

Offspring of pregnant women exposed to high level of pollutants may have lower IQs

July 22 2019



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A new study found that pregnant women exposed to higher levels of air pollutants had children with lower IQs, compared to the children of women exposed to lower levels.

The study, led by researchers at the University of Washington and UCSF as part of the ECHO PATHWAYS consortium, will be published in the September issue of *Environmental Research* and is currently available online.

Researchers looked at 1,005 [pregnant women](#) participating in the Conditions Affecting Neurodevelopment and Learning study, set in Shelby County, Tenn., and assessed the IQs of their offspring between the ages of 4 and 6. They found that exposure to PM10—pollutant particles with a diameter of one-seventh the width of a human hair that are produced by industry, power plants, cars, air traffic and railways—was negatively associated with IQ. Children whose mothers were in the highest 10 percent of exposure had IQ scores that were 2.5 points lower than those in the lower 10 percent.

When the researchers looked at plasma levels of maternal folate, which is found naturally in leafy vegetables, beans and citrus fruit, and is recommended for all pregnant women in its synthetic form as [folic acid](#), they found that the difference between offspring IQs in the highest and lowest PM10-exposed groups had widened to 6.8 points among those whose mothers had the lowest levels (bottom 25 percent) of folate.

PM10 exposure had no impact on IQ if maternal levels of folate were higher, the researchers found.

While the study underlines the importance of folic acid in pregnancy, there may be such a thing as too much folic acid supplementation, said first author Christine Loftus, an epidemiologist from the UW's Department of Environmental & Occupational Health Sciences.

"Although supplementation has been shown to be protective against [neural tube defects](#), which are devastating birth defects of the central nervous system, recent research suggests that too much prenatal folic

acid may impair healthy fetal neurodevelopment," Loftus said. "The dose of folic acid is something that pregnant women should discuss with their doctors."

Long-term exposure to PM10 has been linked to reduced lung function and the development of cardiovascular and respiratory diseases. In this study, other pollutants, including nitrogen dioxide, which is a marker for high-concentration motor traffic, were not found to impact IQ.

The authors said that they could not explain the mechanism by which PM10 exposure contributed to lower IQ, but said that animal studies indicated that air pollution exposure increased maternal inflammation and oxidative stress. "This could result in placental inflammation and may interfere with placental or fetal epigenetic programming," said senior author Kaja LeWinn, ScD, associate professor of psychiatry at the UCSF School of Medicine.

"While it's beyond the scope of our paper to understand how folate might alter this association, it is possible that higher folate levels increase the antioxidant capability of the diet, buffering oxidative stress associated with PM10 exposure," said LeWinn.

"It may also be that [folate](#) itself is protective, since it plays an important role in healthy neurodevelopment, regardless of air pollution exposure."

More information: Christine T. Loftus et al. Prenatal air pollution and childhood IQ: Preliminary evidence of effect modification by folate, *Environmental Research* (2019). [DOI: 10.1016/j.envres.2019.05.036](https://doi.org/10.1016/j.envres.2019.05.036)

Provided by University of Washington

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