New insight could improve maternal vaccines that also protect newborns

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A team led by Duke Health scientists has identified a cellular process that could lead to the development of safer and more effective vaccines that protect pregnant women as well as their newborns from dangerous infections.

Publishing online June 13 in the journal *Cell*, the researchers describe a previously unidentified route for antibodies to be transferred from the mother to the fetus, illuminating a potential way to capitalize on this process to control when and how certain antibodies are shared.

"It's always been assumed that the types of maternal antibodies that cross over the placenta to the fetus, all antibodies had the same chance of transferring to fetus," said senior author Sallie Permar, M.D., Ph.D., a professor of pediatrics and member of the Duke Human Vaccine Institute.

"This meant there was no way we could direct certain antibodies across the placenta and to the baby," Permar said. "Our study found that there seems to be a code on the antibody that determines which antibodies will more effectively transfer across the placenta."

Permar and colleagues—including co-senior author Genevieve Fouda, Ph.D., and lead author David Martinez, Ph.D.—studied two populations of pregnant women in the United States and Malawi who were infected with HIV, which is known to inhibit the transfer of antibodies to the fetus—and not just HIV antibodies. This feature provided a unique circumstance to explore a little-understood process with implications for numerous common pathogens, including tetanus, pertussis, influenza and others.

The researchers identified a sugar molecule that interacts with placental receptors, an interaction that had previously not been known to be involved in the antibody transfer process. The finding was corroborated in healthy women by another research team publishing in the same issue of *Cell*.

"We have shown that the efficiency of antibody transfer across the placenta is differentially regulated," Permar said. "This insight could

improve the design of vaccines for a variety of infectious diseases to improve the transplacental antibody transfer to the fetus."

"Our findings provide a roadmap of how antibodies cross the placenta to the baby," Martinez said. "We hope our results will be useful for developing antibody therapeutics that protect infants against infectious diseases in early life."

Provided by Duke University Medical Center