Babies exposed in the womb to a commonly used insecticide have brain abnormalities after birth, according to a study that looked at children born before the U.S. limited the chemical’s use.

Magnetic resonance imaging of elementary school-aged children with the highest exposure to chlorpyrifos, used mostly in agricultural settings now, showed structural changes in the brain compared with those who had the lowest exposure, research online today in Proceedings of the National Academy of Sciences found. Some parts of the brain were overgrown, while other regions were smaller, the scientists found.

The study is the first to use imaging scans to show that prenatal exposure to the chemical, included in Dow Chemical Co. (DOW)’s pesticide Dursban, is linked to structural changes in the brain five to 10 years after exposure, said Virginia Rauh, the lead author. While the chemical’s use was banned in residential areas 12 years ago, many women are exposed to moderate levels in agricultural settings and through food residue, Rauh said.

“Prenatal exposure to chlorpyrifos is risky for pregnant women and should be avoided,” said Rauh, a professor of clinical population and family health at Columbia University in New York, in an April 27 e-mail. “Mother breathes or ingests the chlorpyrifos, which then enters her blood stream. The chemical crosses the placenta and enters the infants’ blood stream.”

**Minimize Exposure**

Pregnant women should minimize proximity to agricultural and commercial areas where pesticide applications are taking place, wash fruits and vegetables before eating and try to find organic sources of food, Rauh said.
The children considered to have a high exposure to the chemical have levels that are much lower than doses shown to cause no effect in laboratory animals, Garry Hamlin, a spokesman for Midland, Michigan-based Dow Chemical’s Dow AgroSciences unit, said today in an e-mail. Another mechanism may be at work, he said.

“Chlorpyrifos binds to lipids and high levels of blood lipids are linked with adverse health outcomes. So it is possible that the effects reported here for chlorpyrifos are actually masking the effects of high blood lipids or some other, underlying cause,” he said. “This study plows new ground, but its results are hard to interpret.”

New York Children

The researchers in the study looked at the brain scans of 20 New York City children with the highest exposure to chlorpyrifos at birth and 20 children with the lowest exposure to the chemical at birth. The children, ages 6 to 11, were part of a larger trial that tested infants at birth to look at the role air pollution had on respiratory health and neurodevelopment.

Areas of the brain related to attention, language, reward systems, emotions and control may be affected by the chemical, the researchers found. The study also showed that high-exposure children didn’t have expected sex differences in their brains, which may affect their hormones and behavior as they get older, Rauh said. Studies are needed to look at what effect that has on the children as they grow.

“I am hopeful that some targeted interventions might improve a child’s performance in some of the affected areas, however, I do not know if we can alter the structural changes in the brain,” she said. “Brains, however, are surprisingly plastic, and some areas of the brain can develop to compensate for deficits in other parts of the brain, as after an acute injury.”

The researchers are conducting a study of children who are 9 to 12 years old, and testing to better understand the damage associated with early exposure to chlorpyrifos, she said.

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