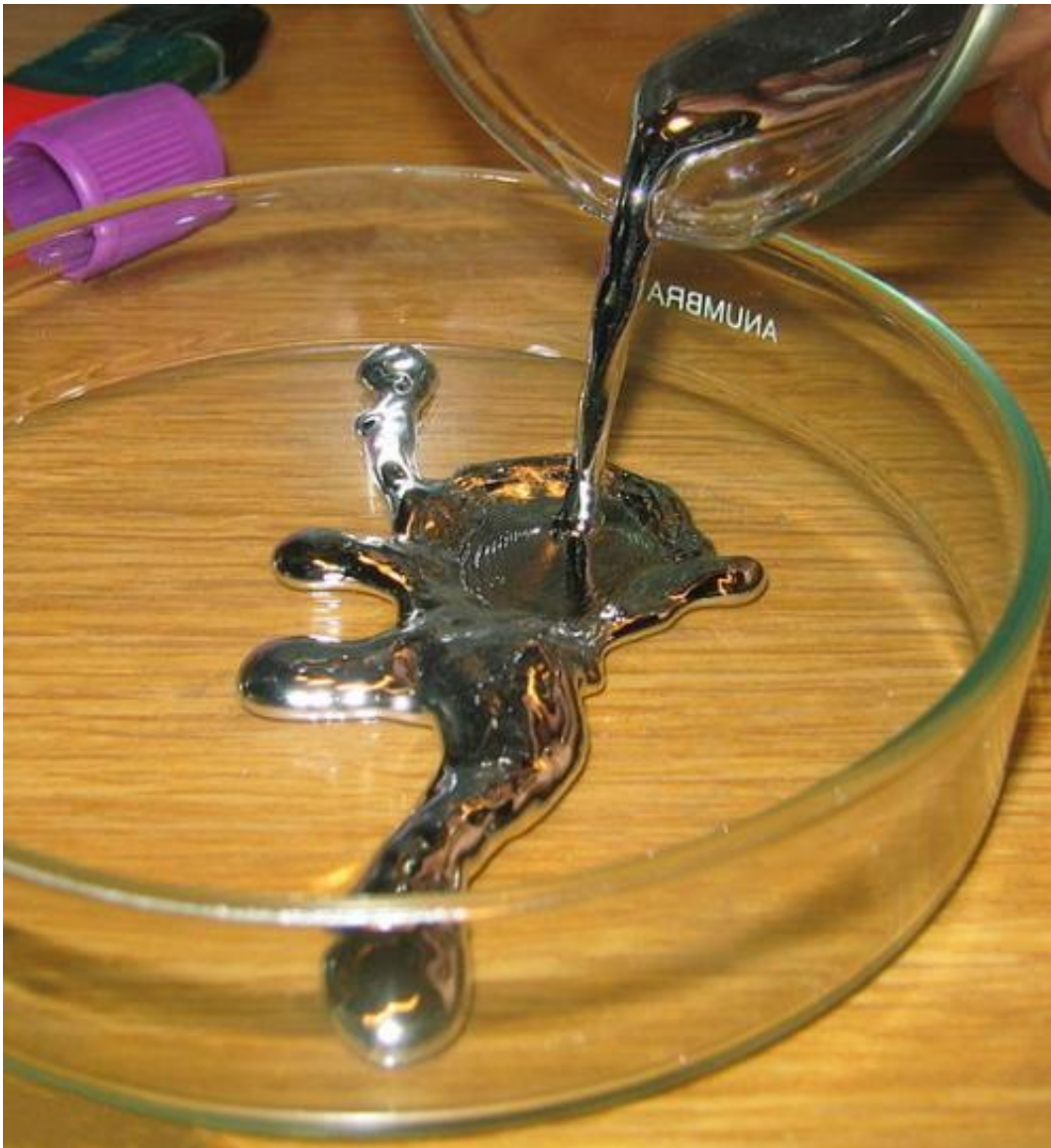


# Brain benefits of aerobic exercise lost to mercury exposure

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Element mercury (Hg), liquid form. Credit: Wikipedia.

Cognitive function improves with aerobic exercise, but not for people exposed to high levels of mercury before birth, according to research funded by the National Institute of Environmental Health Sciences (NIEHS), part of the National Institutes of Health. Adults with high prenatal exposure to methylmercury, which mainly comes from maternal consumption of fish with high mercury levels, did not experience the faster cognitive processing and better short term memory benefits of exercise that were seen in those with low prenatal methylmercury exposures.

This is one of the first studies to examine how methylmercury exposure in the womb may affect cognitive function in adults. Mercury comes from industrial pollution in the air that falls into the water, where it turns into methylmercury and accumulates in fish. The scientists, based at the Harvard T.H. Chan School of Public Health, suspect that prenatal exposure to methylmercury, known to have toxic effects on the developing brain and nervous system, may limit the ability of nervous system tissues to grow and develop in response to increased aerobic fitness.

"We know that neurodevelopment is a delicate process that is especially sensitive to methylmercury and other environmental toxins, but we are still discovering the lifelong ripple effects of these exposures," said Gwen Collman, Ph.D., director of the NIEHS Division of Extramural Research and Training. "This research points to adult cognitive function as a new area of concern."

The 197 study participants are from the Faroe Islands, 200 miles north of England, where fish is a major component of the diet. Their health has been followed since they were in the womb in the late 1980s. At age 22, this subset of the original 1,022 participants took part in a follow-up exam that included estimating the participants' VO<sub>2</sub> max, or the rate at which they can use oxygen, which increases with aerobic fitness. Also, a

range of cognitive tests were performed related to [short-term memory](#), verbal comprehension and knowledge, psychomotor speed, visual processing, long-term storage and retrieval, and [cognitive processing speed](#).

Overall, the researchers found that higher VO2 max values were associated with better neurocognitive function, as expected based on prior research. Cognitive efficiency, which included cognitive processing speed and short term memory, benefitted the most from increased VO2 max.

But when the researchers divided the participants into two groups based on the methylmercury levels in their mothers while they were pregnant, they found that these benefits were confined to the group with the lowest exposure. Participants with prenatal methylmercury levels in the bottom 67 percent, or levels of less than 35 micrograms per liter in umbilical cord blood, still demonstrated better cognitive efficiency with higher VO2 max. However, for participants with higher methylmercury levels, cognitive function did not improve as VO2 max increased.

"We know that [aerobic exercise](#) is an important part of a healthy lifestyle, but these findings suggest that early-life exposure to pollutants may reduce the potential benefits," added Collman. "We need to pay special attention to the environment we create for pregnant moms and babies."

The U.S. Food and Drug Administration recommends that children and women of childbearing age eat two to three weekly servings of fish low in mercury as part of a healthy diet. Low mercury fish include salmon, shrimp, pollock, canned light tuna, tilapia, catfish, and cod. Four types of fish should be avoided because of typically high mercury levels—tilefish from the Gulf of Mexico, shark, swordfish, and king mackerel.

The findings were published Sept. 9 in the journal *Environmental Health Perspectives*.

**More information:** Youssef Oulhote et al. Aerobic Fitness and Neurocognitive Function Scores in Young Faroese Adults and Potential Modification by Prenatal Methylmercury Exposure, *Environmental Health Perspectives* (2016). [DOI: 10.1289/ehp274](https://doi.org/10.1289/ehp274)

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