

# Does eating fish protect brains from air pollution?

16 July 2020



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Older women who eat more than one to two servings a week of baked or broiled fish or shellfish may consume enough omega-3 fatty acids to counteract the effects of air pollution on the brain, according to a new study published in the July 15, 2020, online issue of *Neurology*, the medical journal of the American Academy of Neurology.

Researchers found that among [older women](#) who lived in areas with [high levels of air pollution](#), those who had the lowest levels of omega-3 fatty acids in their [blood](#) had more brain shrinkage than women who had the highest levels.

"Fish are an excellent source of omega-3 fatty acids and easy to add to the diet," said study author Ka He, M.D., Sc.D., of Columbia University in New York. "Omega-3 fatty acids have been shown to fight inflammation and maintain [brain structure](#) in aging brains. They have also been found to reduce [brain damage](#) caused by neurotoxins like lead and mercury. So we explored if omega-3 fatty acids have a protective effect against another neurotoxin, the [fine particulate matter](#) found in air [pollution](#)."

The study involved 1,315 women with an average age of 70 who did not have dementia at the start of the study. The women completed questionnaires about diet, physical activity, and medical history.

Researchers used the diet questionnaire to calculate the average amount of fish each woman consumed each week, including broiled or baked fish, canned tuna, tuna salad, tuna casserole and non-fried shellfish. Fried fish was not included because research has shown deep frying damages omega-3 fatty acids.

Participants were given blood tests. Researchers measured the amount of omega-3 fatty acids in their red blood cells and then divided the women into four groups based on the amount of omega-3 fatty acids in their blood.

Researchers used the women's home addresses to determine their three-year average exposure to air pollution. Participants then had brain scans with magnetic resonance imaging (MRI) to measure various areas of the brain including white matter, which is composed of nerve fibers that send signals throughout the brain, and the hippocampus, the part of the brain associated with memory.

After adjusting for age, education, smoking and other factors that could affect [brain shrinkage](#), researchers found that women who had the highest levels of omega-3 fatty acids in the blood had greater volumes of white matter than those with the lowest levels. Those in the highest group had 410 cubic centimeters (cm<sup>3</sup>) white matter, compared to 403 cm<sup>3</sup> for those in the lowest group. The researchers found that for each quartile increase in air pollution levels, the average [white matter](#) volume was 11.52 cm<sup>3</sup> smaller among people with lower levels of omega-3 fatty acids and 0.12 cm<sup>3</sup> smaller among those with higher levels.

Women with the highest levels of omega-3 fatty acids in the blood also had greater volumes of the

hippocampus.

"Our findings suggest that higher levels of omega-3 [fatty acids](#) in the blood from fish consumption may preserve brain volume as women age and possibly protect against the potential toxic effects of air pollution," said He. "It's important to note that our study only found an association between brain volume and eating fish. It does not prove that eating fish preserves brain volume. And since separate studies have found some species of fish may contain environmental toxins, it's important to talk to a doctor about what types of fish to eat before adding more fish to your diet."

A limitation of the study was that most participants were older white [women](#), so the results cannot be generalized to others. Also, researchers were only able to examine exposures to later-life air pollution, not early or mid-life exposures, so future studies should look at exposures to air pollution across a person's lifespan.

**More information:** Cheng Chen et al. Erythrocyte omega-3 index, ambient fine particle exposure and brain aging, *Neurology* (2020). [DOI: 10.1212/WNL.00000000000010074](#)

Provided by American Academy of Neurology

APA citation: Does eating fish protect brains from air pollution? (2020, July 16) retrieved 7 September 2022 from <https://medicalxpress.com/news/2020-07-fish-brains-air-pollution.html>

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