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Haemochromatosis genotype modification of lead biomarker effects upon infant neurodevelopment

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Objective: We examined the potential modifying effect of the haemochromatosis gene (HFE) variants C282Y and H63D on the impact of lead exposure on infant neurodevelopment.

Methods: This was a pilot study of 268 mother/infant pairs nested within a larger birth cohort living in Mexico City. Bayley Scales of Infant Development II (MDI) were administered at 24 months as the primary outcome of interest. Multiple linear regression models, stratified by infant HFE genotype and then combined with interaction terms, were constructed examining the relationship of MDI scores to umbilical cord blood lead controlling for maternal education, maternal IQ, and infant gender.

Results: Of the 268 infants with data on all variables of interest, 48 (19%) carried at least one copy of the HFE mutant allele. Mean MDI scores among HFE carriers and wildtype individuals were 92.1 (12.2) and 90.8 (14.5), respectively. In our stratified analyses the impact of lead biomarkers on MDI scores was consistently and markedly lower than amongst carriers of either HFE variant when compared to wildtype individuals. The interactions terms for HFE by lead biomarker in the combined multiple linear regression analyses were consistently positive (i.e., lower adverse lead effect in the carriers) but failed to reach statistical significance.

Conclusions: Although not statistically significant, these findings suggest that infant HFE genotype may attenuate lead's adverse effects upon MDI scores. This preliminary study is being followed up by a larger study that will address several other iron metabolism genetic polymorphisms in addition to the HFE variants.