

HORIZON

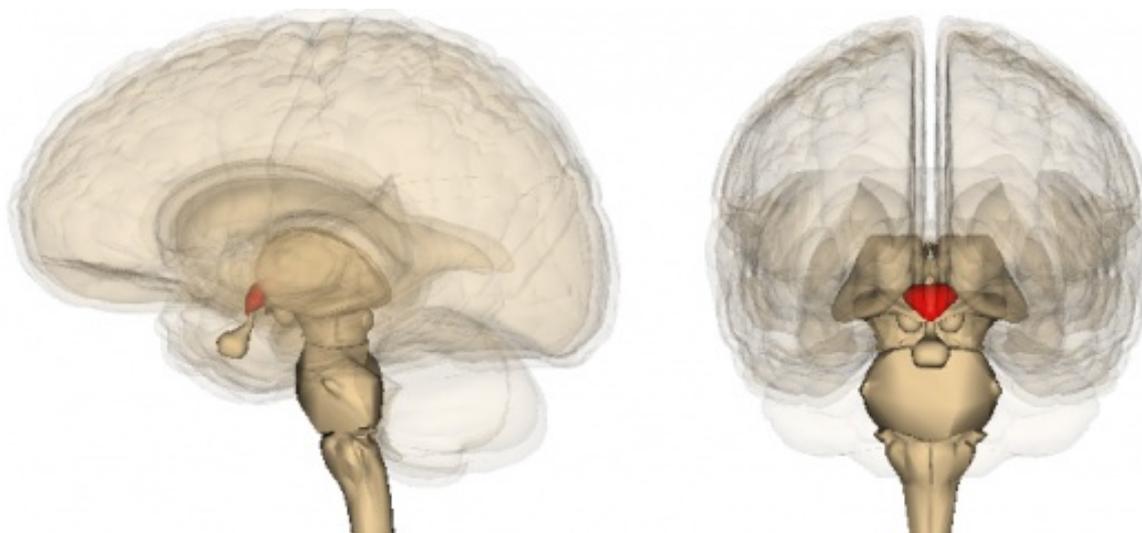
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HEALTH

Full feeling 'impaired' in children of obese mothers - study

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The hypothalamus is a section of the brain responsible for hormone production and has an important role in appetite control. Image credit: The Database Center for Life Science

The part of the brain that makes you feel full could be impaired in babies of obese mothers, researchers believe – predisposing them to a lifetime of weight problems.

It is known that overweight women produce babies that are heavier - and long-term data is increasingly showing that this weight problem may worsen as the child gets older.

But the precise reason has remained a mystery. Is it because the foetus is just doing the same as the mother - converting the mother's excessive calorie intake to fat? Or is something more complex at play?

Scientists at King's College London (KCL), UK, working as part of the EU-funded EarlyNutrition project, have been exploring whether the hypothalamus, a part of the brain that produces many of the body's essential hormones, might develop differently in foetuses growing in overweight mothers.

They now think that the key to the problem is leptin, the so-called satiety hormone. Released by fat stores in the body it travels to the hypothalamus, where it triggers signals that suppress our appetite. Obese people produce a lot of leptin because they have more fat – but the hypothalamus becomes resistant to it, so it is harder to trigger the sensation of being full.

In the developing foetus, however, leptin has an additional role: it is a growth hormone, stimulating the expansion of networks of neurones in the hypothalamus that will eventually regulate appetite as well as

blood pressure.

The Issue

Around [a third of 11-year-olds](#) in Europe are overweight, according to data.

In order to tackle obesity and the diseases associated with it, the EU has [promoted](#) policies such as improving the labelling of food, funding research and educating people.

Scientists now think that high-leptin conditions in the womb may prevent the hypothalamus developing properly – with the result that it can't do its job so well after birth.

Professor Lucilla Poston, head of the KCL Division of Women's Health, says there is now a lot of evidence to support this theory, but most of it comes from mouse experiments. 'What we don't know is whether it really works in people,' she said.

They have found that babies of obese human mothers do have higher levels of leptin in their umbilical cord blood, which supports the theory.

And the team published intricate mouse work in October this year which supports a parallel theory about why babies born to obese mothers can develop high blood pressure. Using clever genetic techniques to flick on and off a receptor in the hypothalamus, they demonstrated that excessive leptin directs it to set a course towards hypertension.

Programming

Evidence that a mother's diet and other behaviour might be programming her baby while it develops in the womb has been growing. A recent analysis of studies presented at EarlyNutrition's The Power of Programming event, held in Munich, Germany, last October, has revealed a trajectory of weight gain in children of obese mothers.

'The influence gets stronger as the children get older – it's startlingly different,' said Prof. Poston. 'When we saw the results we were all absolutely gobsmacked.'

'I've been on the fence for a long time on the relative roles of early life versus later life influences on childhood obesity. I've come off now – the evidence is insurmountable.'

Whether the findings lead to useful windows for intervention is another question. Prof. Poston's team has done a controlled trial in which overweight pregnant women received help to cut their calories.

The trial was successful in that the mothers did eat less while they were pregnant. And at six months their children were 7 % thinner than the children of those who didn't diet. The children are now nearing four years of age and researchers are gathering data on whether the difference has persisted.

'This is the first study in the world to show that an intervention in pregnancy can make children thinner,' said Prof. Poston.

A 7 % weight reduction might be hard to improve on if dieting doesn't begin until the narrow window of pregnancy. Dieting before conception could achieve more, researchers believe.

'There needs to be a really big public message – if you are thinking of having a baby then optimise your nutrition now,' said Prof. Poston. Over half of pregnancies in the UK, for example, are planned, she points out.

The conference heard calls for a broader approach to raising awareness of the importance of the period prior to pregnancy, which will need bottom-up mobilisation of communities as well as top-down policy initiatives.



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Otherwise, the research might give a rather dismal impression of generation after generation of obese mothers producing offspring programmed to gain too much weight and pass the propensity on, in turn, to their children – although Prof. Poston points out that what is programmed is a vulnerability, not a destiny.

Given the breadth of research and the intriguing nature of some of the results, EarlyNutrition's recommendations for the public are perhaps not that unexpected. There are just four so far – reach a healthy body weight before conceiving, don't eat too much during pregnancy, eat healthily while breastfeeding and don't give cow's milk till the child is over a year old.

Professor Hania Szajewska of the Medical University of Warsaw in Poland said: 'There will be more as the project is not finalised yet.'

A further recommendation, she says, is likely to be that infant formula should contain less protein – more similar to the amount of protein in breast milk. This is because feeding babies excessive protein seems to be strongly linked to too much weight gain.

How children develop their food-buying habits is the subject of another EU-funded research project – FoodHabits – which will examine issues such as how temptation influences what we buy, how impulse purchases differ from planned ones – and how many calories children manage to squeeze in by buying snacks away from the parental eye.

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The researchers, led by Rachel Griffith of the Institute for Fiscal Studies in London, UK, plan to investigate whether being part of a family that eats healthily leads children to buy more – or less – junk food when they are on their own.

'There seems to be some correlation,' said Kate Smith, one of the researchers. 'Children from households where the parents buy low-nutritional-quality foods are also more likely to buy low-nutritional-quality foods when they start taking their own decisions.'

The team has also found that, regardless of the socio-economic group, the British eat steadily more junk food as the year goes by. In January, supermarket trolleys are full of healthy purchases but the proportion of calories coming from unhealthy products creeps up throughout the year, peaking in December and reverting to healthy food again in January.

Why self-control peters out as the year progresses, and who is most susceptible to these habit-changes, are questions the project will try to answer.

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