

Urine of pregnant women could be used to predict fetal growth and birth weight

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The urine of pregnant women could be used to help identify lifestyle interventions that help maintain a healthy birth weight for their baby, according to new research published in *BMC Medicine*. Abnormal fetal growth and birth weight are well-established risk factors for chronic diseases later in life, including the development of type-2 diabetes and obesity.

Dr Mireille Toledano, co-lead author of the research from the School of Public Health at Imperial College London, said: "We used a technique called NMR spectroscopy to identify, for the first time, a panel of 10 urinary metabolites in the 3rd trimester of pregnancy that were associated with greater fetal growth and increased birth weight. These

metabolites included steroid hormones and important biological building blocks called branched-chain amino acids (BCAAs)."

BCAAs are essential nutrients that are vital during pregnancy as an energy source for the growing fetus. In this study, changes in BCAAs and other metabolites detected in the urine were able to explain 12% of the variation seen in birth weight, independent of other known predictors such as parent's own weight and maternal smoking or alcohol intake.

Dr Muireann Coen, co-lead author from the Department of Surgery and Cancer at Imperial College London, added: "We found that a 50% increase in the mother's level of individual BCAAs equated to a 1-2.4% increase in birth weight, or 5-11 grams. When we made comparisons with the lifestyle and environmental exposures of the women in our study we found that the variability between BCAA profiles of individual mothers could be partially explained by levels of physical activity, vitamin D, coffee consumption and smoking exposure, suggesting them to be potential areas of intervention to promote a healthy [birth weight](#)."

The research team from Spain at ISGlobal, collected urine samples and lifestyle questionnaire data from over 800 [pregnant women](#), aged 28-33 years old, from two locations in Spain (Gipuzkoa and Sabadell), making it the most comprehensive study of urinary metabolites and fetal weight outcomes to date. The two locations in Spain differed in socio-demographic factors, with women in Gipuzkoa reported to be more educated, from a higher social class and generally healthier than women from Sabadell. This distinction allowed for useful comparisons to be made between women from different backgrounds and different geographical location.

Although the researchers found an association between several lifestyle factors and the metabolomic signature detected in the mother's urine, it is not clear from this study if one is the cause of the other, or if any

specific lifestyle factor is associated with an individual metabolite. In observational studies like this it is not possible to rule out other factors and an experimental trial would be needed to test cause and effect. This proof-of principle study highlights the value metabolic profiling of pregnant women could have on personalizing pregnancy plans to improve fetal growth outcomes.

More information: Maternal urinary metabolic signatures of fetal growth and associated clinical and environmental factors in the INMA study, *BMC Medicine*, [DOI: 10.1186/s12916-016-0706-3](https://doi.org/10.1186/s12916-016-0706-3)

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