

Maternal fat has negative impact on embryo development

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Exposing eggs to high levels of saturated fatty acids – as commonly found in the ovaries of obese women and those with Type II diabetes – compromises the development of the embryo, according to new research published in *PLoS ONE*.

The study – by researchers from Antwerp, Hull, and Madrid – found that embryos resulting from cattle eggs exposed to high levels of [fatty acids](#) had fewer cells, altered gene expression and altered metabolic activity, all indicators of reduced viability.

Although the work was carried out using eggs from cows, the findings could help to explain why women suffering from metabolic disorders like obesity and diabetes struggle to conceive. Patients in this group tend to metabolise more of their stored fat, resulting in higher levels of fatty acids being present within the ovary, which research has already shown to be toxic for the growing eggs before ovulation.

Lead researcher, Professor Jo Leroy from the University of Antwerp, says: "In cows we can induce very similar metabolic disorders leading to reduced fertility in these animals and compromised egg quality in particular. This is one of the reasons that bovine eggs are a very interesting model for human reproductive research."

Co-researcher, Dr Roger Sturmey, from the University of Hull and Hull York Medical School, says: "Our findings add further weight to the public health recommendations which emphasise the importance of

women being a healthy weight before starting a pregnancy."

Professor Leroy adds: "We know from our previous research that high levels of fatty acids can affect the development of eggs in the ovary, but this is the first time we've been able to follow through to show a negative impact on the surviving embryo."

University of Antwerp PhD student, Veerle Van Hoeck, funded by FWO-Flanders and the EU Cost Gemini Action FA0702, tested the embryos eight days after fertilisation, when they had developed into what are known as blastocysts, containing around 70 to 100 cells. One of the key indicators of embryo viability is metabolic activity, calculated through analysis of what the embryo consumes from its environment and what it releases back out.

"The most viable embryos, those most likely to result in a successful pregnancy, have a 'quieter', less active metabolism, particularly in relation to amino acids," explains Dr Sturmey. "Where eggs were exposed to high levels of fatty acids, the resulting embryos showed increased amino acid metabolism and altered consumption of oxygen, glucose and lactate – all of which indicates impaired metabolic regulation and reduced viability."

"These embryos also showed increased expression of specific genes which are linked to cellular stress," adds Professor Leroy. "And although the higher fatty acid levels didn't stop eggs developing to the two-cell stage, there was a notable reduction in those able to develop into blastocysts."

The researchers are now applying for further funding to take their findings into a clinical setting and to investigate whether exposing [eggs](#) to high levels of fatty acids can also lead to post natal effects.

Provided by University of Hull

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