

The epigenetics of increasing weight through the generations

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Overweight mothers give birth to offspring who become even heavier, resulting in amplification of obesity across generations, said Baylor College of Medicine researchers in Houston who found that chemical changes in the ways genes are expressed – a phenomenon called epigenetics -- could affect successive generations of mice.

"There is an obesity epidemic in the United States and it's increasingly recognized as a worldwide phenomenon," said Dr. Robert A. Waterland, assistant professor of pediatrics – nutrition at BCM and lead author of the study that appears in the *International Journal of Obesity*. "Why is everyone getting heavier and heavier? One hypothesis is that maternal obesity before and during pregnancy affects the establishment of body weight regulatory mechanisms in her baby. Maternal obesity could promote obesity in the next generation."

Waterland and his colleagues studied the effect of maternal obesity in three generations of genetically identical mice, all with the same genetic tendency to overeat. One group of mice received a standard diet; the other a diet supplemented with the nutrients folic acid, vitamin B12, betaine and choline. The special 'methyl supplemented' diet enhances DNA methylation, a chemical reaction that silences genes.

"We wanted to know if, even among genetically identical mice, maternal obesity would promote obesity in her offspring, and if the methyl supplemented diet would affect this process," said Waterland. "Indeed, those on the regular diet got fatter and fatter with each generation. Those

in the supplemented group, however, did not."

"We think DNA methylation may play an important role in the development of the hypothalamus (the region of the brain that regulates appetite)," said Waterland.

"Twenty years ago, it was proposed that just as genetic mutations can cause cancer, so too might aberrant epigenetic marks – so called 'epimutations.' That idea is now largely accepted and the field of cancer epigenetics is very active. I would make the same statement for obesity. We are on the cusp of understanding that," he said.

Source: Baylor College of Medicine

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