Icahn School of Medicine at Mount Sinai

Children's Environmental Health Center
Department of Environmental Medicine and Public Health

Icahn School of Medicine at Mount Sinai
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March 19, 2021

Testimony in support of SB 926, AN ACT CONCERNING THE PRESENCE OF PFAS IN CERTAIN CONSUMER PACKAGING.

To the Honorable Chair and Members of the Committee on the Environment,

As public health scientists whose research focuses on the impacts of prenatal and early life environmental exposures on child health and development, we support the passage of SB 926, An Act Concerning the Presence of PFAS in Certain Consumer Packaging. Along with our pediatrician and scientist colleagues at the Icahn School of Medicine at Mount Sinai, we advocate against the use of per- and polyfluoroalkyl substances (PFAS) chemicals and advise communities on the potential harms associated with these exposures. **The passage of SB 926 would be a major step towards protecting Connecticut residents from the harmful effects of this class of toxic chemicals.**

PFAS exposure is widespread and harmful to health. PFAS are a large group of man-made compounds that have been ubiquitous in our environment since their introduction to consumer products in the1940s[1,2]. These fluorinated organic compounds have been deemed "forever chemicals" because they do not readily break down in the environment or in our bodies and accumulate over many years. Due to their grease-resistant and stain- and water-repellent properties, PFAS have high utility for use in a wide range of consumer products including cosmetics, food packaging, textiles, non-stick cookware, and fire-fighting foams [3]. Over 3000 PFAS congeners have been produced which vary in the length of their carbon chains, with long-chain PFAS demonstrating greater toxicity and persistence in the body[1]. Although the long-chain, more toxic PFOA and PFOS were banned for use in products in the U.S. in 2015, many products continue to be manufactured using short-chain PFAS (e.g. GenX, PFBS), which studies suggest have similar toxic properties[4,5].

PFAS is found in the blood of nearly all Americans, including children[6]. Humans are exposed to PFAS through contaminated foods and drinking water or consumer products like grease-resistant food packaging, non-stick cookware, and water-repellant clothing. Despite their recent phaseout, both PFOA and PFOS are present in the blood in high concentrations due to their persistence and widespread environmental contamination [2]. Exposure is associated with a range of adverse health effects: reproductive and developmental toxicity (e.g. infertility, preeclampsia, and miscarriages), thyroid and kidney dysfunction, cancer, and reduced immune response [7-18]. A scientific panel of epidemiologists convened to study the health impacts of widespread PFAS water contamination in the Mid-Ohio Valley found probable links to high cholesterol, ulcerative colitis, thyroid disease, kidney cancer, testicular cancer, and pregnancy-induced hypertension[19].

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The serious impacts of PFAS toxicity are highlighted by the COVID-19 pandemic. Recent studies find that elevated blood levels of some PFAS may increase the risk of more severe COVID-19[20]. In addition, emerging evidence suggests that PFAS may reduce the immune response to vaccination, threatening our ability to achieve herd immunity against COVID-19[21]. CDC studies are currently underway to address whether PFAS exposure is associated with diminished antibody response to the COVID-19 vaccines[22].

Food and consumer packaging is associated with PFAS exposure.
The major route of exposure to PFAS is through ingestion of contaminated water and foods. A recent study of the U.S. population using data from the Centers for Disease Control and Prevention conducted by the Silent Spring Institute found higher blood levels of several PFAS in individuals who reported consumption of microwave popcorn, the bags of which are lined with PFAS chemicals. Participants in the study who reported eating more meals prepared in the home had lower levels of PFAS in their blood, further evidence that packaging used for prepared and takeout foods is a significant source of exposure[23]. Thus, removal of PFAS from food packaging is an expedient and effective way to reduce population-wide PFAS exposure.

PFAS is a major drinking water contaminant. Widespread use of PFAS in consumer products has resulted in contamination of drinking water across United States. Leachate from landfills filled with items made with PFAS such as food and other product packaging leads to contamination of groundwater and waterways. Notably PFAS contamination has been found in wells that supply drinking water in several Connecticut communities including Greenwich, Willimantic, and Ellington[24]. Leaching of PFAS from landfills across the state has been confirmed and is associated with contamination of waterways and the fish that live in them, leading to fishing advisories in several locations[25].

Children are uniquely vulnerable to the health effects of PFAS exposure. PFAS exposure begins *in utero*, and is detectable in cord blood serum, indicating transfer from mother to fetus [10,26]. During the postnatal period, exposure persists through dust, breastmilk, textiles, drinking water, and foods. As with many environmental chemicals, children's unique behaviors and physiology result in higher exposures and greater risk of health effects[27]. Children eat and drink more for their body weight than adults and eat a less varied diet, making them more susceptible to PFAS exposures through foods and drinking water. They're also closer to the ground where PFAS settles in dust and soil and more likely to put their hands in their mouths. Children are more sensitive than adults to bioaccumulative toxicants like PFAS given that they have many future years of life over which chronic diseases like cancer develop. They lack mature enzymes that detoxify chemicals effectively and are more sensitive to hormone-disrupting compounds like PFAS during the pre-pubertal and pubertal stages. Numerous adverse health impacts have been associated with PFAS exposure in children including cardiometabolic outcomes, obesity, allergy, asthma, reduced vaccine response, thyroid impairment, alterted pubertal onset, and impaired neurodevelopment [7-12, 28-30].

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Removal of PFAS from consumer packaging would improve the health of Connecticut residents. Now more than ever, the role that environmental chemicals play in health outcomes cannot be ignored. Numerous studies demonstrate associations between PFAS exposure and long-term detrimental health outcomes and chronic illnesses that are already on the rise such as cardiometabolic disease and cancer. Many of the health outcomes associated with PFAS are also associated with increased COVID-19 severity. Given evidence that PFAS acts as an immunotoxicant and may interfere with vaccine efficacy, it is critical that we reduce PFAS exposures to the largest possible degree. A ban on this toxic class of chemicals in product packaging would minimize exposure from one of the most common sources of PFAS exposure. Because of the known harms to human health highlighted above, New York, Washington, and Vermont have issued bans on PFAS chemical in food packaging and other items. We urge you to follow in their footsteps to protect Connecticut residents through the passage of SB 926.

Sincerely,

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References

1. Wang Z, DeWitt J, Higgins CP, Cousins IT. 2017. A Never-Ending Story of Per- and Poly-fluoroalkyl Substances (PFASs)? Environ Sci Technol. 51(5):2508-2518.
2. De Silva A, Armitage JM, Bruton TA, Dassuncao C, Heiger-Bernays W, Hu XC, Karrman A, Kelly B, Ng C, Robuck A, Sun M, Webster TF, Sunderland EM. 2020. PFAS Exposure Pathways for Humans and Wildlife: A Synthesis of Current Knowledge and Key Gaps in Understanding. Environ. Toxicol and Chem. 40(3): 631-657.
3. Agency for Toxic Substances and Disease Registry (ATSDR). Reviewed: June 24, 2020. "Per- and Polyfluoroalkyl Substances (PFAS) and Your Health" https://www.atsdr.cdc.gov/pfas/health-effects/overview.html.
4. Rice, P.A. *et al.* Comparative analysis of the toxicological databases for 6:2 fluorotelomer alcohol (6:2 FTOH) and perfluorohexanoic acid (PFHxA). *Food Chem Toxicol*. 2020 Apr;138:111210. doi: 10.1016/j.fct.2020.111210. Epub 2020 Feb 19.
5. Kabadi, SV et al. Characterizing biopersistence potential of the metabolite 5:3 fluorotelomer carboxylic acid after repeated oral exposure to the 6:2 fluorotelomer alcohol. *Toxicology and Applied Pharmacology*. Volume 388, 1 February 2020, 114878.
6. CDC. Fourth National Report on Human Exposure to Environmental Chemicals Updated Tables, January 2019, Volume One. https://www.cdc.gov/exposurereport/pdf/FourthReport_UpdatedTables_Volume1_Jan2019-508.pdf
7. Grandjean P, Andersen E, Budtz-Jorgensen E, Nielsen F, Molbak K, Weihe P, Heilmann C. 2012. Serum Vaccine Antibody Concentrations in Children Exposed to Perfluorinated Compounds. JAMA. 307(4):391-397.
8. Geiger S, Yao P, Vaughn M, Qian Z. 2021. PFAS exposure and overweight/obesity among children in a nationally representative sample. Chemosphere. 268: 128852.
9. Jackson-Browne M, Eliot M, Patti M, Spanier A, Braun J. 2020. PFAS (per- and polyfluoroalkyl substances) and asthma in young children: NHANES 2013-2014. Int J Hyg Environ. Health. 229:113565.
10. Mamsen LS, Bjorvang RD, Mucs D, Vinnars MT, Papadogiannakis N, Lindh CH, Andersen CY, Damdimopoulou P. 2019. Concentrations of perfluoroalkyl substances (PFASs) in human embryonic and fetal organs from first, second, and third trimester pregnancies. Environ Int. 124:482-492.
11. Rappazzo KM, Coffman E, Hines EP. 2017. Exposure to Perfluorinated Alkyl Substances and Health Outcomes in Children: A Systematic Review of the Epidemiologic Literature. Int J of Env Res and Pub Health. 14, 691.
12. Timmermann C, Jensen K, Nielsen F, Budtz-Jorgensen E, van der Kils F, Benn C, Grandjean P, Fisker A. 2020. Serum Perfluoroalkyl Substances, Vaccine Responses, and Morbidity in a Cohort of Guinea-Bissau Children. Environ Health Prespect. 128(8):87002.

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13. Blake BE, Pinney SM, Hines EP, Fenton SE, Ferguson KK. 2018. Associations between longitudinal serum perfluoroalkyl substances (PFAS) levels and measures of thyroid hormone, kidney function, and body mass index in the Fernald Community Cohort. Environ Pollut. 242(Pt A):894-904.
14. Gardener H, Sun Q, Grandjean P. 2021. PFAS concentration during pregnancy in relation to cardiometabolic health and birth outcomes. Environ Res. 192:110287.
15. Ding N, Harlow SD, Randolph Jr JF, Loch-Caruso R, Park SK. 2020. Perfluoroalkyl and polyfluoroalkyl substances (PFAS) and their effects on the ovary. Hum Reprod Update. 26(5):724-752.
16. Shearer JJ, Callahan CL, Calafat AM, Huang WY, Jones RR, Sabbisetti VS, Freedman ND, Sampson JN, Silverman DT, Purdue MP, Hofmann JN. 2020. J Natl Cancer Inst. djaa143.
17. Wikstrom S, Hussein G, Lingroth KA, Lindh CH, Bornehag CG. 2021. Exposure to perfluoroalkyl substances in early pregnancy and risk of sporadic first trimester miscarriage. Sci Rep. 11(1):3568.
18. Liew Z, Luo J, Nohr EA, Bech BH, Bossi R, Arah OA, Olsen J. 2020. Maternal Plasma Perfluoroalkyl Substancecs and Miscarriage: A Nested Case-Control Study in the Danish National Birth Cohort. Environ Health Perspect. 128(4):47007.
19. http://www.c8sciencepanel.org/prob_link.html
20. Grandjean et al. Severity of COVID-19 at elevated exposure to perfluorinated alkylates. Plos One. 15(12): e0244815. https://doi.org/10.1371/journal. pone.0244815
21. Grandjean P, Heilmann C, Weihe P, Nielsen F, Mogensen UB, Timmermann A, Budtz-Jørgensen E. 2017. Estimated exposures to perfluorinated compounds in infancy predict attenuated vaccine antibody concentrations at age 5-years. J Immunotoxicol. 14(1):188–195.
22.
23. Susmann, H.P., et al., Dietary Habits Related to Food Packaging and Population Exposure to PFASs. Environ Health Perspect, 2019. 127: 107003.
24. https://ctmirror.org/2020/06/26/pandemic-delays-effort-to-deal-with-connecticuts-pfas-pollution-problems/#:~:text=State%20officials%20have%20found%20PFAS,in%20Greenwich%2C%20Willimantic%20and%20Ellington.&text=The%20likelihood%20that%20PFAS%20is,state%20environmental%20and%20health%20experts.
25. https://www.ctpost.com/local/article/Sewer-agency-DEEP-caused-PFAS-contamination-from-14455561.php
26. Needham L, Grandjean P, Heinzow B, Jorgensen P, Nielsen F, Patternson D, Sjodin A, Turner W. 2011. Partition of Environmental Chemicals between Maternal and Fetal Blood Tissues. Environ. Sci. Technol. 45, 1121-1126.
27. Bearer, CF. The special and unique vulnerability of children to environmental hazards. *Neurotoxicology* 2000 21: 925-934.

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28. Gump B, Wu Q, Dumas A, Kannan K.2011. Perfluorochemical (PFC) exposure in children: Associations with impaired response inhibition. Environ Sci Technol. 45:8151-8159.
29. Hoffman K, Webster TF, Weisskopf MG, Weinberg J, Wieria VM. 2010. Exposure to polyflioroalkyl chemicals and attention deficit/hyperactivity disorder in US children 12-15 years of age. Environ Health Perspect. 118, 1762-1767.
30. Stein CR, McGovern KJ, Pajak AM, Maglione PJ, Wolff MS. 2016. Perfluoroalkyl and polyfluoroalkyl substances and indicators of immune function in children aged 12-19 years. National Health and Nutrition Examination Survey. Pediatr Res. 79, 348-357.