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# Comparative nanostructure consideration on novel coronavirus and possibility of transplacental transmission

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**TO THE EDITORS:** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection or novel coronavirus infection is a new emerging viral infection that leads to coronavirus disease 2019 (COVID-19). A large outbreak of SARS-CoV-2 infection occurred in early 2020. From its first appearance, the virus spread to many countries worldwide.[1] SARS-CoV-2 infection leads to respiratory disorders (COVID-19). In addition, airborne transmission of the virus from human to human is confirmed. In gynecology, the effect of COVID-19 during pregnancy needs further studies. As noted by Rasmussen et al,[2] there are many issues obstetricians need to know. Of several issues, finding infection in neonates born to mothers with SARS-CoV-2 infection draws the attention of the medical society toward a possible transplacental mode of transmission.

In fact, many viruses can cross the placenta and cause infection from the mother to the neonate. Good examples of viruses that cross the placenta are the human immunodeficiency virus (HIV) and hepatitis virus.[2–4] Based on the nanomedicine concept, the transplacental transmission of HIV is explained by the particle size of the virus and the pore size of the placenta.[2] Conceptually, the viral pathogen that is smaller than the pore size of the placenta can pass the placenta and further cause neonatal infection. Applying nanostructure size analysis on the novel coronavirus, the estimated size of the virus is about 50 to 120 nm. The size of the virus is larger than the pore size of the placenta (about 10 nm). Therefore, it is unlikely that transplacental transmission of novel coronavirus can occur if there is no placental pathology. Indeed, the observations from China also show no case of vertical transmission.[5] The cause of SARS-CoV-2 infection in neonates could possibly be due to respiratory transmission from close contact with the mother. ■

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# Clinical characteristics and intrauterine vertical transmission potential of coronavirus disease 2019 infection in 9 pregnant women: a retrospective review of medical records

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**TO THE EDITORS:** Chen and colleagues[1] report that there is no evidence currently for intrauterine infection caused by vertical transmission in women who develop coronavirus disease 2019 (COVID-19) pneumonia in late pregnancy in *The Lancet*. However, we believe that the existing data are not enough to support this conclusion. Furthermore, Rasmussen

and colleagues[2] also reported in the *American Journal of Obstetrics & Gynecology* that it is unknown whether severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can be transmitted from the mother to the fetus.[2]

The 2019 novel coronavirus (2019-nCoV) is considered as SARS-CoV-2 owing to the similar structure to the SARS-CoV. There is a possibility that the 2019-nCoV can be distributed to the entire body via the circulatory system. Furthermore, the 2019-nCoV potentially works by binding to the angiotensin-converting enzyme 2 (ACE2) receptor, which was previously proven by the Anat Levy group that the placentas constitute important sources of ACE2 during pregnancy.[3] We hypothesize that the 2019-nCoV is able to target the placenta directly by inducing viremia to infect the fetus through maternal-fetal vertical transmission. In addition, immunoglobulin M (IgM)-capture enzyme-linked immunosorbent assay (ELISA) provides an earlier and more efficient approach to the definite diagnosis of viral infection than RNA-based molecular tests.[4] Combining these 2 methods may improve the accuracy to confirm neonatal infection.

To confirm the assumption of no intrauterine vertical transmission of SARS-CoV-2 infection, the researchers should first confirm viremia and then quantify the load of virus in the blood. Concurrently, the RNA-based molecular tests should be used in the placenta and along with quantitative analysis of ACE2 expression to determine whether the virus interacts directly with placental tissue. The combination of RNA-based molecular tests and IgM-capture ELISA should be applied to diagnose infection in cord blood, gastric swab, rectal swab, and throat swab after the neonates are born.

Because of the 2019-nCoV outbreak, pregnant women may suffer severe obstetrical outcomes after 2019-nCoV infection. Therefore, more rigorous evidence should be provided to verify the potential vertical transmission of the virus to prevent the spread of infection and to improve the obstetrical outcomes. ■

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# Antenatal corticosteroids and COVID-19: balancing benefits and harms

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**TO THE EDITORS:** In a recent article, Rasmussen et al[1] recommend against the routine use of antenatal corticosteroids for fetal lung maturity in pregnant women with coronavirus disease 2019 (COVID-19). We believe this recommendation warrants further discussion. First, we would like to highlight that the impact of corticosteroid treatment in nonpregnant patients with COVID-19 is currently unclear, precluding conclusions about likely maternal harm in the context of COVID-19. Second, we argue that in these unique circumstances, decision-making about the use of antenatal corticosteroids should keep in mind that the absolute benefits of antenatal corticosteroids for fetal lung maturity changes on a week-by-week basis during pregnancy.

Rasmussen et al[1] supported their recommendation against routine administration of corticosteroids for fetal lung maturation by citing evidence that outside of pregnancy, corticosteroids were not beneficial for the treatment of the Middle East respiratory syndrome (MERS) and may have led to decreased MERS coronavirus clearance.[2] We believe it is important to better acknowledge the evolving state of evidence regarding corticosteroids in the treatment of COVID-19. A metaanalysis of observational data examining patients with viral pneumonia and acute respiratory distress syndrome