

New analysis predicts how well vaccines will work against COVID-19 strains

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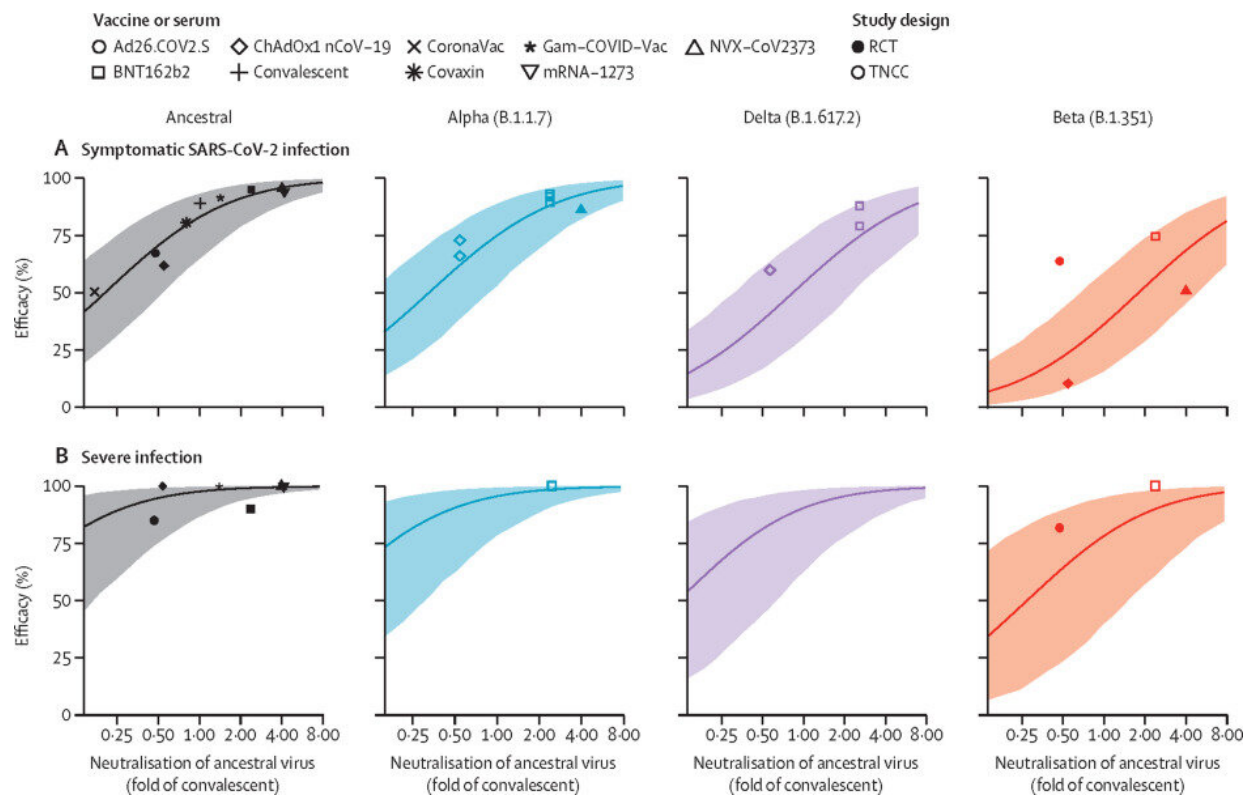


Figure 2. Predicting vaccine efficacy against SARS-CoV-2 variants The association between mean neutralization of ancestral SARS-CoV-2 and protection against symptomatic (A) and severe infection (B) with different variants is shown. The line indicates the model prediction of efficacy for a given neutralization against ancestral virus. Shading indicates 95% CI based on uncertainties in measuring mean neutralization titre against ancestral virus, the loss of neutralization against each variant and in model parameters. Individual points shown represent results of different studies of vaccine efficacy against ancestral virus (black) or SARS-CoV-2 variants. Details of studies of ancestral

virus are outlined in Khoury et al⁸ (all of which are randomized controlled trials), and studies of variants of concern are outlined in the appendix (p 17).
Credit: DOI: 10.1016/S2666-5247(21)00267-6

Vaccines are less effective against some COVID-19 variants and boosting may be required within one year to maintain efficacy above 50 percent, according to a new study.

The researchers from the Sydney Institute for Infectious Diseases at the University of Sydney, UNSW Sydney's Kirby Institute and the University of Melbourne's Doherty Institute have conducted an analysis that can help inform the COVID-19 response by identifying an 'immune correlate' of vaccine [protection](#).

This is the first and largest study to predict protection against variants using neutralizing [antibodies](#), and it provides insights that can inform vaccine rollouts.

The findings were published in *The Lancet Microbe*.

One of the authors of the study, Professor Jamie Triccas from the University of Sydney says this research is crucial because it shows that we can predict vaccine efficacy from a relatively simple laboratory test.

"It is likely that new COVID-19 variants will continue to emerge, as we have seen with Delta, with varying transmissibility and severity. Vaccines may not work as well against some of these variants, but fortunately, our model allows us to predict this.

"Essentially, we can predict how current vaccines will work against new variants, and test the efficacy of new vaccines, based on the results of

small clinical trials that measure antibody responses. That's a huge win for the battle against COVID-19."

The results published in *The Lancet Microbe* is a continuation of previous research that examined the relationship of neutralizing antibodies generated by the [immune system](#) in response to the SARS-CoV-2 virus.

Professor Triccas and Dr. Megan Steain were part of a group of researchers that wanted to know how the COVID-19 variants affected our immune system's relationship with the virus, and how it impacted on vaccine efficacy (how well the vaccine prevents disease).

In this study, Professor Triccas and Dr. Steain's role was to analyze existing data on how effective neutralizing antibody responses were in infected and vaccinated individuals against different viral variants.

They found that antibodies induced by infection or vaccination were less protective against the variants of concern, and that over time, there was a drop in neutralizing antibodies, and these changes could be used to predict vaccine efficacy.

"We are now doing further work to confirm these predictions and particularly to examine how well existing vaccines will protect against severe COVID-19 disease over the longer term," said Dr. Steain.

Boosters make vaccine protection even better

Vaccines work well in the first months after vaccination and against the viruses that were used to make them. However, *The Lancet Microbe* study showed reduced vaccine efficiency against COVID-19 disease resulting from other variants, such as Delta, which declined with time.

The analysis was able to pre-emptively predict this decline based on

analysis of antibody levels.

"Our previous research showed that we can measure neutralizing antibody levels as a 'proxy' for immune protection from COVID-19 infection. In this new analysis, we've tested this against the variants of concern, including Delta, and found that the model continues to provide a robust prediction of immune protection, despite the differences between the viral sequence seen in variants like Delta," said lead author Dr. Deborah Cromer, from the UNSW Sydney's Kirby Institute.

A major implication of the research was that booster shots of the COVID-19 [vaccine](#) was needed to maintain immune protection across a population. Without boosters, protection from symptomatic COVID may drop below 50 percent after six months, which means more people will become infected.

"Reassuringly though, protection against severe disease and death will likely remain high over the first year," said Dr. Cromer.

"Optimal timing for boosters will depend on the availability of boosters, and whether the aim is to reduce overall case numbers or reduce the burden on the health system."

The model gives a clearer picture to policy makers about how levels of protection against symptomatic disease, severe disease and death are likely to change based on different vaccines, emerging variants and over time.

In Australia, the TGA recently approved booster doses after six months, which will help maintain high levels of protection against all stages of [disease](#).

The analysis also found that a [booster](#) shot within a year increases

immunity to higher levels than those seen after a full primary vaccination schedule.

"This is excellent news, particularly for people who are six months from their initial vaccination, and who are currently being offered third dose vaccination in Australia," said Dr. Cromer.

"Vaccines have had an incredible impact in controlling the current COVID-19 outbreak and will continue to provide very good protection. But boosters will make that good protection even better."

More information: Deborah Cromer et al, Neutralising antibody titres as predictors of protection against SARS-CoV-2 variants and the impact of boosting: a meta-analysis, *The Lancet Microbe* (2021). [DOI: 10.1016/S2666-5247\(21\)00267-6](https://doi.org/10.1016/S2666-5247(21)00267-6)

Provided by University of Sydney

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