In Utero Pesticide Exposure and Neurodevelopment in Three NIEHS/Environmental Agency Children's Center Birth Cohorts

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Introduction:

Despite evidence in animal studies and known human exposure, the effect of in utero exposure to organophosphate (OP) and organochlorine (OC) pesticides on human neurodevelopment has rarely been studied in humans. In 1999 to 2000, 3 of the NIEHS/Environmental Agency Children's Centers established birth cohorts, 2 in New York City and one in rural California, to examine the association of OPs and OCs with neurodevelopment.

Methods:

All 3 centers collected maternal urine and blood samples, 2 administered the Brazelton Neonatal Behavioral Assessment Scale (BNBAS) shortly after delivery (Ns = 381 and 311), and all administered the Bayley Scales of Infant Development when the children were 1 (Ns = 416, 200, and 523) and 2 years of age (Ns = 389, 276, and 419). One center also administered the Bayley at 6 months and another at 3 years. Metabolites of OP pesticides, including 3 diethylphosphates (DEP), 3 dimethylphosphates (DMP), and malathion dicarboxylic acid (MDA), were measured in maternal urine in 2 centers and OP parent compounds were measured in maternal and cord blood in the other center. DDT/DDE and other OC compounds were measured in

maternal and/or cord blood at all 3 centers. Multivariate analyses of the association of OPs and OCs with BNBAS and/or Bayley performance are being conducted separately in each population and in pooled analyses.

Results:

Median levels of DEP were comparable in the New York and California populations, but median levels of DMP and DDE were considerably higher in California mothers. Higher levels of total OP metabolites were associated with an increase in the number of abnormal reflexes on the BNBAS in 2 different cohorts, although results differed for subgroups of metabolites. Higher chlorpyrifos levels in cord blood were associated with significantly poorer performance on the Bayley MDI and PDI at age 3 years, as well as with ADHD and attentional problems, at one center. Analyses of OP metabolites and Bayley score are currently underway at 2 centers and will be presented. DDT/DDE was not associated with any of the BNBAS domains, but higher levels of DDT/DEE were associated with poorer performance on the Bayley MDI at 1 and 2 years of age.

Discussion:

The racial/ethnic makeup of the populations and the magnitude and types of exposures differed across centers; yet there is some consistency in results. Data will be presented from the 3 centers, results will be compared and contrasted, and findings from pooled analyses will be presented.