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Thyroid Imbalances and “Forever Chemicals” – Can Biological Sex Protect You?
St. Lawrence Island, Alaska

Studies have shown that “forever chemicals”, also known as PFAS (Perfluoroalkyl substances), can impact thyroid hormones and lead to thyroid problems for humans. Researchers in St. Lawrence Island, Alaska found that biological sex might play a role in the effects of forever chemicals. Biological sex, or sex, is defined as the sex that is assigned to a person at birth¹. The study suggests that male and female thyroid hormones may react differently to certain forever chemicals.

Native Alaskans in St. Lawrence Island were the focus of the study due to their food diet and natural environment. Several types of forever chemicals travel to the Arctic through the air and oceans. A typical food diet includes animals that live in the ocean for long periods of time as well as caribou: these animals have been found to contain forever chemicals. Researchers wanted to see if thyroid hormones were being changed by the forever chemicals that Alaska natives had encountered.

People who were asked to participate were from two native villages, Gambell and Savoonga. The researchers posted flyers around the villages and community research workers directly asked people to be part of the study. To measure if sex made a difference in how forever chemicals reacted with thyroid hormones, researchers had to find one male and one female from the same home to agree to be part of the study: they were able to get 36 pairs of male and females from the same home. Other individuals were from separate homes.

All 89 people in the study were interviewed to determine if there were individuals who might have other issues that could be affecting them; to make sure that the study could determine the true cause of any issues found. After this, laboratory blood testing was used to measure levels of four different thyroid hormones. Thirteen forever chemicals were measured against each other and against the four thyroid hormones in the tests that were done. Using computer programs, the researchers searched for any relationships that existed between the forever chemicals and thyroid hormones.

Males were found to have higher amounts of forever chemicals in their blood compared to females. Despite this, in one thyroid hormone relationship to two separate forever chemicals, males had lower levels of the thyroid hormone than females. Researchers suggested the relationship could mean that forever chemicals affect female thyroid hormones more than for males. As noted in the study, some research suggests that the difference in thyroid hormone effects could be due to hormones that are specific to each sex.

The study concluded that further research is needed of relationships between forever chemicals and other body measurements including weight. There is a need to better

understand how chemicals may react with each other in the human body. Lastly, more research with larger groups is needed to understand how forever chemicals are impacting different communities.

Researchers who worked on the study were from St. Lawrence University, Alaska Community Action on Toxics, Northern Arizona University, and the University at Albany.

Article citation:

Byrne, S. C., Miller, P., Seguinot-Medina, S., Waghiji, V., Buck, C. L., von Hippel, F. A., & Carpenter, D. O. (2018). Exposure to perfluoroalkyl substances and associations with serum thyroid hormones in a remote population of Alaska Natives. *Environmental Research*, 166, 537–543. <https://doi.org/10.1016/j.envres.2018.06.014>

¹American Psychological Association. (2015). Guidelines for Psychological Practice with Transgender and Gender Nonconforming People. *American Psychologist*, 70(9), 832-864. doi.org/10.1037/a0039906