

Mum and Dad's genes battle over baby's body shape

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Scientists from our Department of Biology & Biochemistry have uncovered how genes inherited from your mother and father have opposite effects on growth during early life, the outcome of which can influence the risk of conditions such as obesity and diabetes in adult life.

Researchers have known for a while that our body shape and health in later life is influenced by growth before birth and in the first few months of life. This developmental programming can be influenced by environmental factors, but little is known about the role [genes](#) play in this process.

In a study published in the open access journal *BMC Biology*, the researchers from the University's Department of Biology & Biochemistry found that the Grb10 gene inherited from the mother

restricts growth and promotes a leaner body, whereas the Dlk1 gene inherited from the father has the opposite effect, increasing growth and promoting fat deposition.

Previous research in mice by the team has shown Grb10 is active in both the mother's breast tissue and the baby. It works by controlling the supply of nutrients passing through the placenta and, after birth, through the mother's milk, to match the demand from the offspring.

The researchers hope that better understanding of the key genetic mechanisms controlling developmental programming could lead to new treatments or preventative measures for conditions such as obesity and type 2 diabetes, for example, by improving the diet of pregnant and breastfeeding [mothers](#) and newborn babies.

Dr Andrew Ward from the University of Bath's Centre for Regenerative Medicine explained: "We all know that to stay lean you need to eat healthily and lead an active life, but with rates of obesity and diabetes rising to epidemic proportions, it's obvious that the story isn't as simple as that.

"We already know that our health in adult life is programmed to some extent by nutrition before birth and in early [life](#). Our research is trying to understand how genes are involved in this programming.

"Our study has discovered that Dlk1 and Grb10 act through the same genetic pathway. This results in a parental tug-of-war in offspring because, the father's Dlk1 gene promotes growth and at the same time the mother's Grb10 gene restricts growth.

"The father's gene acts opportunistically to acquire resources for his offspring, whereas the mother's gene counteracts this to conserve resources and distribute them more evenly among her offspring. This

situation has evolved because, while a mother is equally related to all of her offspring, they may not all have the same father.

"We've shown the antagonistic behaviour of the two genes is needed to keep everything in balance and ensure normal growth and healthy lean:fat body proportions."

Having identified these genes, the researchers' next aim is to test how changes to the mother's diet during pregnancy affect the genes' activity and resulting growth and future health of the offspring.

More information: "Antagonistic roles in fetal development and adult physiology for the oppositely imprinted Grb10 and Dlk1 genes." *BMC Biology* 2014, 12:771 [DOI: 10.1186/s12915-014-0099-8](https://doi.org/10.1186/s12915-014-0099-8)

Provided by University of Bath

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