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Emotional behavior of adults could be triggered in the womb

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Adults could be at greater risk of becoming anxious and vulnerable to poor mental health if they were deprived of certain hormones while developing in the womb according to new research by scientists at Cardiff and Cambridge universities.

New research in mice has revealed the role of the placenta in long-term programming of emotional behaviour and the first time scientists have linked changes in adult behaviour to alterations in placental function.

Insulin-like growth factor-2 has been shown to play a major role in foetal and placental development in mammals, and changes in expression of this hormone in the placenta and foetus are implicated in growth restriction in the womb.

"The growth of a baby is a very complex process and there are lots of control mechanisms which make sure that the nutrients required by the baby to grow can be supplied by the mother," according to Professor Lawrence Wilkinson, a behavioural neuroscientist from Cardiff University's School of Psychology who led the research.

"We were interested in how disrupting this balance could influence emotional behaviours a long time after being born, as an adult," he added.

In order to explore how a mismatch between supply and demand of certain nutrients might affect humans, Professor Wilkinson and his

colleagues Dr Trevor Humby, Mikael Mikaelsson - both also from Cardiff University – and Dr Miguel Constancia of Cambridge University, examined the behaviour of adult mice with a malfunctioned supply of a vital hormone.

Dr Humby added: "We achieved this by damaging a hormone called Insulin-like growth factor-2, important for controlling growth in the womb. What we found when we did this was an imbalance in the supply of nutrients controlled by the placenta, and that this imbalance had major effects on how subjects were during adulthood – namely, that subject became more anxious later in life.

"These symptoms were accompanied by specific changes in brain gene expression related to this type of behaviour. This is the first example of what we have termed 'placental-programming' of adult behaviour. We do not know exactly how these very early life events can cause long-range effects on our emotional predispositions, but we suspect that our research findings may indicate that the seeds of our behaviour, and possibly vulnerability to brain and mental health disorders, are sown much earlier than previously thought."

Although these studies were carried out in mice, the findings may have wider implications for human development. Further studies are planned to investigate the brain mechanisms linking early life events, placental dysfunction and the emotional state of adults.

More information: 'Placental programming of anxiety in adulthood revealed by Igf2-null models' is published on Tuesday 6th August 2013 in *Nature Communications*.

Provided by Cardiff University