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Genomic imprinting in human placentas and the intergenerational transmission of parental phenotypes: a two-generation cohort study

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Genomic imprinting is a mechanism of epigenetic regulation in the sperm and eggs that selectively represses either the maternal or the paternal copy of a gene. Partial de-repression of imprinted alleles, or “loss of imprinting” (LOI), leads to quantitative variation in allelic bias between individuals and is potentially an understudied mechanism for the parental transmission of phenotypes. This research is basic science that has the potential to provide mechanistic insights that will improve human health in the future. At my long-term field site among the Dogon of Mali, we collected 1 gram of tissue from 470 placentas and then used RNA-seq to analyze allele specific expression in imprinted genes. The placentas were returned to the families who, in this ethnicity, do not perform any special rites in connection with the after-birth. All protocols were done with informed consent from the participants and both Malian and American IRB approval. A unique feature of this study is that it entails two generations of longitudinal data on human phenotypes. We enrolled ~1700 males and females in the F1 generation in infancy and early childhood and followed them regularly until adulthood (20^{+} years). We enrolled 470 members of the F2 generation at birth and followed them regularly for 5^{+} years. This talk will present the results of tests for associations between allelic bias and maternal and offspring phenotypes (e.g. sex, birth length, height at age 0 to 10 years, age at menarche). Over 99% of longitudinal cohort studies relevant to public health are conducted in high-income countries. Studies like this one have the potential to redress this imbalance and to shed light on health vulnerabilities associated with under-nutrition.

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