COVID-19 mRNA Vaccine Booster During Pregnancy Increases Maternal and Fetal Antibodies

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Pregnant individuals who received a booster dose of the BNT162b2 (Pfizer-BioNTech) COVID-19 mRNA vaccine during their second trimester developed higher antibody levels than those who received the second shot in their primary vaccine series during the same trimester, researchers in Israel recently reported in *Obstetrics & Gynecology*. Infants in the booster group also had higher antibody levels at birth than those in the 2-dose group. The study’s authors say the findings support a COVID-19 maternal booster following full COVID-19 vaccination to protect both pregnant people and their infants.

The Backstory
The researchers published data in *JAMA Pediatrics* last year on SARS-CoV-2 antibody levels induced after pregnant people received the second dose of the BNT162b2 vaccine. Now that COVID-19 vaccine boosters are recommended during pregnancy, the team wanted to compare antibody levels after second vs third shots.

Why This Is Important
Pregnant and recently pregnant people have a higher risk of developing severe COVID-19, and SARS-CoV-2 infection increases the chance of pregnancy complications such as delivering preterm. But despite recommendations for pregnant individuals to receive a COVID-19 vaccine booster after completing the primary vaccine series, booster rates during pregnancy are still low and lag behind primary vaccine series rates.

In the US, about 72% of pregnant individuals had completed their primary COVID-19 vaccine series with 1 or 2 doses as of late May of this year, but only about 48% of them had received a booster dose, according to data from the US Centers for Disease Control and Prevention. Although the COVID-19 booster vaccination rate for pregnant individuals in Israel isn’t known, the overall rate for women of reproductive age there is only about 50%, according to study principal investigator Nir Kugelman, MD, a medical resident in the department of obstetrics and gynecology at Carmel Medical Center in Haifa, Israel.

The Methods
The study compared SARS-CoV-2 antibody levels at an average of about 15 weeks after vaccination among 241 pregnant people who were not previously infected with the virus, and their infants. Levels were tested on admission for delivery and in umbilical cord blood after delivery in 2 groups:

- **The booster group**: 120 pregnant individuals who received their booster dose at 17 to 30 weeks of pregnancy, and 109 of their infants.
- **The 2-dose group**: 121 pregnant individuals in the team’s previous study who received the second dose in the same gestational age window, and 107 of their infants.

What We’ve Learned
- Median maternal antibody titers were substantially higher in the booster group than in the 2-dose group—4485 AU/mL vs 1122 AU/mL.
- Maternal antibodies waned as the time between vaccination and delivery increased, but the decline was slower in the booster group.
- Median neonatal antibody titers were substantially higher in the booster group than in the 2-dose group—8773 AU/mL vs 3280 AU/mL.
- Neonatal titers were also almost twice as high as maternal titers in the booster group.

In an email, Denise Jamieson, MD, MPH, professor and chair of the Department of Gynecology and Obstetrics at Emory University School of Medicine, who was not involved with the work, called the study “carefully conducted,” and said that it demonstrated “that the booster provided robust and relatively durable antibody response.”

The Limitations—And What We (Still) Don’t Know
Jamieson noted that the study was relatively small and that it included a relatively homogeneous population who all received...
And although higher SARS-CoV-2 antibody levels are correlated with better protection from COVID-19, Kugelman wrote in an email that the "protective level of antibodies needed to prevent COVID-19 is still unknown, and future studies are needed to interpret the meaning of different SARS-CoV-2 antibody levels." To his knowledge, researchers have yet to compare COVID-19 clinical outcomes among boosted and nonboosted pregnant individuals. Jamieson added that she wants to see further research on how the neonatal antibody levels correlate with neonates' risk of SARS-CoV-2 infection.

**The Clinical Takeaway**

Jamieson, who collaborated on a COVID-19 vaccine practice advisory from the American College of Obstetricians and Gynecologists (ACOG), wrote that the new study "highlights the importance of pregnant persons being fully vaccinated for COVID including receiving a booster. There is evidence that vaccine protects both the pregnant person as well as their neonate." (ACOG is the publisher of Obstetrics & Gynecology.)

She also noted that because antibody levels wane following vaccination, some experts have suggested that maternal vaccination should be delayed until late in pregnancy to maximize neonatal protection at birth. She cautioned that although the booster group received their third shot during the second trimester, she does not want pregnant people to wait until then if they are eligible to receive an initial series dose or booster dose earlier in their pregnancy. "However, it does raise the question of whether we should consider a second booster in pregnancy," she wrote.

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