Abstract citation ID: deac104.064

O-054 COVID-19 during pregnancy, maternal immune response and neonatal cell-specific immunity

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Pathogens are a major threat to maternal health and the progression of pregnancy. The immune response during normally progressing pregnancies, primarily the suppression of inflammation, likely accounts for this high susceptibility of pregnant women to infections. An increased morbidity and mortality related to influenza, COVID-19 and malaria has been reported for pregnant women, compared to non-pregnant women. Especially influenza infections during pregnancy have been well studied, as humans are severely and recurrently affected by seasonal epidemics and random pandemics. Besides severe maternal symptoms such as acute cardiopulmonary events, pneumonia, and acute respiratory distress syndrome, maternal influenza infection also causes foetal complications, such as intrauterine growth restriction, preterm birth or even foetal death. However, vertical transmission of the influenza virus across the placenta and infection of the foetus has not been observed, suggesting that the pregnancy pathologies are maternally derived.

In addition to influenza-mediated adverse conditions, the recent COVID-19 pandemic has underscored that infection with the severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2) can also lead to severe illnesses in pregnant women, accompanied by a higher risk for foetal loss or preterm birth. Fortunately, with the ongoing pandemic, large cohort studies and meta-analyses revealed that vertical transmission and related fetal infection is a rare complication affecting only 1-3% of SARS-CoV-2 infections in pregnancy. These low risk for placental infection is likely due to the inefficient SARS-CoV-2 virus replication in placental tissues. Since understanding SARS-CoV-2-related pathogenicity during pregnancy is highly relevant, we initiated a study early in 2020, to which we have recruited more than 160 pregnant women with COVID-19. Our comprehensive placental analyses unearthed a paucity of SARS-CoV-2 viral expression *ex vivo* in term placentae under acute infection and in convalescent pregnant women. Furthermore, we could show inefficient SARS-CoV-2 replication in placental tissues *in vitro*, which provides a rationale for the low *ex vivo* viral expression. We detected specific SARS-CoV-2 T cell responses in mothers within a few days upon infection, which is undetectable in cord blood. Reports by others have shown that maternal SARS-CoV-2 during pregnancy may cause placental insufficiency, defined by increased perivillous fibrin deposition, histiocytic intervillositis and trophoblast necrosis. These changes can cause extensive placental damage leading to placental malperfusion and insufficiency that is incompatible with intrauterine survival. Considering that multiple SARS-CoV-2 variants of concern which emerged until today may affect pregnant women differently and bear a differential risk for pregnancy complication. This, continuous vigilance is needed in order to provide best protection of the highly vulnerable group of pregnant women and their unborn children.

Trial registration number