

Maternal blood test may predict birth complications

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A protein found in the blood of pregnant women could be used to develop tests to determine the health of their babies and aid decisions on early elective deliveries, according to an early study led by Queen Mary University of London (QMUL).

Tests in [pregnant mice](#) and a small sample of women found that low levels of the blood marker known as DLK1 were a good predictor of poor foetal growth and complications of pregnancy, and could be used as a non-invasive prenatal diagnostic.

Lead researcher Dr Marika Charalambous from QMUL said: "At the moment, there are very few ways of predicting which pregnancies will

go wrong, and which small babies are small because they are not getting enough nutrition while in the womb, and which are small simply because of their genes."

"It's incredibly important to start developing tests that can give an obstetrician much more information on the pregnancy before delivery, so that they can intervene before complications come to crisis point.

"Measuring DLK1 levels in the mother's blood could be a reliable and non-invasive way of predicting whether there are likely to be complications, especially those that cause reduced nutrient supply to the baby. In those instances, you really need to get the baby out quickly, so women could opt to have an early elective delivery."

DLK1 is a protein that is found in high levels in the mother's blood during pregnancy, in humans and rodents. But little has been known about its source, what it does, and whether it can indicate anything about the health of a foetus.

The study, funded by the Medical Research Council and published in *Nature Genetics*, initially used mice experiments that involved knocking out the gene in either the foetus or the mother, and then measuring the mother's DLK1 level to determine its source. The researchers found that the protein originates from the embryo. This means that its levels in maternal blood could provide a direct readout of the embryo's biological state.

The team then looked at how DLK1 affects a pregnant mouse's metabolism. When fasting for 24 hours, humans start a process known as 'ketosis', which is what the Atkins diet is based on, and involves burning the energy from fat stores to keep the body functioning.

When DLK1 was inactivated in pregnant mice, their fasting response

was impaired by not being able to begin ketosis. This indicated the importance of DLK1 in providing energy for the foetus and their growth, and DLK1 levels in the mother were found to be a good predictor of the mass of their offspring.

Finally, with help from the POPs study at the University of Cambridge, the researchers studied 129 first time mothers, taking measurements of DLK1 levels in their blood and recording the outcomes of their pregnancies. They found that low DLK1 levels were associated with reduced growth of the foetus resulting from pregnancy complications, including [poor blood flow](#) through the umbilical cord.

The researchers warn that further clinical studies in humans will be required to fully determine DLK1's potential as a prenatal diagnostic.

The study was also funded by the Centre for Trophoblast Research at the University of Cambridge.

More information: Fetus-derived DLK1 is required for maternal metabolic adaptations to pregnancy and is associated with fetal growth restriction, *Nature Genetics*, [nature.com/articles/doi:10.1038/ng.3699](https://doi.org/10.1038/ng.3699)

Provided by Queen Mary, University of London

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