



Health & Wellness



The Mysterious PFAS and Me



Dr. Kate Thomsen and Silky

"We do not weave the web of life, we are merely a strand in it. Whatever we do to the web, we do to ourselves." —Chief S'tahl, Seattle Suquamish Leader.

Perfluoroalkyl substances, or PFASs are a large group of man-made fluorinated chemicals that repel oil and water and are resistant to heat and chemical reactions. Two members of this slippery class of chemicals are PFOA (Perfluorooctanoic acid), and PFOS (perfluorooctane sulfonate). They are the most well studied because they have been around a long time.

For fifty years, DuPont, in its Washington Works plant in West Virginia, was using PFOA to manufacture the fluoropolymer, Teflon. From 1951 to 2003 DuPont disposed of more than 1.7 million pounds of PFOA from its manufacturing plant into the environment: 600,000 pounds into the Ohio River, 400,000 pounds trucked into unlined landfills and buried, and 700,000 pounds forced through smokestacks into the air settling in human respiratory tracts, on skin, on plants, and on surface water. The death of cattle on a farm near the Washington Works plant prompted a lawsuit against DuPont in 1988. This created some buzz in the community as residents suspected there was more than the usual amount of thyroid disease and cancer in the area. Public health officials uncovered the decades long widespread contamination. They tested 70,000 residents and found their average blood level of PFOA to be 83 parts per billion compared to 4 parts per billion in the overall US population. This investigation became the longest and largest exposure study to date. PFOA is an eight carbon molecule referred to as C8. In 2012 the C8 Science Panel found PFOA had a probable link to pregnancy-induced hypertension and pre-eclampsia, testicular and kidney cancer, thyroid disease, ulcerative colitis and elevated cholesterol. DuPont settled 3,550 personal injury lawsuits for \$670.7 million, was fined another \$16.5 million from the EPA for hiding information, had to pay for the PFOA clean-up and replacement of the public water supply, AND had to phase out it's billion-dollar baby, PFOA, which it did by

2015. A feature length movie, "Dark Waters", based on the environmental lawsuit and health effects of the exposure was released in Nov 2019.

Since the DuPont episode, a 2014 research review found that PFOA and PFOS are associated with low birth weight and could be considered "toxic" to reproduction. A 2016 systematic review by the US National Toxicology Program concluded that PFOA and PFOS are immunosuppressive. Strong evidence exists that they produce a decreased response to vaccines. Research shows that unlike many toxins that accumulate in fat, C8 attaches itself to a protein in the blood and uses the blood as it's "storage site". Travelling through the blood, it can attack every organ in the body: the thyroid, GI tract, urinary system, reproductive system among others. Studies of the health effects of these chemicals are ongoing even though the chemicals are no longer made. Why? 1) because these substances are called "forever" chemicals or persistent organic pollutants (POPs). They are very stable molecules, meaning it is difficult for the body or the environment to break them down. The half-life of a chemical is the amount of time it takes for over 50% of the substance to be metabolized and eliminated from the body. The half-life of PFOA is 2 - 10 years. The half-life of PFOS is 3 - 27 years. These chemicals bioaccumulate in the food chain and they are found in all manner of wildlife. They will be with us for a very long time. 2) PFASs are ubiquitous. They are found in soil, air and groundwater sites across the US. A 2015 report by the CDC using NHANES (National Health and Nutrition Examination survey) data found there were PFASs in the blood of 97% of Americans studied. Contamination of drinking water has become a major concern. C8 from the DuPont plant in West Virginia (in the mid Ohio valley) has spread as far south as New Orleans and as far north as Pittsburgh. PFASs have been found in 49 states. More than 1,500 drinking water systems serving about 110 million Americans having been contaminated with PFAS chemicals. The scope of this public health problem is enormous. Some have called it "this generation's PCBs". But it is worse than PCBs. PFASs are even more persistent in the environment and they affect many more body systems than PCBs.

The most common source of exposure to PFASs is drinking water. This includes municipal water systems and private/public wells. But we are not all drinking DuPont's legacy. Water contamination comes mostly from aqueous film-forming foam (AFFF) used by firefighters for Class B fires. These are fires fueled by petroleum or flammable liquids. Military bases have long been a site

of firefighting exercises and are often heavily PFAS contaminated sites. The Department of Defense has identified 401 military installations with known or potential contamination. Airports are also areas used for firefighting exercises. Industrial sites that manufacture or use PFAS chemicals can also be a source of contamination. Water moves underground so neighboring areas are often unknowingly affected. Other sources include:

- Diet and Food Related sources (stain and water resistant food packaging like paper take-out containers, microwave popcorn bags, french fry boxes, bakery and deli papers and wrappers, burger wrappers, pizza boxes; seafood harvested from contaminated waters)
- Indoor Air and House Dust (PFASs attach to dust particles and are a source of exposure for crawling children)
- Health and Beauty Aides (dental floss, shampoo, mascara, nail polish - up to 1/3 of all make-up and skin care products)
- Home products (stain resistant coatings on carpets, upholstery, and other fabrics; nonstick cookware like Teflon, paints, varnish and sealants)
- Clothing (water resistant coatings on clothing like CoreTex, water repellent treatments for shoes and boots)
- Industry (being a worker in an industry that makes or uses PFAS chemicals; firefighters)
- Children (fetuses are exposed in utero as PFAS crosses the placenta, infants exposed through breast milk, and children exposed when hand to mouth behavior occurs after crawling on stain proof carpet/furniture)

Amazingly there is no enforceable regulatory standards currently existing for PFAS levels in air or water. In 2016 the EPA issued a lifetime health advisory of 70ng/L as the maximum concentration in drinking water. Since communities all over the US have been affected by PFAS, politicians have been supporting enforceable standards. As the EPA drags their feet, the states themselves have issued policies. Washington state has banned the manufacture and sale of food packaging and class B firefighting foam containing PFAS. Several states have set their own enforceable standards for drinking water and I am proud to say that NJ has set a high bar (low concentration). The maximum concentration allowed in drinking water is: PFOA 14ng/L, PFOS 13ng/L, and PFNA 13ng/L. Way to go Jersey!!!!

The American Academy of Pediatrics issued a policy statement criticizing the regulatory system for food additives including PFAS, call-

Kate Thomsen MD, MPH
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Environmental Protection Agency <https://www.epa.gov/pfas>
ATSDR Agency for Toxic Substances and Disease Registry
<https://www.atsdr.cdc.gov/pfas/index.html>

Northeastern University Social Science Environmental Health Research Institute - PFAS Lab <https://www.northeastern.edu/environmentalhealth/pfas-lab/>
Military Sites with Known or Suspected Discharges of PFAS
<https://www.epa.gov/interactive-maps/2020-military-pfas-sites/map/>

PFAS Contamination in the US
https://www.epa.gov/interactive-maps/pfas_contamination/

Silent Spring Institute <https://www.silent.spring.org/>
Safer States and Toxic Free Future <https://www.nonsticknightmare.org/>

PFAS, COVID-19, and the Immune System
<https://toxicfreefuture.org/science-review-pfas-covid-19-and-the-immune-system/>

Alpha Analytical (tests water for PFAS) <https://alphalab.com/>
Vista Analytical (tests blood for PFAS) <https://www.vista-analytical.com/pfas/>



Office of Dr. Kate Thomsen
252 West Delaware Ave.
Pennington, NJ 08534
609-818-9700

WWW.DRKATETHOMSEN.COM
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ing it insufficient, with potential for conflicts of interest and with inadequate authority to protect human health. NGOs have filed food additive petitions to the FDA but perhaps the testing of products and shaming in the media has leveraged the most change in corporate policy. In December 2018 two organizations (Safer Chemicals, Healthy Families and Toxic Free Future) tested PFASs in food packaging from grocery stores and released the study results to the media. Announcing that Whole Foods Market containers tested positive in 4 out of the 5 samples tested, Whole Foods wasted no time in pulling these products from their shelves. Media shaming and voting with our wallets are strategies that can work when government drags their feet. Our work as activists is far from over though. In our heavily lobbied corporatocracy, all products are innocent until proven guilty - which apparently takes a long time. Ready for this? Since banning PFOA and PFOS, there have been 5000 more PFAS chemicals brought to market. Unbelievable.

To my surprise, in March I received a letter from the NJ Department of Environmental Protection requesting to test my water. There have been some local schools and neighbors that have had contaminants in their wells. Two gentlemen came and sampled my water from the outside spigot - representing my well water. This groundwater comes into my house and is piped through a tangle of UV lights, tanks, sieves, salts and filters before it becomes my drinking water. To my bigger surprise, on May 17, a letter arrived reporting that the DEP sample of my well water was positive for PFAS!! I explained that I should not drink it or cook with it and that I can have

a Point Of Entry Treatment (POET) system installed after I fill out some paperwork. I was shocked. I have my water tested every 2 years for all the chemicals they can test for. I looked up my last test - no PFAS were tested. I learned that PFAS is an "emerging contaminant" and that testing has only recently become available. It is expensive and many companies do not offer it. The price may be from \$200 - \$400 just for the PFAS test. OK - but what if I did not have all these water filters including reverse osmosis under my sink? How long has this plume of PFAS been there? I scratch my head - where did this PFAS come from? I have no industry around here... The DEP does not know the origin either. There is an airport... and when I use the EWG interactive map (link given), there is a military base, the Naval Air Warfare Center in Ewing... I know there has been huge contamination in Bucks and Montgomery County, PA from the Warminster Naval Air Warfare Center... Hmmmm... With the tsunami of PFAS contaminated drinking water we are seeing, better get your water checked. <https://www.epa.gov/tapwater/>. Immunosuppression from PFAS is not in your best interest right now.

Dr. Kate Thomsen's office for holistic health care is located in Pennington, NJ. She is trained in Family Medicine, and Board Certified in Integrative Medicine, and is an Institute for Functional Medicine Certified Practitioner. She has been practicing Functional Medicine for 23 years. For more information see www.drkatethomsen.com or call the office at 609-818-9700.