

Common Insecticide Causes Significant Neurological Deficits in Children

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The organophosphate (OP) insecticide chlorpyrifos is among the most widely used pesticides in the United States. Over two dozen crops are sprayed with chlorpyrifos, leading to periodic residues in many common foods. Until December 2001, chlorpyrifos was also one of the most widely used insecticides in the home, schools, and residential environments. Products containing this OP insecticide were sprayed in and around homes for control of termites, cockroaches, ants, and other insects.

A June 2000 agreement between the major chlorpyrifos manufacturer, Dow AgroSciences, and the Environmental Protection Agency (EPA) led to the withdrawal of essentially all indoor chlorpyrifos uses by the end of 2001. The Center's "Critical Issue Report" on [reducing pesticide dietary exposures](#) provides further details on the uses and exposures to chlorpyrifos, national indicators of exposure, and the impact of regulatory actions taken in the course of implementing the "Food Quality Protection Act (FQPA)". An update on contemporary chlorpyrifos use and risks has also been posted to help answer questions about current use, exposures, and risks.

A team led by Dr. Robin Whyatt at the Center for Children's Environmental Health, Columbia University, studied exposures to chlorpyrifos among a group of 648 pregnant women living in large apartment buildings in New York City. This long-term project began in 1997. The team measured indoor exposures to chlorpyrifos in the air in apartments, as well as in umbilical cord and maternal blood soon after giving birth. These measures provided an accurate estimate of each woman's exposure levels.

All mothers in the study were divided into one of four chlorpyrifos exposure levels ranging from undetectable to an average of 63 picograms per gram of blood in the high-exposure group. Birth outcomes and infant development in the low-exposure group were then compared to high exposure infants. In previously published work, Whyatt et al. (2004) reported significant impacts of chlorpyrifos exposures on birth weight and length. In the current research, the team studied the neurological development of the children at 12, 24, and 36 months of age. Standard methods for assessing cognitive developmental, motor skills, and behavior were used.

At 36 months of age, children in the high exposure group were 4.9 times as likely to display mild to significant psychomotor skill developmental delays, based on a sophisticated regression analysis of the results taking into account possible confounding variables. High-exposed children were also 2.4 times more likely to have impaired mental abilities. High-exposure children were also about five-times more likely to develop attention-deficit/hyperactivity disorder (ADHD), and were almost ten-times more likely to have attention problems.

Study results lead the authors to report three conclusions. Chlorpyrifos exposures in this group of infants caused:

- Significant mental and motor skill developmental delays;
- The adverse impacts on neurological development increased over time; and
- By age three the highly exposed children were more likely to score in the clinical range for ADHD and "Pervasive Developmental Disorder" (PDD) problems.

Work on this cohort of children is ongoing and will no doubt lead to additional insights into the degree to which prenatal OP exposures can trigger developmental deficits.

Sources: "Impact of Prenatal Chlorpyrifos Exposure on Neurodevelopment in the First 3 Years of Life Among Inner-City Children."

Authors: Virginia Rauh, Robin Garfinkel, Frederica Perera, Howard Andrews, Lori Hoepner, Dana Barr, Ralph Whitehead, Deliang Tang, and Robin Whyatt

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Robin Whyatt, D. Camann, and Frederica Perera. "Prenatal insecticide exposure and birth weight and length among an urban minority cohort." Environmental Health Perspectives, Vol. 112:1125-1132. 2004.