

New study explores infection effect on fetal brain development

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The risk of infection during pregnancy has always been a concern, but the high rate of illness during the COVID-19 pandemic has highlighted the potential impact of infection on a developing brain.

To better understand the long-term consequences, a new Western University study has explored the effects of a pregnant person's [immune response](#) to a virus or bacteria on an unborn baby's [brain](#) development. The study examined how early developmental changes can disrupt [sensory processing](#) abilities later in life commonly seen in neurodevelopmental disorders including autism spectrum disorder and schizophrenia.

"Even before the pandemic, previous studies found that developmental disruption caused by infection during pregnancy can increase the risk of a child later developing autism or schizophrenia," said Faraj Haddad, first author of the paper and former Western Ph.D. neuroscience researcher. "To examine this further, our study looked at a specific molecule called Interleukin-15 and its involvement in the maternal immune response's effects on fetal brain development and behavior later in life."

The study, published in the journal *Brain, Behavior, & Immunity—Health*, found the maternal immune response affected sensory processing and anxiety in rodent models and the absence of Interleukin-15 (IL-15) modified these effects. The result was that sensory processing and anxiety was either better or worse without IL-15.

"The rodents in this study lacked IL-15 or natural killer cells, which are the major immune cells in the placenta," said Susanne Schmid, senior author of the paper and professor at the anatomy and cell biology department at Western's Schulich School of Medicine & Dentistry. "We looked to see if this immune response in the placenta impacts the fetal brain. We found that the answer is complicated—it's not just one mechanism that impacts the fetal brain, it's the interaction of different mechanisms."

Despite the complex findings, the study confirmed the lack of IL-15 can affect an individual's behavior.

"It tells us that the IL-15 molecule plays a role in normal development of the brain," explained Haddad. "This study paves the way for future work to fully explain how a maternal immune response can increase the risk for neurodevelopmental disorders."

While the study signals the need for additional research in this area, an understanding of the effect of IL-15 provides insight into how pregnant individuals can protect themselves and their developing babies.

"COVID-19 is known to lead to a strong immune response, sometimes one that goes on for a long time," said Haddad. "We know that the more severe the infection, the higher the risk for the developing brain. The earlier that infection happens during pregnancy, the higher the risk as well."

Haddad suggested that awareness is important for those who are pregnant. Understanding the risks of

infections during early pregnancy and knowing how to take care of oneself when an infection occurs can help ensure the immune response is controlled.

As Schmid explained, the ultimate goal for this research is to provide an antidote that will take away the risk for a developing baby. "But until that time, vaccines are really important during [pregnancy](#) as they help protect against severe [infection](#) and reduce the maternal immune response."

More information: Faraj L. Haddad et al, Interleukin 15 modulates the effects of poly I:C maternal immune activation on offspring behaviour, *Brain, Behavior, & Immunity—Health* (2022). [DOI: 10.1016/j.bbih.2022.100473](#)

Provided by University of Western Ontario

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