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Opinion

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PFAs the Forever Chemicals

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It comes to our attention that PFAs (also called forever chemicals) are so pervasive in our daily lives, and it looks like we cannot avoid them anywhere we live. So, what are PFAs? How do they negatively affect our lives? And how can we avoid them or keep them out of our bodies? We did some research on this topic and think it deserves our attention to write something as this relates to public health and our well-being. First of all, what are PFAs? The U.S. Food & Drug Administration (FDA) provides a clear definition of these man-made chemicals [1]: "Per- and poly-fluoroalkyl substances (PFAs) are a diverse group of thousands of chemicals used in hundreds of types of products." They are chemicals that have a common carbon-fluorine bond, which is very strong, and difficult to break down. This means that they can stay for a long time in the environment and our body. They can resist grease, oil, water, and heat, and they are widely used in cookware (such as Teflon), food packaging, water-resistant clothing and furniture, flooring materials, etc., and almost everything. They are even used in our dental floss, which makes it easy to enter our body. It is very hard to find any product today that does not have PFAs. It is estimated that more than 97% of the population in the US have PFAs in their blood, and drinking water is the major pathway of PFA exposure. According to government statistics, at least 45% of the nation's tap water contains one or more PFAs [2]. In one word, they are harmful chemicals acknowledged by the FDA and the U.S. Environment Protection Agency (EPA) [3]; they are widely used in our daily lives, and yet the agencies haven't put in enough effort to make the general public aware of how harmful the PFAs are.

Although PFAs have been manufactured for over 80 years, and widely exist in our daily lives, research on the effects of PFAs related to human health is only about six years. There is evidence that PFAs widely exist in animal and human blood, and they can cause many health issues, including but not limited to cancer, fertility issues, and increased risk of certain diseases such as liver disease, kidney disease, thyroid disease, lipid and insulin dysregulation, etc. [4]. However, given that PFAs have only been studied for a very short time, the full extent of their risk and related health effects is yet to be fully explored. What is known about PFAs is that they can increase risk among groups such as pregnant women and children or those who already have poor immune systems. But how exactly can PFAs create such harm regarding human health? Since PFAs include over a thousand different chemicals, only a few have been studied so far, and more detailed research is urgently needed in this area.

PFAs as stated before are made out of a stable carbon-fluorine bond, which gives them limited reactivity with other chemicals. Adding the fact that they are bio accumulative, which means that once they enter the human body, they stay there and are hard to get rid of, hence health risks can increase over a lifetime as PFAs build up in the body. Along with the little to no knowledge of the removal of PFAs from the environment and human body once introduced, prevention is seen as the only way for now of reducing PFA build-up. A practical way to reduce PFAs is to avoid drinking directly from tap water and use a water filter instead. Boiling water does not remove PFAs and may increase the concentration of them. Another practical way is to avoid using a cooking pot that has PFAs

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on the surface [5]. For example, replace a Teflon cooking pot with a stainless steel one. Food packing is another major source of PFAs, for example, papers used in wrapping food were coated with a film containing PFAs. A simple way to check whether some surface has PFAs or not is just to drop some water on it: if the water is absorbed, it has no PFAs, but if the water drop is rolling on the surface, then it has PFAs.

So far, there are no definitive medical procedures that can clear PFAs from our bodies. Some PFAs could leave the body through urine slowly over time. People who have kidney disease may have trouble removing PFAs from their body through their urine. Some PFAs can leave the body in blood during menstruation. Therefore, maybe one possible way to decrease the PFAs in our body is to draw a little blood periodically, say once every two or three months. But can this blood be donated directly to the Red Cross? Is there any way to remove the PFAs from the donated blood? These are critical research questions that need a deep understanding and research. Right now, the blood donated to the Red Cross contains PFAs already, which is sad. Finally, we would like to provide a simple protocol for testing the effectiveness of the blood drawing method to decrease PFAs in the blood. We can design a completely randomized clinical trial with two arms: a study and a control arm. Healthy males between 18 and 60 are recruited and randomly assigned to the two arms. People in the study arm will be scheduled to draw one-half pint of blood every two months [6]; people in the control arm will not. The whole study can be lasted for 12 months. The PFAs in all participants' blood are measured at the baseline and every time after the blood draw; hence seven measurements will be collected from each individual. A longitudinal study can be used to compare the differences in the PFAs concentration between the two groups as time goes by, and also how the PFAs change for each individual. If blood draw is effective, then at least it provides one possible way to get rid of PFAs from our body. The study excludes females as menstruation adds a confounding factor, and makes it harder to test the blood draw method's effectiveness. In summary, PFAs are pervasive in our lives and pollute our food, clothes, living space, and soil. More regulations are needed to limit these chemical compounds in commercial products. And we have to learn how to protect ourselves from these forever chemicals if we want to live a healthy life.

Acknowledgement

None.

Conflict of Interest

None.

References

1. https://www.fda.gov/food/environmental-contaminants-food/and-polyfluoroalkyl-substances-pfas
2. Darlington R, Barth E, and McKernan J (2018) The Challenges of PFAS Remediation. Mil Eng 110(712): 58-60.
3. https://www.epa.gov/pfas/pfas-explained
4. Fenton SE, Ducatman A, Boobis A, et al. (2021) Per- and Polyfluoroalkyl Substance Toxicity and Human Health Review: Current State of Knowledge and Strategies for Informing Future Research. Environ Toxicol Chem 40(3): 606-630.
5. https://earthjustice.org/feature/breaking-down-toxic-pfas
6. https://www.redcrossblood.org/faq.html