ASSOCIATIONS OF PRENATAL EXPOSURE TO ORGANOPHOSPHATE PESTICIDES WITH BIRTHWEIGHT AND GESTATIONAL LENGTH, AND MODIFICATION BY PON1 GENOTYPE

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Background and Aims: Prenatal exposure to organophosphate (OP) pesticides, a widely-used class of insecticides, may decrease birthweight and shorten gestational length. PON1, a gene coding for paraoxanase (PON), an OP-detoxifying enzyme, may mediate susceptibility. We examined relationships of prenatal OP exposure with birthweight and gestational length. We also assessed interactions by infant PON1 genotype, using two previously-identified polymorphisms, PON1_192 and PON1_-108.

Methods: We collected two spot-urine samples around 16 and 26-weeks gestation from 334 pregnant mothers enrolled in the HOME Study, a prospective birth cohort study. We measured six dialkyl phosphate (DAP) metabolites of OP pesticides and used multivariable regression to examine relationships between DAP concentrations and birthweight and gestational length. We examined whether functional polymorphisms of PON1_192 and PON1_-108 mediated susceptibility.

Results: In multivariable analyses, each 10-fold increase in total DAP concentration was associated with a 0.5 week decrease in gestation (95% confidence interval [CI]: -0.8, -0.1), and a -151g decrease in birthweight (95% CI: -287, -16). Associations between birthweight and OP pesticides were primarily the result of shortened gestation. Race modified these associations; Black mothers showed a greater decrease in birthweight than White mothers (Black: β=-188g, 95% CI: -395, 19; White: β=-118g, 95% CI: -296, 60; p-value for interaction =0.46), but only White mothers showed an association between OP exposure and gestational length (Black: β=-0.1 weeks, 95% CI: -0.9, 0.6; White: β=-0.7 weeks, 95% CI: -1.1, -0.3; interaction p=0.10). In PON1-stratified models, associations with perinatal outcomes were strongest in infants who were heterozygous for PON1_192 and PON1_-108.

Conclusions: Prenatal OP exposure was associated with shortened gestation and reduced birthweight, but the effects differed by race. The PON1 polymorphisms did not show the expected pattern, possibly due to differences in the underlying population substructure or in pesticide-specific exposures not captured by DAP metabolites.