IN UTERO DDT AND DDE EXPOSURE AND NEURODEVELOPMENT IN CHILDREN OF FARMWORKERS

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Epidemiology: September 2005 - Volume 16 - Issue 5 - p S101
Program and Abstracts: The Seventeenth Conference of the International Society for Environmental Epidemiology (ISEE): Abstracts

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ISEE-259

Introduction:

Dichlorodiphenyltrichloroethane (DDT), a persistent organochlorine pesticide, breaks down slowly in soil, has a long half-life, and bio-accumulates in plants and animals. Although DDT was banned in the U.S. in 1972 and in Mexico in 2000, it continues to be used in other malaria-endemic areas. There is substantial animal evidence that DDT exposure *in utero* and during early postnatal life impacts neurodevelopment. However, few studies have examined these associations in humans. A North Carolina study found levels of DDE, a metabolite of DDT, to be dose-related to neonatal hyporeflexia (Brazelton Neonatal Behavioural Assessment Scale), but this was not confirmed in a smaller study from New York. The latter study also did not find an association with 6- and 12-month olds' performance on the Fagan Test of Infant Intelligence. However, in a small Spanish study (n=92), cord serum DDE was negatively associated with 13-month olds' cognitive, psychomotor, and social development (Bayley Scales of Infant Development, Griffiths Scales of Infant Development).

Aim:

The present study aims to investigate the relationship of *in utero* DDT/DDE exposure and neurodevelopment of children from primarily Mexican farmworker families in the Salinas Valley, California.

Methods:

Participants were drawn from the CHAMACOS project, a longitudinal birth cohort study of pesticides and other environmental exposures and the health of pregnant women and their children. This analysis includes approximately 350 singletons with a maternal blood collected during pregnancy (~26 weeks gestation) and measured for *p,p*- DDT, *p,p*- DDE, and *o,p*- DDT by gas chromatography high-resolution mass spectrometry.

Results:

p,p -DDT, *p,p* -DDE, and *o,p* -DDT were detected in almost all samples. Geometric mean levels and 95% confidence intervals were: *p,p* -DDT = 19.7 ng/g lipid (16.7, 23.2); *p,p* -DDE = 1361 ng/g lipid (1201, 1542); and *o,p* -DDT = 1.6 ng/g lipid (1.4, 1.8). Crude analyses indicate a relationship between serum levels and some measures of mental and psychomotor development at different ages: Among 6-month olds, *p,p* -DDT was negatively associated with Bayley Psychomotor Development Index (PDI) (β= -1.6 points per $\log_{10}$ unit increase, *p* =0.08), but not the Bayley Mental Development Index (MDI). Among 12-month olds, *o,p* -DDT *p,p* -DDT, and *p,p* -DDE were all negatively associated with PDI (β= -2.4, *p* =0.04; β= -2.6, *p* =0.01; and β= -2.7, *p* =0.04, respectively). *o,p* -DDT and *p,p* -DDT were also associated with MDI at 12 months (β= -2.0, *p* =0.02; β= -1.2, *p* =0.10, respectively). Among 24-month olds there were no associations with PDI, but *o,p* -DDT was associated with MDI (β= -2.3, *p* =0.06). We will determine whether these findings remain after adjustment for potential confounders.

Conclusion:

In summary, we find preliminary evidence for an association between *in utero* exposure to DDT and DDE and neurodevelopment in children, but the associations may vary with age.