

High-fat diet during pregnancy contributes to offspring's increased weight

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Exposure to a high-fat diet in the womb and after birth can permanently change the cells in the brain that control food intake, predisposing monkeys to overeating and an increased preference for fatty and sugary foods, a new study finds. The results were presented Monday at The Endocrine Society's 95th Annual Meeting in San Francisco.

The study, funded by the National Institutes of Health's National Institute of Diabetes and Digestive and Kidney Diseases, also found that [male offspring](#) of maternal monkeys that ate a high-fat diet had increased body weight, compared with the offspring of mothers that ate a low-fat diet.

"Studies in humans have demonstrated that maternal obesity during pregnancy is a strong determinant of offspring [body mass index](#), or BMI," said the study's lead author, Juliana Gastao Franco, PhD, a [postdoctoral fellow](#) at Oregon Health and Science University.

"Our group demonstrated that consumption of a high-fat diet during gestation alters fetal development of neurons that control food intake, ultimately leading to an increased preference for high-calorie food and to increased body fat in the offspring."

Franco and her co-investigators studied monkeys born to females that consumed either a low-fat (control) diet, consisting of 14 percent of calories from fat, or a high-fat diet in which 36 percent of calories came from fat. After weaning, 20 offspring of female monkeys on the high-fat diet either received the same high-fat diet (8 monkeys) or were switched to the control diet (12 monkeys). Seven offspring of the control monkeys continued to receive the control diet.

When the monkeys were 6 to 11 months of age (equivalent to toddlers in humans), the researchers measured their total food intake, dietary preferences, [body composition](#), physical activity

and metabolic rate, which is the rate at which the body burns calories. Using [molecular and cell biology](#) techniques, the investigators examined neurotransmitter systems in the monkeys' hypothalamus, the region of the brain that regulates food intake.

All male offspring that had fetal exposure to a high-fat diet had increased body weight, despite having no changes in their metabolic rate and regardless of what they ate after weaning, Franco reported. Also, the offspring that were switched to the [control diet](#) displayed, on average, greater overall food intake and increased binge eating of food with high sugar and fat, compared with either those maintained on a high-fat diet or the controls' offspring, she said.

According to Franco, these animals had what appeared to be permanent changes in their hypothalamus—an abnormal organization of the neurons that control food intake.

Co-author Elinor Sullivan, PhD, also of Oregon Health and Science University, speculated on the possible cause of this neurochemical change.

"We know that obesity incites inflammatory cytokines [molecules], which change how neurons develop," Sullivan said. "We believe that inflammation in the brain is causing the reprogramming of these appetite-regulating neurons."

Provided by The Endocrine Society

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