

Study finds prenatal exposure to certain chemicals affects childhood neurodevelopment

January 28 2010

A new study led by Mount Sinai researchers in collaboration with scientists from Cornell University and the U.S. Centers for Disease Control and Prevention, has found higher prenatal exposure to phthalates—manmade chemicals that interfere with hormonal messaging—to be connected with disruptive and problem behaviors in children between the ages of 4 and 9 years. The study, which is the first to examine the effects of prenatal phthalate exposure on child neurobehavioral development, will be published January 28, on the *Environmental Health Perspectives* website.

"There is increasing evidence that [phthalate exposure](#) is harmful to children at all stages of development," said Stephanie Engel, PhD, lead study author and Associate Professor of Preventive Medicine at Mount Sinai School of Medicine. "We found a striking pattern of associations between low molecular weight phthalates - which are commonly found in [personal care products](#) - and disruptive childhood behaviors, such as aggressiveness and other conduct issues, and problems with attention. These same behavioral problems are commonly found in children diagnosed with Attention-Deficit Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder, or Conduct Disorder."

Phthalates are part of a group of chemicals known as endocrine disruptors, that interfere with the body's endocrine, or hormone system. They are a family of compounds found in a wide range of consumer

products such as nail polishes, to increase their durability and reduce chips, and in cosmetics, perfumes, lotions and shampoos, to carry fragrance. Other phthalates are used to increase the flexibility and durability of plastics such as PVC, or included as coatings on medications or nutritional supplements to make them timed-release.

"Recently, the government instituted regulations limiting certain phthalates in things like child care articles or toys that a young child might put in their mouth," continued Dr. Engel. "But it's their mother's contact with phthalate-containing products that causes [prenatal exposure](#). The phthalates that we found most strongly related to neurodevelopment were those commonly found in cosmetics, perfumes, lotions and shampoos. Current US regulations do not address these kinds of phthalates."

For the study, phthalate metabolite levels were analyzed in prenatal urine samples of a multiethnic group of 404 women who were pregnant for the first time. The women were invited to participate in follow-up interviews when their children were between the ages of 4 and 9. The mothers were not informed of their phthalate metabolite levels and the researchers were unaware of their exposures when testing the children.

Follow-up visits were completed by 188 of the women and their children. At each follow-up visit, the mothers completed validated questionnaires designed to assess their behavior and executive functions. The researchers found that mothers with higher concentrations of low molecular weight phthalates consistently reported poorer behavioral profiles in their children. The strongest trends were in the categories of conduct and externalizing problems, characteristics typically associated with Oppositional Defiant Disorder, Conduct Disorder and ADHD.

"These are high level, chronic exposures that start before the child is even born, but continue throughout their life. More research is needed to

examine the effects of cumulative exposure to phthalates on child development. But what this study suggests is that it's not enough to regulate childhood exposure to these chemicals. The regulations need to include products that moms use," said Dr. Engel.

Provided by Mount Sinai Hospital

Citation: Study finds prenatal exposure to certain chemicals affects childhood neurodevelopment (2010, January 28) retrieved 1 May 2024 from <https://medicalxpress.com/news/2010-01-prenatal-exposure-chemicals-affects-childhood.html>

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