

United States House of Representatives
Committee on Energy and Commerce
Subcommittee on Environment and Climate Change

“Protecting Americans at Risk of PFAS Contamination & Exposure”

Testimony of Jamie C. DeWitt, PhD, DABT
Associate Professor
Department of Pharmacology and Toxicology
Brody School of Medicine
East Carolina University

May 15, 2019

Brief Summary of PFAS

Per- and polyfluoroalkyl substances (PFAS) are described as “forever chemicals” due to their persistence in the environment. They aren’t readily broken down by sunlight, microbes, or other processes. We, as a scientific community, have not yet uncovered an easy way by which these chemicals can be degraded, so forever chemical is an appropriate description of PFAS. In addition, this class of chemicals is highly mobile once released to the environment. PFAS have been found everywhere scientists have looked, from the Arctic circle to the Marianas Trench.

When exposure occurs, PFAS move from the environment into bodies of plants and animals, including people. Because PFAS are so long-lasting in our environment, scientists do not yet know all of the ways we are exposed to these chemicals. What we do know is that exposure begins in the womb, even before we are born. Exposures then continue throughout the course of a person’s lifetime. Many Americans are exposed daily from sources such as the water they drink, consumer products, and food packaging that contains PFAS. Given that they are forever chemicals, even if production is stopped today, human exposure will be ongoing into the distant future. PFAS also are slow to be excreted from human bodies and can take years to be eliminated. Therefore, concerns for human health are not going away.

Once in our bodies, PFAS interact with a wide range of molecules and biological systems to produce multiple types of adverse health effects. Studies of human populations exposed to PFAS have uncovered adverse health effects to include: kidney and testicular cancer, decreased antibody responses to vaccines, liver damage, changes in serum lipids and cholesterol, increased risk of thyroid disease, increased risk of asthma, increased risk of decreased fertility, decreases in birth weight, and increased risk of pregnancy-induced hypertension and preeclampsia. PFAS are truly “multi-system toxicants.” These forever chemicals possess tremendous risks to Public Health – they are Persistent in the environment and in human bodies; they Bioaccumulate from the environment into the bodies of living organisms, including humans; and they are Toxic and able to produce adverse health effects in humans and wildlife.

Testimony

Chairman Tonko, Ranking Member Shimkus, and Distinguished Members of the Subcommittee on Environment and Climate Change, good morning and thank you for inviting me to speak with you about health effects of exposure to per- and polyfluoroalkyl substances, or PFAS, chemicals that are estimated to contaminate the drinking water of 19 million Americans¹. My name is Dr. Jamie DeWitt and I am an Associate Professor of Pharmacology and Toxicology at the Brody School of Medicine of East Carolina University in Greenville, North Carolina. I have been conducting research on health effects of PFAS since 2005 with a focus on the immune system.

PFAS are a class of nearly 5,000 closely related chemicals that all contain a carbon-fluorine bond. This bond makes them highly stable, heat resistant, and versatile in manufacturing processes and consumer goods. This bond also makes PFAS extremely long-lived in our environment and our bodies because they do not readily degrade. The Centers for Disease Control and Prevention² assesses the US population's exposure to environmental chemicals in a cross-section of the US population. They have reported that 98% of Americans have one or more PFAS in their blood³. Currently, my state of North Carolina part of the PFAS crisis. To better understand PFAS contamination and health risks, I am part of the "PFAS Testing Network,⁴" which is a collaborative partnership of seven different North Carolina-based universities using both federal grants and a substantial state investment to manage and focus our PFAS research efforts. The North Carolina Policy Collaboratory,⁵ which was created in 2016 by the North Carolina General Assembly to better utilize academic expertise across institutions of higher learning within our State and assist policymakers with complex issues that rely on scientific input and expertise, oversees the Network. We can be a model for other states.

¹ EWG: PFAS Chemicals must be Regulated as a Class, Not One by One, <https://www.ewg.org/release/mapping-pfas-contamination-crisis-new-data-show-610-sites-43-states>.

² Centers for Disease Control and Prevention, National Report on Human Exposure to Environmental Chemicals, <https://www.cdc.gov/exposurereport/index.html>.

³ Centers for Disease Control and Prevention, National Biomonitoring Program, Per- and Polyfluorinated Substances (PFAS) Factsheet. https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html.

⁴ NC PFAS Testing Network, <https://ncpfastnetwork.com>.

⁵ The University of North Carolina at Chapel Hill NC Policy Collaboratory, <https://collaboratory.unc.edu>.

Regarding the health effects of PFAS, our scientific understanding is still somewhat limited. Of the 5,000 PFAS, only two have been well-studied and a handful of others have limited data. That said, in the last couple of years there has been a concerted effort among researchers to expand our understanding of PFAS. A comprehensive evaluation of the toxicological data for 14 different PFAS compiled by the Agency for Toxic Substances and Disease Registry⁶ reported that people exposed to PFAS experience prevalence of a wide variety of health effects. These associations include decreased antibody responses to vaccines, liver damage, changes in serum lipids and cholesterol, increased risk of thyroid disease, increased risk of asthma, increased risk of decreased fertility, decreases in birth weight, and increased risk of pregnancy-induced hypertension and preeclampsia. Some populations have also seen increases in kidney and testicular cancer associated with PFAS exposure. These adverse health effects indicate that developing organisms, the immune system, the endocrine system, and lipid metabolism are all sensitive to PFAS exposure and that PFAS also have carcinogenic abilities. These adverse health effects also have been observed in experimental animals fed individual PFAS. Data from experimental animals is an important component of human health effects research as is research into the molecular mechanisms by which PFAS produce adverse health effects. It is this combination of data from studies of exposed human populations, experimental animals, and molecular mechanisms that has broadened our understanding of how PFAS exposure leads to adverse health effects in humans⁷. Finally, it's important to note that as these health effects are being seen at levels lower than the US EPA Health Advisory Level of 70 parts per trillion set in 2016⁸, we now know that this level is not health protective for all Americans.

Prevention, including vaccines, is a first line of defense against diseases. We need vaccines to be as effective as possible. Exposure to PFOA and PFOS, two well-studied PFAS, reduces the

⁶ Agency for Toxic Substances and Disease Registry Toxicological Profile for Perfluoroalkyls, Draft for Public Comment, 2018, <https://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=1117&tid=237>.

⁷ Testimony of Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S., Director, National Institute of Environmental Health Sciences and National Toxicology Program, National Institutes of Health, Hearing on "The Federal Role in the Toxic PFAS Chemical Crisis," Senate Committee on Homeland Security and Governmental Affairs Subcommittee on Federal Spending Oversight and Emergency Management, 09/26/2018.

⁸ US EPA, 2016, FACT SHEET, PFOA & PFOS Drinking Water Health Advisories, EPA-800-F-16-003.

immune system's ability to produce antibodies, making our vaccines less effective. PFAS-associated immune system effects observed in epidemiological studies of children and adults - and in experimental animal studies of individual PFAS - have supported a causal relationship. In 2016, the National Toxicology Program evaluated studies on immune effects of PFOA and PFOS and concluded that they are presumed to be immune hazards in humans⁹. This conclusion was based on evidence that PFOA and PFOS can suppress the ability of the immune system to make antibodies in experimental animals and evidence that they can do the same in humans⁸. The Program also highlighted evidence that PFOA and PFOS can affect multiple immune outcomes, including allergic responses, resistance to infectious disease, and autoimmune disease¹¹.

The US EPA has not set a legally binding regulatory limit for any chemical in two decades; it is time for Congress to act. Of the 5,000 known PFAS, the vast majority have NO associated research data or standards for human biomonitoring. It is not feasible from a time or resource perspective to "TEST" our way out of this crisis. Employing a "CLASS" approach for ALL PFAS will be protective for vulnerable populations and the general public. It is not too late. Following the voluntary removal of PFOA and PFOS, levels of these PFAS have decreased in the environment and in our bodies. Since that time, replacement PFAS have increased in production. We need to learn more about these replacement compounds and ask ourselves, "Are these essential for the public good?"¹⁰ Thank you all for understanding the need for legislation that will diminish the number and amounts of PFAS contaminating our environment and our bodies.

⁹ National Toxicology Program, 2016, NTP Monograph, Immunotoxicity associated with exposure to perfluorooctanoic acid or perfluorooctane sulfonate, <https://ntp.niehs.nih.gov/pubhealth/hat/noms/pfoa/index.html>

¹⁰ Cousins IT, Goldenman G, Herzke D, Lohmann R, Miller M, Ng, CA, Patton S, Scheringer M, Trier X, Vierke L, Wang Z, and DeWitt JC. 2019. The concept of essential use for determining when uses of PFASs can be phased out. *Under review at Environmental Science: Processes & Impacts*. Available online at: https://chemrxiv.org/articles/The_Concept_of_Essential_Use_for_Determining_When_Uses_of_PFASs_Can_Be_Phased_Out/7965128.



<http://ncpfastnetwork.com>

NC PFAS Testing Network

