Lifestyle changes in pregnant women affect babies' genes

February 11 2021

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A study led by researchers at Lund University in Sweden showed a connection between lifestyle intervention in pregnant women with obesity and epigenetic alterations in the baby. The study is published in

the journal *Diabetes*.

An international collaboration between researchers in Sweden, Denmark and Spain investigated whether children's genes were programmed differently if a pregnant woman with a BMI over 30 underwent lifestyle interventions.

The study involved 425 pregnant women, all of whom have a BMI over 30, which is defined as obesity. They were divided at random into three different groups:

- Group 1had a lifestyle intervention that included both physical activity (they were urged to walk 11000 steps per day and use a step counter) and a recommendation for a Mediterranean diet of 1200–1675 calories per day.
- Group 2 had a lifestyle intervention that only included physical activity
- Group 3 continued to live as usual (control group)

The researchers examined the umbilical cord blood of 208 of the newborn babies to see if epigenetic changes had taken place. One way in which epigenetic changes occur is through DNA methylation, in which the activities of nearby genes are changed by molecules that attach to the DNA. Such changes arose in 370 genes at a total of 379 places in the genome, in the children whose mothers were part of the groups that received lifestyle intervention.

Several of the genes that had changed epigenetically regulate metabolism, adipose tissue development and insulin release. It was previously known that several of the altered genes are linked to type 2 diabetes.

"We saw that the babies of mothers in both of the lifestyle-intervention

groups, either with physical activity only or with the addition of a healthy diet, had an increased muscle mass at birth, compared with the control group," states Charlotte Ling, a professor at Lund University, who led the study.

The researchers also wanted to find out if the epigenetic changes affected the babies' growth. The children involved in the study were therefore followed up at 9, 18 and 36 months. Twenty-two of the epigenetic changes found are associated with the children's BMI over time.

"In our study we cannot demonstrate a direct causality, but our results suggest that physical activity and a healthy diet during pregnancy in women with obesity affect epigenetics in the newborn babies, and it probably also affects the children's body composition and growth later in life," says Charlotte Ling.

Kristina Renault, an obstetrician and consultant at Rigshospitalet in Copenhagen and one of the researchers behind the study, has previously shown that a lifestyle intervention that includes physical activity with or without a healthy diet leads to reduced weight increase in pregnant women with a BMI over 30. The same group took part in the current study.

"Increased physical activity and a healthy diet during pregnancy can reduce weight increase in pregnant women with obesity, which counteracts some of the otherwise increased risks connected to a high BMI. The fact that the muscle mass of the children appeared to increase and that DNA from the umbilical cord showed epigenetic DNA changes suggests a potentially beneficial programming effect from a healthy lifestyle on the children's health," concludes Kristina Renault.

More information: Josefine Jönsson et al. Lifestyle Intervention in

Pregnant Women With Obesity Impacts Cord Blood DNA Methylation Which Associates With Body Composition in the Offspring, *Diabetes* (2021). DOI: 10.2337/db20-0487