Medical Xpress

Autism four times likelier when mother's thyroid is weakened

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Pregnant women who don't make nearly enough thyroid hormone are nearly 4 times likelier to produce autistic children than healthy women, report scientists from the Houston Methodist Neurological Institute and Erasmus Medical Centre in an upcoming *Annals of Neurology*.

The association emerged from a study of more than 4,000 Dutch mothers and their children, and it supports a growing view that autism spectrum disorders can be caused by a lack of maternal thyroid hormone, which past studies have shown is crucial to the migration of fetal brain cells during embryo development.

"It is increasingly apparent to us that autism is caused by environmental factors in most cases, not by genetics," said lead author Gustavo Román, M.D., a neurologist and neuroepidemiologist who directs the Nantz National Alzheimer Center. "That gives me hope that prevention is possible."

The researchers also found that autistic children had more pronounced symptoms if their mothers were severely deficient for T4, also called thyroxine. Mild T4 deficiencies in mothers produced an insignificant increase in autistic children's symptoms.

The most common cause of thyroid hormone deficiency is a lack of dietary iodine—because both the thyroid hormones, T3 and T4, contain that element.

Iodine deficiency is common throughout the world, including developed countries. The World Health Organization estimates nearly 1 in 3 people are affected globally. A 2005 CDC-University of Kansas study estimated that in the U.S., where iodine deficiency had been practically eradicated thanks to iodized salt, 1 in 7 Americans is believed deficient.

The present work was based on the Generation R Study, conducted by Erasmus Medical Centre (Rotterdam, Netherlands) doctors and social scientists, in which thousands of pregnant women were voluntarily enrolled between 2002 and 2006.

Blood was withdrawn from the mothers at or around 13 weeks into their pregnancies to measure levels of T4 and two proteins that could indicate the cause of thyroid deficiency. Six years later, mothers were asked to describe the behavioral and emotional characteristics of their children using a standardized psychology checklist.

Researchers identified 80 "probable autistic children" from a population of 4,039—a number consistent with the Dutch rate of autism spectrum disorders. 159 mothers were identified as being severely T4 deficient (defined as having 5 percent or less of normal T4, but producing a normal amount of thyroid stimulating hormone), and 136 were identified as mildly T4 deficient. The researchers found a weak association between mild T4 deficiency and the likelihood of producing an autistic child, but a strong association between severe T4 deficiency and autism (3.89 more likely, as compared with mothers with normal thyroid hormone).

Román, who is a physician, says he has advice for women who are now pregnant, or who are considering having children. "If you are planning to become pregnant, have your doctor measure urine iodine and thyroid function beforehand. If you have just become pregnant, have your doctor measure urine iodine, thyroid function, and begin using prenatal

vitamins, making sure iodine is present."

A lack of dietary iodine interferes with normal thyroid function, leading to pregnancy complications, as well as deafness and developmental delay in the baby and loss of control of fat and sugar metabolism and heat generation in the mother.

It is well established that expecting mothers' poor thyroid function (whether caused by poor diet, disease, or genetics) can lead to serious problems with fetal brain development, but only in the last 10 years or so has hypothyroidism been implicated as a possible cause of autism spectrum disorders.

Previous work by Román and others has shown that a deficiency of T4 during a crucial period of embryonic development causes mild to severe brain development errors, such as the lackluster migration of specialized brain cells from the cortex to the outer areas of the cerebrum—a characteristic of autistic brains. In a 2007 review Román published in the *Journal of the Neurological Sciences*, he presented a wide swath of evidence that the near-epidemic rise in autism diagnoses—which Román says cannot be accounted for by heightened awareness alone—could be at least partly the result of an iodine-starved diet and/or exposure to toxins that interfere with normal thyroid function.

The *Annals of Neurology* study presents a troubling correlation, but it does not prove that the thyroid function of expecting mothers causes autism in their children.

"The next steps are interventional studies," Román said. "We must look at a large nationwide population of women in early pregnancy, to measure urine iodine and thyroid function. We must then correct thyroid deficiencies, if present, and provide prenatal vitamins with supplementary iodine. If autism cases fall precipitously compared with

recent historical numbers, I think we will be able to conclude that thyroid function is critical."

Provided by Weill Cornell Medical College