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Pesticides - A Greater Threat to Children
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Children are more vulnerable than adults to dangers of all kinds. We invest in car seats, babysitters, and childproofing our homes knowing that environments that seem safe for adults are wrought with potential disaster for the very young. However, we do not adequately protect kids from chemical pollution in our environment, even though it too may be much more dangerous to children than to adults. A new scientific study shows that children can be up to 164 times more sensitive than adults to pesticides that frequently contaminate agricultural communities. The findings strengthen an ongoing lawsuit alleging that the Environmental Protection Agency (EPA) is not adequately protecting children from pesticide exposures.

"The science is in: Children are born with lower levels of our bodies' natural defenses against toxic pesticides," said Dr. Gina Solomon, M.D., a physician and senior scientist at the Natural Resources Defense Council (NRDC). "Yet EPA too often ignores the clear scientific evidence and fails to protect the most vulnerable people from these dangerous chemicals."

According to a research team led by Professor Brenda Eskenazi at the University of California, Berkeley, newborn children can be 65 to 164 times more vulnerable than adults to the common agricultural pesticides chlorpyrifos (Lorsban) and diazinon. The new study was published in the scientific journal *Pharmacogenetics and Genomics* in March 2006.

The Berkeley researchers worked with 130 Latina mothers and children in the Salinas Valley agricultural region of California starting in 1998 . Blood samples from both groups were analyzed for a key enzyme (known as PON1) which normally helps the human body detoxify the class of pesticides known as organophosphates. Higher levels of the enzyme help protect people from being poisoned by these chemicals. The researchers examined levels of PON1 to predict the women and children's sensitivities to these pesticides.

The study found great variations among individuals in their PON1 levels and concomitant sensitivity to organophosphates. Some of the women studied were 14 times more sensitive to diazinon and 35 times more sensitive to chlorpyrifos than other women. Some of the newborns were 26 times more

sensitive to diazinon and 65 times more sensitive to chlorpyrifos than other newborns. The researchers also found that the newborns had consistently lower levels of the protective enzyme than the mothers, making them about four times more sensitive. When the scientists compared across the entire group, the most sensitive newborns were 65 times more sensitive to diazinon and 131 to 164 times more sensitive to chlorpyrifos than the average mother.

The results of the Berkeley study call into question EPA's practices to protect children and the public in general from pesticide exposure. Due to differences in chemical tolerance between individuals, regulators apply "uncertainty factors" when determining the maximum levels of pesticides that they think people can be exposed to without harm. Regulators reduce recommended exposure levels by a factor of 10 to account for the fact that some people are more sensitive than others. The Food Quality Protection Act also mandates the addition of a "child protection factor" reducing pesticide exposure levels by another factor of 10 if data exist that show that children are more sensitive or if key data are not available.

The Berkeley study indicates that both mothers' and children's sensitivity to certain pesticides may be substantially greater than the uncertainty factors used by EPA. NRDC and the Northwest Coalition for Alternatives to Pesticides are using the study as further evidence in their ongoing lawsuit charging that EPA fails to protect children from pesticide exposure in foods including fruits, vegetables, milk, eggs, meat, cereal grains and vegetable oils. The case is being heard by the 9th U.S. Circuit Court of Appeals in San Francisco.

EPA banned chlorpyrifos and diazinon for household use in December 2001 and December 2002 respectively largely because of hazards to children, but it allowed continued use on agricultural crops. More than 1.78 million pounds of chlorpyrifos were used in California in 2004, the most recent year for which data are available. The top uses were on cotton, alfalfa, almonds and walnuts. More than 490,000 pounds of diazinon were used in California in 2004, mostly on lettuce, peaches, almonds, prunes and spinach. In 2001, the most recent year for which EPA has reported data, about 20 percent of all foods for sale had residues of one or more organophosphate pesticides. The highest residues of chlorpyrifos tend to show up on apples from New Zealand, grapes from Chile, tomatoes from Mexico and domestically grown soybeans according to the University Of California report.
Chlorpyrifos has also recently been found to depress levels of the nervous system enzyme cholinesterase in one out of ten farmworkers studied in the state of Washington. "We're all exposed to pesticides in the foods we eat,"

said Margaret Reeves, Ph.D., senior scientist at the Pesticide Action Network of North America. "But it's the farmworkers and the fence line communities in agricultural areas that are hit the hardest." Altogether, these studies indicate that chemical-intensive agriculture extracts a high price from rural residents--especially the children.

Sources:_Furlong, Clement E., Nina Holland, Rebecca J. Richter, Asa Bradman, Alan Ho and Brenda Eskenazi. 2006. "PON1 status of farmworker mothers and children as a predictor of organophosphate sensitivity," *Pharmacogenetics and Genomics* 16:183-190.

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Farm Worker Pesticide Project, Columbia Legal Services, Farmworker Justice Fund, and United Farm Workers. 2006. *More Messages from Monitoring: Year 2 of Washington State's* Farm Worker Medical Tracking Program._http://www.fwpp.org/?page=MedicalMonitoring_**Contact**: Panna