

Assessment of Maternal and Neonatal Cord Blood SARS-CoV-2 Antibodies and Placental Transfer Ratios. *JAMA Pediatr.* 2021;175(6):594–600.

Background & Objectives: Neonatal immunity to SARS-CoV2 depends on trans-placentally acquired antibodies. To assess the association between maternal and neonatal SARS-CoV2 antibodies.

Methods: This observational study was conducted in a cohort of parturient women and their newborns, born between April 9 and August 8, 2020 at Pennsylvania Hospital, Philadelphia. Residual maternal sera and cord blood collected for other purposes were used for SARS-CoV2 antibody testing and mother's NP-PCR tested at admission for delivery as a part of routine screening. IgG and IgM antibodies to the receptor-binding domain of SARS-CoV-2 spike protein were measured by ELISA, with concentrations >0.48 arbitrary units/mL considered as seropositive. All antibody concentrations were log2-transformed for analysis and geometric mean concentrations with 95% CIs reported. Transfer ratio was calculated as infant IgG concentration divided by maternal IgG concentration. Maternal illness severity (CDC criteria) categorized as asymptomatic, mild, moderate to critical disease, were obtained from electronic medical records along with other clinical and demographic data. Standard descriptive analyses used as appropriate (significance if $p < 0.05$) and Pearson correlation coefficient for correlations.

ACADEMIC P.E.A.R.L.S

Pediatric Evidence And Research Learning Snippet



What is the association between maternal and neonatal SARS-CoV2-specific antibody concentrations?

Results:

- Among 1471 mother-infant dyads tested, **83 (6%)** women were SARS-CoV2 IgG- and/or IgM- positive (*Fig. 1*).
- In infants of seropositive mothers, **72 (87%)** were seropositive (all IgG +ve, **none IgM +ve**) and 11 were seronegative.
- 44 of 82 seropositive (**54%**) women tested were NP-PCR +ve and all 20 of the infants tested were negative (infants tested at 24-48 hours if mother is NP-PCR +ve & contagious at delivery).
- A positive correlation was noted between **IgG concentrations of maternal and cord sera ($r=0.886$; $p<0.001$)**.
- Mothers of 11 seronegative infants were either only IgM +ve ($n=6$) or had lower IgG concentrations ($n=5$) ($p=0.005$).
- Mothers with moderate or critical illness and their infants had higher IgM and IgG concentrations (not statistically significant).
- **Transfer ratios did not differ** between asymptomatic (60%) and symptomatic illness.
- In symptomatic illness, a **positive correlation** was seen in **transfer ratio with increasing time** between NP-PCR testing (onset of infection) and delivery ($r=0.62$; $p<0.001$).
- There was no association between maternal demographics, pregnancy health characteristics and cord blood seropositivity and the transfer ratio did not vary with gestational age.

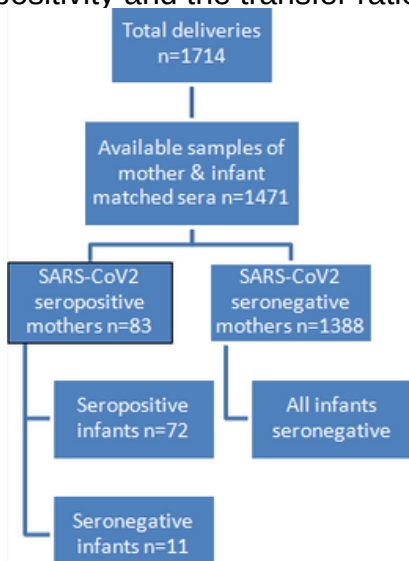


Figure 1. Study flow diagram
*First of twin tested among twin deliveries

Conclusion : Neonates have higher chance of acquiring antibodies against SARS-CoV2 from mother in earlier weeks of pregnancy and transfer ratios decline nearing delivery. These antibodies are likely to be protective in early infancy. Ideal timing of maternal vaccination to protect both mother and infant may be based on these findings although transplacental kinetics and protection from vaccine-elicited antibody response may vary.

EXPERT COMMENT

“Infection with SARS-CoV2 during pregnancy may result in severe disease and poor outcomes. Trans-placentally acquired antibodies are the only source of protection in early infancy and detected even after asymptomatic infections. As transfer ratios were associated with time elapsed from maternal infection to delivery, vaccination can be optimally planned early in the second trimester.”

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With warm regards,

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Reference

Flannery DD, Gouma S, Dhudasia MB, Mukhopadhyay S, Pfeifer MR, Woodford EC et al. Assessment of Maternal and Neonatal Cord Blood SARS-CoV-2 Antibodies and Placental Transfer Ratios. *JAMA Pediatr.* 2021;175(6):594–600