Fetal exposure alters brain structure, say scientists

May 1, 2012 by Pesticide Action Network

When a pregnant woman is exposed to low levels of a commonly used pesticide, the architecture of her developing infant's brain may be irreversibly damaged. This according to researchers who for the first time used MRI testing to see structural evidence of harm from exposure to the insecticide chlorpyrifos during fetal development.

Researchers report that the changes in brain structure they observed were consistent with the learning and developmental effects (including reduced IQs) that have been linked to chlorpyrifos. The effects were observed at exposure levels well below those considered harmful by EPA.

The scientists scanned the brains of 40 New York City children, ages 5 to 11, whose mothers had participated in a larger study measuring pesticide exposure during pregnancy. Twenty children whose mothers had been exposed to higher levels of chlorpyrifos were compared with 20 children with lower exposure levels.

The structural changes — abnormal areas of thinning and enlargement across the surface of the brain — appeared among the children whose mothers had been exposed to higher levels. Areas of the brain related to attention, language, reward systems, emotions and control appear to be affected.

Low levels, irreversible harm

In the press release announcing the study, lead author Virginia Rauh, Professor at the Mailman School of Public Health and Deputy Director of the Columbia Center for Children's Environmental Health, describes the implications of the research:

> The present study provides evidence that the prenatal period is a vulnerable time for the developing child, and that toxic exposure during this critical period can have far-reaching effects on brain development and behavioral functioning.

The findings suggest that EPA's current "safety" threshold for chlorpyrifos is not accounting for whatever mechanism is leading the pesticide to cause structural changes in the brain.

Children still at risk

The prenatal study of the mothers took place before 2001, when EPA withdrew household uses of chlorpyrifos due to concerns about health effects on children. The insecticide continues to be widely used in agriculture, despite several recent studies documenting harmful cognitive effects from both prenatal exposure and children's intake of chlorpyrifos residues on common foods.

Children in rural areas, who may be exposed to both drift from farm applications and food residues, are particularly at risk.

The researchers note that chlorpyrifos exposure also appears to eliminate male-female differences ordinarily present in the brain. They call for ongoing study of these findings as the children move through puberty.

EPA's independent Scientific Advisory Panel recently reviewed the latest science on the cognitive effects of chlorpyrifos exposure; their findings and recommendations to the agency are expected in the coming weeks.

Source URL: http://www.panna.org/blog/fetal-exposure-alters-brain-structure-say-scientists