

Researchers find connection between PFAS exposure in men and the health of their offspring

May 21 2024



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Wayne State University researchers are reporting new findings that demonstrate a link between exposure to per- and polyfluorinated alkyl

substances (PFAS) in males and health issues in their offspring.

The study, "Mixtures of per- and polyfluoroalkyl substances (PFAS) alter sperm methylation and long-term reprogramming of offspring liver and fat transcriptome," [published](#) recently in *Environment International*, assessed the effect of PFAS mixtures on the sperm methylome and transcriptional changes in offspring metabolic tissues such as in the liver and fat.

"PFAS research is important, especially in Michigan," said Michael C. Petriello, Ph.D., assistant professor in the Institute of Environmental Health Sciences and the Department of Pharmacology. "It has been recently in the news, since the EPA is finally starting to regulate PFAS chemicals and include them as part of the Clean Water Act.

"All over the country, communities will have standards they will have to meet. PFAS are associated with many chronic diseases and can impact inflammation and the immune system, for instance. This work is focused on reproductive outcomes, fertility and offspring metabolism. The idea that exposure of the father could affect the health of offspring is entirely new."

"Dr. Petriello's prior work has shown that PFAS exposure has effects on cardio-metabolic health," said J. Richard Pilsner, Ph.D., M.P.H., professor of obstetrics and gynecology, associate director of the C.S. Mott Center for Human Growth and Development and the Robert J. Sokol, M.D. Endowed Chair of Molecular Obstetrics and Gynecology.

"What my research has done is examine paternal exposures and how they may affect the next generation through sperm-related markers. The burden has always been on [maternal health](#) during pregnancy in regard to the health of offspring. This research shows that [environmental health](#) prior to conception also is a key factor that affects offspring health and

development."

The team's results demonstrate that exposure to a mixture of legacy and newly emerging PFAS chemicals in adult male mice result in aberrant sperm methylation and altered gene expression of offspring liver and fat in a sex-specific manner. These data indicate that preconception PFAS exposure in males can be transmitted to affect phenotype in the next generation.

"I hope these findings promote an appreciation of male health on their [offspring](#)'s development," said Pilsner. "In addition to female partners, clinical doctors advising male partners that their pre-conception health impacts their children's health would be a significant change to positively impact future generations."

"This cutting-edge research may have a significant impact on how individuals look at harmful chemicals in their communities, and ultimately how [medical professionals](#) advise their patients," said Ezemenari M. Obasi, Ph.D., vice president for research at Wayne State University.

"Our researchers are playing a crucial role in investigating new methods to improve the well-being of people locally, nationally and beyond, and are an excellent example of how Wayne State is empowering health in our neighborhoods, as well as fueling innovation with creative solutions to benefit the public."

More information: DruAnne L. Maxwell et al, Mixtures of per- and polyfluoroalkyl substances (PFAS) alter sperm methylation and long-term reprogramming of offspring liver and fat transcriptome, *Environment International* (2024). [DOI: 10.1016/j.envint.2024.108577](https://doi.org/10.1016/j.envint.2024.108577)

Provided by Wayne State University

Citation: Researchers find connection between PFAS exposure in men and the health of their offspring (2024, May 21) retrieved 26 June 2024 from

<https://medicalxpress.com/news/2024-05-pfas-exposure-men-health-offspring.html>

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