Common Pesticide “Disturbs” the Brains of Children
By David Biello | May 1, 2012

Banned for indoor use since 2001, the effects of the common insecticide known as chlorpyrifos can still be found in the brains of young children now approaching puberty. A new study used magnetic imaging to reveal that those children exposed to chlorpyrifos in the womb had persistent changes in their brains throughout childhood.

The brains of 20 children exposed to higher levels of chlorpyrifos in their mother's blood (as measured by serum from the umbilical cord) "looked different" compared to those exposed to lower levels of the chemical, says epidemiologist Virginia Rauh of the Mailman School of Public Health at Columbia University, who led the research published online by Proceedings of the National Academy of Sciences on April 30. “During brain development some type of disturbance took place.”

The 6 young boys and 14 little girls, whose mothers were exposed to chlorpyrifos when it was commonly used indoors in bug sprays prior to the ban, ranged in age from seven to nearly 10. All came from Dominican or African American families in the New York City region. Compared to 20 children from the same kinds of New York families who had relatively low levels of chlorpyrifos in umbilical cord blood, the 20 higher dose kids had protuberances in some regions of the cerebral cortex and thinning in other regions. “There were measurable volumetric changes in the cerebral cortex,” Rauh notes.

Though the study did not map specific disorders associated with any of these brain changes, the regions affected are associated with functions like attention, decision-making, language, impulse control and working memory. The "structural anomalies in the brain could be a mechanism, or explain why we found cognitive deficits in children" in previous studies, Rauh notes.

The findings echo similar results with animal studies of the insecticide, which remains widely used in agriculture to kill crop-spoiling insects. Rats exposed to the chemical also experience changes to the brain as well as altered behavior—all at doses below those considered safe by current federal guidelines from the U.S. Environmental Protection Agency (EPA). The change, at least for rats, is irreversible.

Previous studies have linked chlorpyrifos in children to everything from low birth weight to attention problems in both urban and agricultural exposures. And a low, but measurable, dose reaches yet other populations via food—a study that fed children a diet of organic food showed drops in the levels of chlorpyrifos and other organophosphate pesticides that then rebounded when they returned to their regular diet. The insecticide is used on everything from peaches to cilantro. "It's the fruits and vegetables," that can carry chlorpyrifos, Rauh notes.

Of course, it remains unclear what, if any, danger such doses pose but it is now apparent that chlorpyrifos exposure in the womb has impacts on brain structure that persist through childhood, at least. And the children in this study were exposed to lower levels of chlorpyrifos than found in a random sampling from a Cincinnati blood bank (which showed levels twice as high as those in the affected
children. It also remains unclear whether the brain changes—some of which skew masculine or feminine brain characteristics—will have an impact in puberty. “Whether or not there would be any measurable effects is not clear,” Rauh says. “Hopefully, going forward, we’ll be able to answer some of those questions and determine whether the process of puberty or other aspects of sexual differentiation could be assessed.”

The good news is that washing fruits and vegetables can rinse away lingering chlorpyrifos and, presumably, mitigate any risk. In addition, although chlorpyrifos can persist in indoor environments, it breaks down relatively quickly when exposed to sunlight and other natural elements. And the EPA is now following up its prior ban on indoor use by re-evaluating its policy more broadly. “We have a lot of risky chemicals in our environment,” Rauh says. “We need to determine if the risk persists, if it is reversible and look at the larger regulatory picture for chemicals.”

As of now, however, the use of chlorpyrifos remains widespread in conventional agriculture. “Eating organic is a great idea, however, it is very expensive and out of reach for many average families,” such as the ones in this study, Rauh notes. It’s a “better idea to wash your apples. That would eliminate a whole variety of problems.”

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