

Environmental Exposures and Birth Outcomes in the NIEHS/EPA Children's Center Birth Cohorts

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Introduction:

Effects of environmental exposures during the prenatal period has been studied in several of the NIEHS/EPA Children's Centers in relation to fetal and infant growth, which are possible risk factors for later child behavior, obesity, pubertal onset and cancer. In particular, in utero exposures to pesticides have been investigated during the prenatal window that is a vulnerable time for effects of such agents on somatic and neurologic development.

Methods:

To study fetal growth, three of the NIEHS/EPA Children's Centers established birth cohorts with collection of third-trimester maternal blood and urine samples. Data are available for DDE on 194 women from the Mount Sinai Center (MSSM), 105 mothers or cord plasma from Columbia University, and 385 from University of California-Berkeley (UCB), all with birth outcomes and covariates. Urinary dimethyl- and diethyl-phosphates (DMP and DEP) were available for 327 mothers at Mount Sinai and 486 mothers at UCB. Multivariate analyses were conducted in each population to ascertain relationships between the environmental exposure biomarkers and birth weight, length, head circumference, gestational age, and Ponderal index (weight/height³).

Results:

The study populations had differences in some characteristics including race, parity, and BMI. DDE levels were much lower in New York City than in California mothers. MDA and DMP levels were higher than the recent CDC report of women in NHANES; DMP in UCB mothers were approximately twice as high as those at MSSM. DEP levels were similar in the 2 Centers and in NHANES data, and DEP levels were lower than DMP. DDE was associated with reduced birthweight and head circumference in New York, and HCB with length of gestation in the UCB cohort. Among Mount Sinai mothers, birthweight and Ponderal showed a weak inverse association with DEP; length was associated with DMP when an interaction with paraoxonase was considered. In the California study, the only association seen was between gestational age and DMP. In the Columbia cohort, birthweight and length were reduced among mothers with higher blood chlorpyrifos levels.

Discussion:

The magnitude of exposures as well as effects on birth outcomes differed across Centers for the organophosphate metabolites DDE. However, there are some consistent findings that offer opportunities for further research and for clarification by undertaking pooled analyses of data from multiple Centers. Additional data will be presented to highlight the effects of these exposures and to discuss differences in populations and study design that may explain some of the differences observed.

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