

Michigan PFAS Exposure and Health Study Phase 1 Findings

PFAS CAN AFFECT THYROID HORMONES

Per- and polyfluoroalkyl substances (PFAS) are a group of widely used and potentially harmful chemicals. Several have been found in some drinking water in Michigan.

In 2020, the Michigan Department of Health and Human Services (MDHHS) started the Michigan PFAS Exposure and Health Study (MiPEHS). It looks at how PFAS in drinking water might affect the health of people in two west Michigan communities.

MDHHS is sharing results from MiPEHS as they become available. They recently published results about thyroid hormones in *Scientific Reports*.

You can read the thyroid hormone results at [EH.Michigan.gov/MiPEHStHy](https://eh.michigan.gov/MiPEHStHy).

scientific reports

OPEN Per and polyfluoroalkyl substances affect thyroid hormones for people with a history of exposure from drinking water

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Per and polyfluoroalkyl substances (PFAS) may affect thyroid hormones through the literature, these mixed evidence of this effect and exposure to mixtures of PFAS remains poorly understood. We used the Michigan PFAS Exposure and Health Study cohort to examine linear and non-linear associations between serum PFAS concentrations, both alone and in combination, and thyroid hormone concentrations. Study participants included 728 adolescents and adults living in an area with past PFAS contamination of drinking water. We quantified 10 individual PFAS and thyroid hormone results in serum from participants between the years 2012 and 2021. Linear regression-weighted the results to account for participants between the years 2012 and 2021. Linear regression-weighted PFAS mixtures were associated with a 0.23% decrease in T3 concentrations (95% CI: -0.24%, 0.19%, p=0.18). A three-substance mixture consisting of perfluorooctanoic acid, perfluorododecanoic acid, and perfluorodecyl sulfonic acid was associated with a 0.23% decrease in T3 concentrations (95% CI: -0.24%, 0.19%, p=0.18). Adjusted for covariates, including PFAS mixtures, we observed cross-sectional associations between a mixture of serum PFAS concentrations and thyroid hormone dysregulation, largely manifesting as decreased T3 concentrations.

Keywords: Per and polyfluoroalkyl substances, PFAS, (hydroxy)alkyl, Endocrine disruptors, thyroid hormones, Mixtures analysis

Per and polyfluoroalkyl substances (PFAS) are a family of thousands of human-made chemical with wide industrial and consumer use. The general population is exposed to PFAS through food, drinking water, consumer products, and household dust. Although limited to a certain number of chemicals, individual PFAS differ from both the toxicological and epidemiological literature on previously studied exposures to PFAS with numerous health effects and outcomes reported. Accounting for the large number of PFAS chemicals, how they have been regulated through the central government sector with respect to PFAS. Evidence that PFAS exposure may be associated with thyroid hormone dysfunction during pregnancy has accumulated, although both negative and positive associations have been reported. The impact of PFAS on thyroid hormone levels in pregnancy is largely unknown. Among pregnant women, the percentage of infants being born after a period of high PFAS exposure population of children who are affected by thyroid disease (FT4, T3, and thyroid-stimulating hormone (TSH)) have been reported. These toxicologic findings may affect which risk are dependent on unique characteristics of the population, the toxicologic research by the authors, or the unique mixture of PFAS concentrations among the population studied.

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Key Conclusions

Participants and community members were concerned that past exposure to PFAS might affect their thyroid hormone levels. To address this, MDHHS tested blood samples from participants. They measured three thyroid hormones and compared those to blood PFAS levels.

Results showed two important things:

- People with more PFAS in their blood tended to have slightly lower levels of the thyroid hormone, total triiodothyronine (TT3).
- TT3 levels were not low enough to need medical intervention.

Why These Findings are Important

These findings matter because they:

- Address questions raised by residents exposed to high PFAS levels in their drinking water.
- Show that PFAS exposure can have a small, but noticeable effect on the body.
- May help health care providers who want to monitor thyroid levels in people who have existing thyroid issues *and* have been exposed to PFAS in their drinking water.
- Add to what scientists know about how PFAS exposure may affect people's health.
- Can help leaders and decision-makers create rules about PFAS in the environment.

More about MiPEHS

MiPEHS is a long-term health study conducted by MDHHS. It looks at how PFAS levels in blood relate to different markers of health, including thyroid hormones, cholesterol and blood sugar.

Residents affected by PFAS in their drinking water in the City of Parchment/Cooper Township area of Kalamazoo County and the Belmont/Rockford area in Kent County were invited to join the study. **They shared their time, body measurements, blood samples and survey answers.**

Participants were asked to come back three times over five years to do these same tasks. The results discussed here are from the first phase of data collection only.

Ways to reduce your exposure to PFAS

Below are actions you can take to reduce your exposure to PFAS:

- Learn if your drinking water is impacted by PFAS at [EH.Michigan.gov/PFASinDrinkingWater](https://eh.michigan.gov/PFASinDrinkingWater).
- Consider using NSF/ANSI 53 or 58 certified total PFAS-reducing water filters if your water is affected.
- Follow local Eat Safe Fish guidelines (Michigan.gov/EatSafeFish) to choose fish low in PFAS and other chemicals.
- Avoid using products that may contain PFAS, like stain- or water-resistant items.
- Avoid contact with foam on surface water and rinse off after contact.

Learn more about reducing your exposure to PFAS at Michigan.gov/PFAS.



Public health investigations like MiPEHS are at the core of MDHHS's mission to improve public health in Michigan.

For more information about:

- PFAS and thyroid hormones, call the MDHHS Environmental Health Study Hotline at 844-464-7327.
- MiPEHS, visit Michigan.gov/DEHBio and click on the MiPEHS icon.
- PFAS and your health, visit Michigan.gov/PFAS.



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