Infections during pregnancy have a negative impact upon maternal care and can trigger depression in the child

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Infections during pregnancy have a negative impact upon maternal care and can trigger depression in the child . Credit: Medical University of Vienna

A viral infection in a pregnant woman not only affects her subsequent

ability to provide maternal care but can also trigger depression in her offspring, which can then even extend into the next generation as a result of changes to genetic mechanisms in the brain. This is the central finding of a transgenerational study conducted at MedUni Vienna in collaboration with the Division of Neurophysiology and Neuropharmacology (Daniela Pollak) and the Division of Neonatology and Paediatric Critical Care (Angelika Berger), which has now been published in the leading journal *Brain, Behaviour and Immunity*.

The researchers were able to demonstrate the following effects in the mouse model:

1. stimulation of the immune system, comparable with a viral infection in the pregnant mother, results in diminished maternal behaviour towards her offspring after birth.
2. this results in the tendency for offspring to develop depression and
3. that daughters in their turn are less maternal towards their own offspring, even if they suffer no infection, so that the next generation is also more likely to develop depression.

"We were therefore able to show that there is a transgenerational effect and that epigenetic changes occur in the brain," explains Daniela Pollak, who, together with her team, is generally concerned with identifying the neurobiological bases of psychiatric illnesses, particularly depression and anxiety disorders.

Although epigenetic changes do not involve any change in the actual DNA sequence of the individual in question, changes due to external influences – such as the lack of maternal care in this case – take the form of changes in DNA methylation (modulation of the basic building blocks of the genetic material of a cell) or histone acetylation (modulation of the histone proteins). Says Pollak: "This brings about a

change in the regulatory mechanisms, how the genes are read." This leads to a permanent behavioural change or development of a mental illness.

Additional studies are now required to clarify the causality – for example, whether infection of the mother in itself affects the baby's brain and is responsible for development of depression – and also what exactly happens in the mother's brain during infection. Further studies will even look at the father's behaviour.

Premature babies: deficiencies offset by a lot of physical contact

The study was conducted in collaboration with neonatologist Angelika Berger of MedUni Vienna's Department of Pediatrics and Adolescent Medicine. The background: It has been proven that an premature start in life – approximately one in ten children in the world is born prematurely before the 32nd week of gestation – is often associated with impaired cognitive and emotional development.

More information: Marianne Ronovsky et al. Maternal immune activation transgenerationally modulates maternal care and offspring depression-like behavior, *Brain, Behavior, and Immunity* (2016). DOI: 10.1016/j.bbi.2016.10.016

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