

# Maternal COVID-19 infection and the fetus: Immunological and neurological perspectives

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## Abstract

*Immunoneuropsychiatry is an emerging field about the interaction between the immune and nervous systems. Infection and infection-related inflammation (in addition to genetics and environmental factors) can act as the etiopathogenesis of neuropsychiatric disorders (NPDs). Exposure to COVID-19 in utero may be a risk factor for developing NPDs in offspring in the future. Maternal immune activation (MIA) and subsequent inflammation can affect fetal brain development. Inflammatory mediators, cytokines, and autoantibodies can pass through the placenta and the compromised blood-brain barrier after MIA, leading to neuroinflammation. Neuroinflammation also affects multiple neurobiological pathways; for example, it decreases the production of the neurotransmitter serotonin.*

*Fetal sex may affect the mother's immune response. Pregnant women with male fetuses have been reported to have decreased maternal and placental humoral responses. This suggests that in pregnancies with a male fetus, fewer antibodies may be transferred to the fetus and contribute to males' increased susceptibility/vulnerability to infectious diseases compared to female infants.*

*Here, we want to discuss maternal COVID-19 infection and its consequences for the fetus, particularly the neurological outcomes and the interaction between fetal sex and possible changes in maternal immune responses.*

**Keywords:** SARS-CoV-2, Fetal sex, Fetal immune system, COVID-19, Fetal brain, Maternal immune activation