

High-fat diet during pregnancy programs child for future diabetes

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A high-fat diet during pregnancy may program a woman's baby for future diabetes, even if she herself is not obese or diabetic, says a new University of Illinois study published in the *Journal of Physiology*.

"We found that exposure to a high-fat diet before birth modifies [gene expression](#) in the livers of offspring so they are more likely to overproduce glucose, which can cause early [insulin resistance](#) and diabetes," said Yuan-Xiang Pan, a U of I professor of nutrition.

The high-fat diet that caused these changes was a typical [Western diet](#) that contained 45 percent fat, which is not at all unusual, he said.

"In recent years, the [American diet](#) has shifted to include many high-energy, high-fat, cafeteria-type, and fast foods," he noted.

Because the epigenetic marks can be easily evaluated, Pan hopes that the study will give doctors a diagnostic tool to screen newborns born with this propensity so they can help children keep their blood sugar in a normal range and give them their best chance of avoiding diabetes.

In the study, Pan and doctoral student Rita Strakovsky fed obesity-resistant rats either a high-fat or a [control diet](#) from the first day of gestation. Because the animals were not obese before the study began, the scientists were able to determine that diet alone had produced these effects.

"At birth, offspring in the high-fat group had [blood sugar levels](#) that were twice as high as those in the control group, even though their mothers had normal levels," Strakovsky said.

The high-fat offspring also had [epigenetic modifications](#) to genes that regulate [glucose metabolism](#). One of these modifications, the [acetylation](#) of histones, acts by loosening the DNA, making it easier for the gene to be transcribed, she said.

Pan said these epigenetic marks would not be erased easily. However, if people were aware of them, they could change their diet and lifestyle to compensate for their predisposition, delaying or even preventing the development of diabetes.

"We'd like to see if diet after birth could alleviate this problem that was programmed before birth," he said.

Although their study points to using epigenetics as a diagnostic tool, Strakovsky stressed the importance of making dietary recommendations for pregnant women more available so they are able to prevent this health problem.

"Obstetrics patients rarely see a dietitian unless they're having medical problems like gestational diabetes or pre-eclampsia. Doctors now tend to focus on how much weight a woman should gain in a healthy pregnancy. Although healthy weight gain is extremely important, nutritional guidance could be invaluable for all pregnant women and their babies," she said.

Pregnant women should consume a balanced diet low in saturated fats, which are usually found in fattier cuts of meat, fast foods, pastries, and desserts. But they should also consume appropriate amounts of healthy fats, including good sources of omega-3 and -6 fatty acids, which are

important for their baby's brain and neuron development.

Cold-water fish that are low in mercury, flaxseeds and flaxseed oil, soybean and cod liver oils, walnuts and winter squash are good sources of omega-3 fatty acids. Eggs, corn oil, whole-grain bread, poultry, and sunflower seeds and oil provide omega-6 fatty acids.

"Until now we didn't realize that a mother's diet during pregnancy had a long-term effect on the metabolic pathways that affect her child's glucose production," Pan said. "Now that we know this, we urge pregnant women to eat a balanced low-fat diet that follows government guidelines. Then a woman can prime her child for a healthy life instead of future medical struggles."

More information: The article, "Gestational high-fat diet programs hepatic phosphoenolpyruvate carboxykinase gene expression and histone modification in neonatal offspring rats," is available pre-publication online at [jp.physoc.org/content/early/20 ... 203950.full.pdf+html](http://jp.physoc.org/content/early/2011/05/25/203950.full.pdf+html)

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