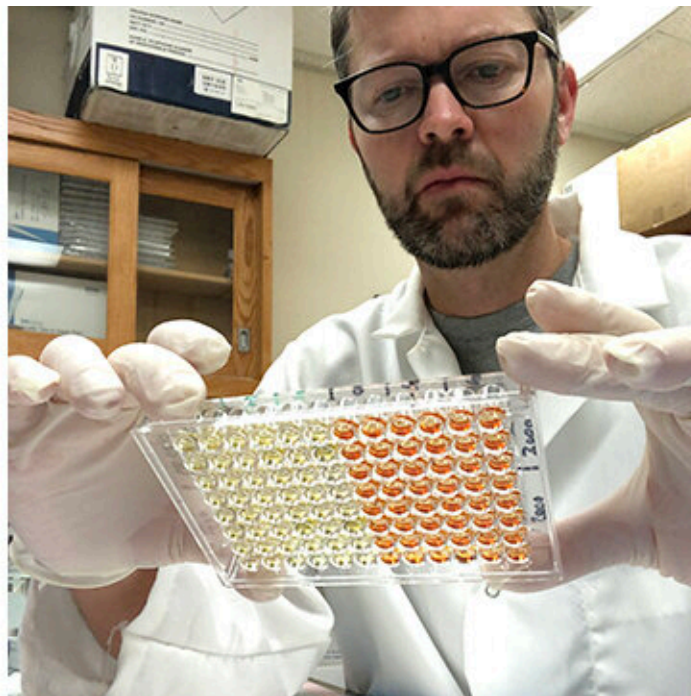# COVID-19 antibody study shows downside of not receiving second shot

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Thomas McDade in his Northwestern University lab testing for SARS-CoV-2 (the virus that causes COVID-19) antibodies. Credit: Northwestern University

A new study shows that two months after the second Pfizer/Moderna vaccination, antibody response decreases 20% in adults with prior cases of COVID-19. The study also tests how well current vaccines resist emerging variants.

The Northwestern University study underscores the importance of receiving a second dose of vaccine, not only because it is commonly known that immunity from vaccines wanes over time, but also because of the risk posed by emerging variants, including the highly contagious delta variant.

The study also showed that prior exposure to SARS-CoV-2 does not guarantee a high level of antibodies, nor does it guarantee a robust antibody response to the first vaccine dose. This directly contradicts the assumption that contracting COVID will naturally make someone immune to re-infection. The findings further support vaccination (and two doses), even for people who have contracted the virus previously.

A team of scientists, including biological anthropologist Thomas McDade and pharmacologist Alexis Demonbreun, tested blood samples from adults who had tested positive for SARS-CoV-2 to measure how long the immunity benefits of Pfizer and Moderna vaccines last and how well they protect from newer variants.

Study participants were selected from a racially and ethnically diverse community-based sample of Chicago-area adults recruited at the start of the pandemic. Using at-home antibody testing kits developed in the lab, participants submitted blood samples two to three weeks after their first and second dose of vaccination and two months after the second dose.

Antibody response after second shot

In the lab, the researchers tested for neutralizing antibodies by measuring whether the blood sample could inhibit the interaction between the virus' spike protein and the ACE2 receptor—this interaction is how the virus causes an infection once it enters the body.

"When we tested blood samples from participants collected about three

weeks after their second vaccine dose, the average level of inhibition was 98%, indicating a very high level of neutralizing antibodies," said McDade, professor of anthropology in the Weinberg College of Arts and Sciences and a faculty fellow with the University's Institute for Policy Research.

The scientists tested emerging variants B.1.1351 (South Africa), B.1.1.7 (UK) and P.1 (Brazil) and found the level of inhibition to viral variants was significantly lower, ranging from 67% to 92%.

Antibody response declined after two months

In testing samples collected two months after the second dose, they found antibody responses declined by about 20%.

The researchers found that the antibody response to vaccination varied based on history of prior infection.

Individuals with clinically confirmed cases of COVID-19 and multiple symptoms had a higher level of response than those who tested positive but had mild symptoms or were asymptomatic.

"Many people, and many doctors, are assuming that any prior exposure to SARS-CoV-2 will confer immunity to re-infection. Based on this logic, some people with prior exposure don't think they need to get vaccinated. Or if they do get vaccinated, they think that they only need the first dose of the two-dose Pfizer/Moderna vaccines," McDade said.

"Our study shows that prior exposure to SARS-CoV-2 does not guarantee a high level of antibodies, nor does it guarantee a robust antibody response to the first vaccine dose. For people who had mild or asymptomatic infections, their antibody response to vaccination is essentially the same as it is for people who have not been previously

exposed."

McDade adds that although the research was conducted prior to the emergence of the delta virus, the conclusions are similar.

"As far as protection goes after vaccination, the story is the same for all the variants, including delta—the vaccine provides good protection, but not as good protection as the original version of the virus for which the vaccine was designed. Combine that with the fact that immunity wanes over time, you get increased vulnerability to breakthrough infection.

"So, it's two strikes right now—delta plus waning immunity among the first wave of the vaccinated," McDade said.

The study "Durability of antibody response to vaccination and surrogate neutralization of emerging variants based on SARS-CoV-2 exposure history" publishes Monday, Aug. 30 in the journal *Scientific Reports*.

  More information: "Durability of antibody response to vaccination and surrogate neutralization of emerging variants based on SARS-CoV-2 exposure history" *Scientific Reports* (2021). www.nature.com/articles/s41598-021-96879-3

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