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O-050 Vulnerability of human preimplantation embryos to SARS-CoV-2 infection

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Presence of SARS-CoV-2, the virus responsible for COVID-19, has been reported in numerous organs and tissues of infected patients, including the reproductive system. The effects of COVID-19 on human reproduction remain poorly understood. While cases of intrauterine transmission between expectant mother and fetus have been documented, the impact of SARS-CoV-2 infection on early embryogenesis and establishment of a pregnancy are not known. This prompted us to ask if SARS-CoV-2 can infect embryos, since such an event could impact embryo viability and affect a subsequent pregnancy. We used a three-pronged approach to investigate this possibility: 1) Using RNA-seq and immunofluorescence, we learned that ACE2 and TMPRSS2, two factors required on target cells for SARS-CoV-2 entry, are co-expressed in cells of the trophoctoderm in blastocyst-stage preimplantation embryos; 2) Using fluorescent reporter virions pseudotyped with Spike (S) glycoprotein from SARS-CoV-2, we observed robust infection of trophoctoderm cells, and this permissiveness could be attenuated with blocking antibodies targeting S or ACE2; and 3) Exposing human blastocysts to live, fully infectious SARS-CoV-2, we detected cases of infection that compromised embryo health. Therefore, we identify a new human target tissue for SARS-CoV-2 with potential medical implications for reproductive health during the COVID-19 pandemic and its aftermath.