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Prenatal Mercury Exposure Linked to ADHD

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October 11, 2012 — Eating certain types of fish with even low levels of mercury while pregnant can increase the risk for attention-deficit/hyperactivity disorder (ADHD) in offspring, whereas consumption of several other types of fish during pregnancy may protect against the disorder, new research suggests.

A cohort study of almost 400 children showed that the risk for inattention and impulsivity at the age of 8 years was significantly associated with maternal mercury levels of at least 1 µg/g. In addition, as the mercury levels increased, so did risk.

However, when the mothers ate at least 2 servings of fish a week, the risk for ADHD symptoms decreased.

"I was a little surprised by the strength of the protective effect of fish consumption," senior author Susan Korrick, MD, MPH, assistant professor of medicine at Brigham and Women's Hospital and Harvard Medical School in Boston, Massachusetts, told *Medscape Medical News*.

Dr. Susan Korrick

"But the study also adds to literature that suggests that low-level contaminant exposures prenatally can alter behavior in kids," said Dr. Korrick.

The investigators suggest that more research is needed, because they did not assess a clinical diagnosis of ADHD in their study, nor did they examine types of fish consumed.

"Although a single estimate combining these beneficial vs detrimental effects vis-à-vis fish intake is not possible with these data, these findings are consistent with a growing literature...and are important for informing dietary recommendations for pregnant women," they write.

The study was published online October 8 in the *Archives of Pediatrics and Adolescent Medicine*.

Dose-Dependent Effect

Between 1993 and 1998, 788 infants from Massachusetts were enrolled in this study, which was designed to assess a possible link between exposure to polychlorinated biphenyls (PCBs) and neurodevelopment.

Soon after birth, hair samples were collected from the mothers and analyzed for mercury levels. The mothers also filled out a questionnaire regarding fish consumption during pregnancy.

At 8-year follow-up, 421 of these children were assessed for possible ADHD behaviors through the use of the Connors Rating Scale–Teachers, the Neurobehavioral Evaluation System 2 Continuous Performance Test, and 2 subscales of the Weschler Intelligence Scale for Children–Third Edition.

Results showed that not only was mercury exposure associated with inattention and impulsivity/hyperactivity, but the risk for these behaviors increased with maternal hair mercury levels.

The threshold for first association with ADHD symptoms appeared to be at least 1 µg/g or more of mercury.

"For example, at 1 µg/g or greater, the adjusted risk ratios for mild/markedly atypical inattentive and impulsive/hyperactive behaviors were 1.4 (95% CI [confidence interval], 1.0 -1.8) and 1.7 (95% CI, 1.2 - 2.4), respectively, for an interquartile range (0.5 µg/g) mercury increase," write the researchers.

In addition, these associations were more notable in boys than girls.

Balancing Act

However, offspring of mothers who consumed at least 2 servings of fish a week, which is currently more than the current recommended amounts from the US Food and Drug Administration and the Environmental Protection Agency, had a decrease in ADHD-related behaviors — especially in impulsivity/hyperactivity (relative risk [RR], 0.4 vs 2 servings or fewer of fish per week).

"These findings underscore the difficulties of balancing the benefits of fish intake with the detriments of low-level mercury exposure in developing dietary recommendations in pregnancy," write the investigators.

Although the researchers did not assess which fish are worst and best to consume while pregnant, they noted in a release that previous studies have shown that shark, fresh tuna, and swordfish should be avoided by pregnant women, whereas fish such as haddock, salmon, and flounder are good because of their low levels of mercury and their nutritional value.

"Women need to know that nutrients in fish are good for the brain of a developing fetus, but women [also] need to be aware that high mercury level in some fish pose a risk," said lead author Sharon Sagiv, PhD, MPH, from Boston University School of Public Health in Massachusetts, in the same release.

Time to Examine Environmental Risk Factors

"The study by Sagiv et al...is an important and rigorously conducted prospective birth cohort study," Bruce Lanphear, MD, MPH, from the Child and Family Research Institute and the Simon Fraser University in Vancouver, British Columbia, Canada, writes in an accompanying editorial.

He notes that implications from the study include that "we can take some comfort in recent legislation to reduce mercury contamination, at least from domestic sources."

In addition, Dr. Lanphear writes that the findings show that the time is now right to form a national scientific advisory panel to examine ADHD environmental risk factors, including known factors such as lead and tobacco.

Both this and recent studies "reinforce the urgency of revising the regulatory framework for environmental contaminants and toxicants," he writes.

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