Pregnant and lactating women should adhere to recommended COVID-19 vaccine schedules fo full antibody protection

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A new study indicates that the two-dose immunization schedule for COVID-19 mRNA vaccines ultimately stimulates comparable antibody responses in pregnant, lactating, and nonpregnant women of reproductive age, but key antibody functions kick in more slowly in pregnant and lactating women following the first dose. The research, which was led by investigators at Massachusetts General Hospital (MGH) and is published in *Science Translational Medicine*, points to the importance of following the recommended timelines for first and second dose of the COVID-19 mRNA vaccines in pregnant and lactating women to ensure full immunity.

"We decided to conduct this study to provide real-world data on how pregnant and lactating women respond to the COVID-19 vaccines, since these individuals were left out of the initial vaccine trials," says co–senior author Andrea Edlow, MD, MSc, a maternal-fetal medicine specialist at MGH and an assistant professor of Obstetrics, Gynecology, and Reproductive Biology at Harvard Medical School. "Including pregnant people in research is critical to combating vaccine hesitancy, especially because they are more likely to have severe COVID-19 disease." The team examined immune responses after vaccination in more than 100 women, including pregnant, lactating, and nonpregnant.

The work looked specifically at the titers, Fc-receptor binding capacity, and functionality of individuals' antibodies after COVID-19 vaccination. Fc-receptor binding capacity is the ability of antibodies to bind to Fc receptors present on immune cells and tissues. Fc-receptor binding is critical to activating cells in the fight against the virus that causes COVID-19, and at the placental tissue level, Fc-receptor binding plays a key role in the transfer of maternal antibodies to the fetus. The scientists found that Fc-receptor binding capacity and other key antibody functions developed more slowly in pregnant and lactating individuals than nonpregnant women, and the second vaccine dose was key to achieving full antibody binding and functionality.

The study also uncovered key differences between vaccine responses in pregnant and lactating individuals, highlighting the importance of including not only pregnant but also lactating individuals in vaccine studies. Specifically, lactating women had higher activity of natural killer cells after vaccination than pregnant women. These cells play a key role in the innate immune response by killing virally infected cells. "We found that the second vaccine or boost dose was critical to the presence of highly functional antibodies in the blood and breastmilk of lactating individuals," says Edlow. The investigators also confirmed results from their prior studies that highly functional maternal antibodies pass through the umbilical cord to provide immune protection to the newborn.

This latest study also revealed that the antibody

responses induced by the mRNA-1273 (Moderna) and BNT162b2 (Pfizer-BioNTech) vaccines were different, with the Moderna-induced antibody response being more focused and coordinated in the study participants. Both vaccines induced highly effective antibody responses, however.

"Taken together, our findings highlight the importance of defining the immunology of pregnancy to inspire the development of vaccines and therapeutics most effective in this unique subpopulation, where optimal immunological responses can protect both mother and baby," says Galit Alter, Ph.D., co–senior author and Group Leader at the Ragon Institute of MGH, MIT and Harvard.

More information: Caroline Atyeo et al, COVID-19 mRNA vaccines drive differential antibody Fc-functional profiles in pregnant, lactating, and non-pregnant women, *Science Translational Medicine* (2021). DOI: 10.1126/scitranslmed.abi8631

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