Pesticide chlorpyrifos is linked to childhood developmental delays

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Exposure to the pesticide chlorpyrifos -- which is banned for use in U.S. households but is still widely used throughout the agricultural industry -- is associated with early childhood developmental delays, according to a study by researchers at Columbia University's Mailman School of Public Health.

Findings of the study, "Chlorpyrifos Exposure and Urban Residential Environment Characteristics as Determinants of Early Childhood Neurodevelopment," are online in the American Journal of Public Health .

The study examined the association between exposure to the pesticide and mental and physical impairments in children in low-income areas of New York City neighborhoods in the South Bronx and Northern Manhattan. Chlorpyrifos was commonly used in these neighborhoods until it was banned for household use by the U.S. Environmental Protection Agency (EPA) in 2001. It is still used as an agricultural pesticide on fruits and vegetables. The EPA registration of chlorpyrifos for agricultural use is currently under review, with a public comment period scheduled for the coming months.

"This study helps to fill in the gaps about what is known about the effect of the pesticide chlorpyrifos on the development of young children by showing that there is a clear-cut association between this chemical and delayed mental and motor skill development in children even when there are other potentially harmful environmental factors present," said Gina

Lovasi, PhD, lead author and Mailman School of Public Health assistant professor of epidemiology. Dr. Lovasi conducted the research as a Robert Wood Johnson Foundation Health & Society Scholar at the Mailman School.

As in previous research in the same study population, published in Pediatrics in 2006, this study controlled for gender, gestational age at birth, ethnicity, maternal education, maternal intelligence quotient, and exposure to secondhand smoke during pregnancy. What this study adds is that building dilapidation and community-level factors such as percentage of residents living in poverty do not explain the association. After controlling for these factors, the research indicates that high chlorpyrifos exposure (greater than 6.17 pg/g in umbilical cord blood at the time of birth) was associated with a 6.5-point decrease in the Psychomotor Development Index score and a 3.3-point decrease in the Mental Development Index score in 3-year-olds. "These associations remained statistically significant and similar in magnitude after accounting for dilapidated housing and neighborhood characteristics," noted Dr. Lovasi.

Of the 266 children included as study participants, 47 percent were male, 59 percent were Hispanic of Dominican descent and 41 percent were Black. In addition, children living in neighborhoods with the highest levels of poverty also had lower test scores—a finding that was not affected by pesticide exposure.

Young children have greater exposure to pesticides than adults, since they tend to play on the floor or in the grass—areas where pesticides are commonly applied—and to place their hands and objects in their mouths. Pregnant women exposed to pesticides can also expose their unborn children to the chemicals.

Those who advocate for further restrictions on the use of pesticides,

including chlorpyrifos, contend that such chemicals drift from treated agricultural fields to nearby yards, homes and schools, placing pregnant women and children at risk.

"Although this pesticide has been banned for residential use in the United States, chlorpyrifos and other organophosphorus insecticides are still commonly used for a variety of agricultural purposes," said study co-author Virginia Rauh, ScD, professor of clinical population and family health, and co-deputy director for the Columbia Center for Children's Environmental Health at the Mailman School of Public Health. "We hope that the results of this study, further demonstrating the neurotoxicity of chlorpyrifos under a range of community conditions, may inform public health professionals and policy-makers about the potential hazards of exposure to this chemical for pregnant women and young children."

Provided by Columbia University's Mailman School of Public Health