Epigenetics Mechanism Links Mom's Nutrition to Child's Health

Studies by U. S. Department of Agriculture-funded research molecular geneticist Robert A. Waterland are helping explain how the foods that soon-to-be-moms eat in the days and weeks around the time of conception—or what's known as periconceptional nutrition—may affect the way genes function in her children, and her children's health.

In an early study, Waterland and co-investigators examined gene function of 50 healthy children living in rural villages in the West African nation of The Gambia. The study has shaped some of Waterland's current research into the effects of nutrition on what geneticists refer to as epigenetic mechanisms. Those mechanisms can impact, for example, the levels at which an everyday biochemical process, DNA methylation, occurs at regions of certain genes. DNA methylation is essential for cell development and for stabilizing cell function.

In the West Africa study, Waterland and co-researchers found that levels of DNA methylation were higher at regions of five genes in children conceived during the peak rainy season months of August and September, when food would typically have been less available to their mothers.

According to Waterland, two of the five genes in which elevated DNA methylation occurred warrant further study because they are associated with risk of disease. Specifically, the SLITRK1 gene is associated with Tourette's syndrome, and the PAX8 gene is linked to hypothyroidism.

In a scientific article in *PLoS Genetics*, the researchers attributed the epigenetic variation to dramatic seasonal differences in the kinds and amounts of foods available in the three subsistence-farming villages that were the focus of the study.

An article in the March 2013 issue of *Agricultural Research* magazine tells more.

Waterland works at the Children's Nutrition Research Center in Houston, Texas,

which is managed by the Agricultural Research Service, USDA's chief in-house scientific research agency, and by the Houston-based Texas Children's Hospital and Baylor College of Medicine, where Waterland is an associate professor of pediatrics and of molecular and human genetics. This research supports the USDA priority of improving children's health and nutrition.

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