

Epigenetic changes in twins of dieting mothers increases risk of obesity and diabetes

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(Medical Xpress) -- Women who fall pregnant while dieting are more likely to have a child that could become obese or diabetic in later life, new research suggests.

While the study was carried out in sheep, University of Manchester scientists suspect the findings may hold true for humans as well. The research, carried out with colleagues in New Zealand and Canada, may also have found a reason why human twins are more likely to develop type-2 diabetes in adulthood after the team studied twin lambs.

The study investigated twin pregnancies in sheep, as well the pregnancies of ewes that received less food around the time the lamb was conceived. The researchers then looked at tissues from the brains of the unborn lambs. This was to see if there were changes in the structure of the DNA that would alter genes involved in food intake and glucose levels after birth.

“We found that unborn twin lambs had changes in the structure of DNA in the region of the brain that regulates food intake and glucose that resulted in an increased chance of diabetes in adulthood,” said study lead Anne White, Professor of Endocrine Sciences.

“Our findings provide a reason why twins are more likely to get diabetes but we have also shown that mothers who don’t have enough food around

the time of conception may have a child who grows up with an increased risk of obesity.”

Although the study, published in the *Journal of the Federation of American Societies for Experimental Biology*, was conducted in sheep, the researchers believe their findings are relevant to humans too, as they reveal a non-genetic, or ‘epigenetic’, way in which the DNA of offspring can be altered.

Professor White, from Manchester’s Faculties of Medical and Human Sciences and Life Sciences, continued: “This is not an inherited change in the genes but a change in the structure of the DNA that affects the genes, and therefore much more unusual.

“What is significant is that the changes we have found are in genes that control food intake and glucose levels and alterations in these genes may lead to obesity and diabetes.”

More and more people are becoming obese and getting diabetes, while rates of twins are steadily increasing as women have babies at older ages and rates of conception using artificial reproductive technologies increase. Dieting in young women is also very common and can occur in women who may not know they are pregnant. The team’s findings in sheep, if replicated in humans, suggest that obesity and diabetes could be more likely in twins and in children from mothers who aren’t eating properly, or dieting, around the time of conception.

Professor White added: “Our study is important because it shows that factors in the brain can be altered by non-hereditary mechanisms and this results in changes in the body, which could make people obese.

“The findings may provide a new understanding of why twins can develop diabetes and also suggests that dieting around the time a baby is

conceived may increase the chance of the child becoming obese later in life.”

While the study doesn't have implications for the treatment of diabetes or obesity, the researchers say it could be important for disease prevention regimes whereby advice on eating is given to women who are planning a family that could reduce future health risks for their children.

More information: Ghazala Begum, Adam Stevens, Emma Bolton Smith, Kristin Connor, John R. G. Challis, Frank Bloomfield, and Anne White. Epigenetic changes in fetal hypothalamic energy regulating pathways are associated with maternal undernutrition and twinning. FASEB J. April 2012 26:1694-1703; [doi:10.1096/fj.11-198762](https://doi.org/10.1096/fj.11-198762)

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