Certain per- and polyfluoroalkyl 'forever chemicals' identified as potential risk factor for thyroid cancer

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Mount Sinai researchers have discovered a link between certain per- and polyfluoroalkyl substances (PFAS) and an increased risk for thyroid cancer, according to a study published in *eBioMedicine* today.

PFAS, also known as "forever chemicals," are a large, complex group of synthetic chemicals that can migrate into the soil, water, and air. Due to their strong carbon-fluorine bond, these chemicals do not degrade easily in the environment. Forever chemicals been used in consumer products around the world since the 1940s, including nonstick cookware, water-repellent clothing, stain-resistant fabrics, and other products that resist grease, water, and oil.

Multiple national and international institutions, including the European Parliament and the U.S. Environmental Protection Agency (EPA), have declared PFAS exposure a health crisis. This study supports the actions needed to regulate and remove these chemicals from potential exposure routes. Although PFAS exposure has been identified as a potential contributor to recent increases in thyroid cancer, limited studies have investigated the association between PFAS exposure and thyroid cancer in human populations.

"With the substantial increase of thyroid cancer worldwide over recent decades, we wanted to dive into the potential environmental factors that could be the cause for this rise. This led us to the finding that PFAS, 'forever chemicals,' may at least partially explain the rise of thyroid cancer and are an area we should continue to study further," said co-corresponding author Maaike van Gerwen, MD, Ph.D., Assistant Professor and Director of Research for the Department of Otolaryngology–Head and Neck Surgery, Icahn School of Medicine at Mount Sinai.

"Thyroid cancer risk from PFAS exposure is a global concern given the prevalence of PFAS exposure in our world. This study provides critical evidence to support large-scale studies further exploring the effect of PFAS exposure on the thyroid gland," Dr. van Gerwen added.

The researchers investigated associations between plasma PFAS levels

and thyroid cancer diagnosis using BioMe, a medical record-linked biobank at Icahn Mount Sinai. They studied 88 thyroid cancer patients with plasma samples collected either at or before cancer diagnosis and 88 non-cancer controls—people who did not develop any form of cancer—who matched on sex, race/ethnicity, age (within five years), body mass index, smoking status, and the year of sample collection.

The researchers measured levels of eight PFAS in blood samples from the BioMe participants using untargeted metabolomics. The levels of individual PFAS were compared between the group of participants who developed thyroid cancer and the group of healthy participants, using different statistical models to estimate accuracy.

The results showed that exposure to perfluorooctanesulfonic acid (n-PFOS, a group of chemicals under the PFAS umbrella) led to a 56% increased risk of thyroid cancer diagnosis. Additionally, the researchers conducted the analysis again in a subgroup of 31 patients who had at least a year between their enrollment in BioMe and their diagnosis of thyroid cancer, to take into consideration the time lag between exposure to PFAS chemicals and developing a disease.

From this second analysis, there was also a positive association between the exposure of n-PFOS and the risk of thyroid cancer, as well as a positive association with a few additional PFAS chemicals, including branched perfluorooctanesulfonic acid, perfluorononanoic acid, perfluorooctylphosphonic acid, and linear perfluorohexanesulfonic acid.

"The results of this study provide further confirmation for the PFAS health crisis and underline the need to reduce, and hopefully one day eliminate, PFAS exposure," said co-corresponding author Lauren Petrick, Ph.D., Associate Professor of Environmental Medicine and Public Health, Icahn Mount Sinai.

"Today, it's nearly impossible to avoid PFAS in our daily activities. We hope these findings bring awareness of the severity of these forever chemicals. Everyone should discuss their PFAS exposure with their treating physician to determine their risk and get screened if appropriate. In addition, we need continued industry changes to eliminate PFAS altogether."

More information: Per- and Polyfluoroalkyl Substances (PFAS) Exposure and Thyroid Cancer Risk, *eBioMedicine* (2023). DOI: 10.1016/j.ebiom.2023.104831j. www.thelancet.com/journals/ebi … (23)00397-3/fulltext

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