast food and carry out foods,** as the wrappers are typically treated with PFAS.

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**Microwave popcorn.** PFAS may not only be present in the inner coating of the bag, it also may migrate to the oil from the packaging during heating. Instead, use "old-fashioned" stovetop popcorn.

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**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. A newer type of nonstick cookware called Duralon uses a nonfluoridated nylon polymer for its nonstick coating. While this appears to be safe, your safest bet is still ceramic and enameled cast iron.

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**Oral-B Glide floss and any other personal care products containing PTFE** or "fluoro" or "perfluoro" ingredients.

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## Sources and References

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- <sup>1, 21</sup> EWG January 17, 2023
- <sup>2</sup> Environ Health Perspect 123:A107–A111, Madrid Statement
- <sup>3</sup> Environmental Health Perspectives April 27, 2022
- <sup>4</sup> Environmental Health Perspectives February 14, 2022
- <sup>5, 7, 17, 19, 20</sup> Mamavation, Indications of PFAS 'Forever Chemicals' in Contact Lenses — Report, April 18, 2023
- <sup>6, 8, 9, 13</sup> The Guardian May 9, 2023
- <sup>10, 14, 29</sup> Environmental Health Perspectives April 26, 2023
- <sup>11</sup> Environ. Sci. Technol. 2020, 54, 20, 12820–12828
- <sup>12</sup> Food and Chemical Toxicology February 2020, Volume 136
- <sup>15, 16</sup> Environment International April 2020, Volume 137
- <sup>18</sup> Environ Health Perspect. 2007 Nov; 115(11): 1596–1602
- <sup>22</sup> Politico May 14, 2018
- <sup>23</sup> ATSDR, What are the health effects of PFAS?
- <sup>24, 27</sup> U.S. EPA, Our Current Understanding of the Human health and Environmental Risks of PFAS
- <sup>25</sup> Environmental Health Perspectives April 27, 2022, Intro
- <sup>26</sup> Environmental Science and Technology Letters August 9, 2016
- <sup>28</sup> Eater December 11, 2018
- <sup>30</sup> EWG's Guide to Avoiding PFCS (PDF)