Manganese and ADHD

A study published in Neurotoxicology has generated discussion because it shows a link between high levels of manganese (Mn) given to rats during infancy and the development of behavioral problems similar to Attention Deficit Hyperactivity Disorder. Mn is an essential element and is currently required by law in infant formulas, but can be neurotoxic at high levels.

Recent reports of high Mn levels in hair of children with neurodevelopmental deficits suggest that these deficits could be due to Mn-induced neurotoxic effects on brain dopamine systems. Because manganese levels are about 80 times higher in soy infant formulas than in breast milk, the discussion focuses on whether soy formula is negatively impacting infants' brains. Soy-based formulas contain 0.2-0.3 mg of manganese per liter while a liter of breast milk contains only 0.004-0.006 mg. Soy naturally absorbs large amounts of manganese from the earth. Cow's milk-based formula also has higher levels of manganese than breast milk, with 0.030-0.050 mgs/liter.

In the study, rats receiving the high-manganese diet showed less goal-oriented behavior and had lower dopamine levels in a critical problem-solving area of the brain. Rats fed a manganese level similar to breast milk showed normal behavior. There is no direct correlation yet between ADHD and infant formulas. Further, it is possible that other nutrients in the formula could positively impact the effect of the manganese.

Bottle-fed infants often show iron anemia, which can increase the effects of manganese toxicity. The authors report that the most impaired rats were those that were also anemic—yet, the most popular soy formula, Isomil, is fortified with iron.

As the saying goes, breast is best. When formula is needed, soy remains superior to cow’s milk for those with lactose intolerance or other milk sensitivity. There are other sources of high levels of manganese, from fortified foods to well water, and inhalation of exhaust. There has also been concern that MMT (methylcyclopentadienyl manganese tricarbonyl), a gasoline additive used to boost octane, could cause neurotoxic effects. Though efforts have been made to have MMT banned (www.globalleadnet.org), it has been used widely in Canada for 25 years and is allowed in some gas in the U.S. and other countries.

The good news: For decades, experts have focused primarily on drugs, genetics, and behavioral training for ADHD. There is now a growing interest in environmental causes of this multifaceted disorder.


Quotable

“The unanswered question obviously is, ‘What is causing your child to be hyperactive?’ . . . Children with early-stage brain tumors can develop symptoms of hyperactivity or poor attention. So can lead or pesticide-poisoned children. So can children with early-onset diabetes, heart disease, worms, viral or bacterial infections, malnutrition, head injuries, genetic disorders, allergies, mercury or manganese exposure, petit mal seizures, and hundreds—yes, hundreds—of other minor, major, or even life-threatening medical problems. Yet, all of these children are labeled hyperactive or ADD.

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