

Researchers identify proteins that prevent COVID-19 transmission through the placenta

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Researchers from Boston Medical Center's Maxwell Finland Laboratory for Infectious Diseases have identified properties in placenta tissue that may play an important role in preventing the transmission of COVID-19

from a mother with the virus to her fetus. The study results demonstrate that the COVID-19 virus universally invades the placenta in cases with and without evidence of fetal infection, highlighting the protection that the placenta may offer against COVID-19 infection as current data indicates a less than five percent COVID-19 transmission rate in newborns from their mothers. Published in *Placenta*, these results underscore the importance of using placenta tissue in COVID-19 research studies aimed at developing novel ways to diagnose, treat and prevent COVID-19 virus transmission.

For this study, the researchers examined placental [tissue](#), which shares many developmental and physiological similarities with the lung and the [immune response](#) of the small and [large intestine](#), making it a key source of human tissue that can be used for ongoing COVID-19 research. It also contains a unique expression pattern of COVID-19 receptors that are different from other organs, which could be helpful in the development of COVID-19 treatments.

"The results of this study provide evidence for ongoing research of COVID-19 [infection](#) at the maternal-fetal interface as means to better understand virus transmission and infection in other [human tissues](#)," said Elisha Wachman, MD, a neonatologist at Boston Medical Center, associate professor of pediatrics at Boston University School of Medicine, and principal investigator of this study. "Previous research has shown that the [placenta](#) protects the fetus from various types of infection, and exploring the particular ways in which it protects the fetus from COVID-19 transmission may help identify new targets of COVID-19 prevention and treatment."

Throughout April and May 2020, samples from 15 COVID-19 positive maternal-fetal dyads were collected for this study; five cases had evidence of fetal transmission. The placental tissue of the positive cases was analyzed and compared with ten COVID-19 negative controls. The

researchers found that the COVID-19 virus was present in the placental tissues in cases with and without evidence of fetal infection. They also found that the placenta contains a unique pattern of cell surface proteins (TMPRSS2 and ACE2) that are important for COVID-19 viral entry, which is different from other cell types. The demographics of mother-baby dyads were also studied and no differences were found to be significant, showing the fetal transmission does not discriminate.

"Determining how the placenta could be preventing COVID-19 infections during pregnancy can help provide clues on how to prevent infection in other organs, such as the lungs and gut," said Elizabeth Taglauer, MD, Ph.D., a neonatologist and placental biologist based at Boston Children's Hospital. "As a readily available tissue for research, the placenta can be a valuable source of scientific study for a variety of human diseases in pregnancy and beyond."

More information: Elizabeth Taglauer et al, Consistent localization of SARS-CoV-2 spike glycoprotein and ACE2 over TMPRSS2 predominance in placental villi of 15 COVID-19 positive maternal-fetal dyads, *Placenta* (2020). DOI: [10.1016/j.placenta.2020.08.015](https://doi.org/10.1016/j.placenta.2020.08.015)

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