

Study shows both importance of second vaccine dose and updating vaccines to combat new variants of concern

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New research presented at this year's European Congress of Clinical Microbiology & Infectious Diseases (ECCMID) shows the importance

of receiving the second dose of a COVID-19 vaccine and also the need to constantly review and update vaccines to deal with new variants of concern. The study is by Dr. Nicole Schneiderhan-Marra, Natural and Medical Sciences Institute at the University of Tübingen, Reutlingen, Germany, and colleagues.

While vaccines have begun to bring the pandemic under control in certain countries, it remains unclear how effective these vaccines will continue to be as the virus mutates and evolves. The protection generated against the virus by vaccination is normally measured by antibodies, with a certain group called "neutralising antibodies" being of particular importance, as they defend the body and destroy the virus.

As the current generation of vaccines were all designed against the original virus strain (known as the "wild type"), they offer maximum protection against this strain. However, it remains unclear whether the protection will still be the same against new strains of the virus, such as the alpha (Kent/ UK), beta (South Africa) delta (India) or gamma (Brazil) variants.

To see how the protection offered by the [vaccine](#) changed for different variants, the researchers firstly profiled the antibodies generated by vaccination and then examined their neutralising capacity. In addition to antibodies circulating within the blood, they checked for the presence of antibodies in saliva as a "first line of defence".

To do this, they adapted a previously developed assay that measures the antibodies present against SARS-CoV-2 and other coronaviruses in the blood, to include targets from variants of concern and to look specifically at the neutralising antibodies. They collected samples from 23 vaccinated individuals (age 26-58 years, 22% female) who had been vaccinated with Pfizer BioNTech vaccine after the first and second doses. For control groups, the team also collected samples from 35

infected [blood donors](#) (age 40-78 years, 29% female) 27 infected saliva donors (age 25-58 years, 63% female) and 49 non-infected saliva donors (age 25-38 years, 55% female) and also control samples of blood and saliva sourced commercially from before the pandemic began.

When looking at the saliva, they saw that vaccinated individuals had large amounts of antibodies present compared to infected individuals, suggesting that vaccination not only offers protection against becoming infected, but should you become infected, it reduces the possibility of you transmitting it to others.

The number of antibodies produced and protection offered by vaccination increased substantially after the second vaccine dose was given, showing the importance in receiving the second dose. At the time of the study, the two global variants of concern were the alpha and beta variants, so they examined whether the protection offered against these two variants was similar or different to that offered against the "wild-type". They found that while there was no reduction in neutralising antibodies against the alpha variant, there was a substantial reduction in neutralising antibodies against the beta variant. "This shows the importance of constantly updating vaccines to offer maximum protection against different strains of the virus," explains Dr. Schneiderhan-Marra.

Since this study was completed, the virus has continued to mutate, with the delta variant now the dominant strain globally. As a result, the researchers have further developed their assays to include more targets from variants of concern, such as delta (India) and gamma (Brazil), along with other variants of interest (eta, iota, zeta, theta, kappa and epsilon), and other interesting strains such as the mink mutation discovered last year.

Dr. Schneiderhan-Marra says: "Two further questions remain however

with regards to vaccination: firstly, what protection is offered by the current vaccines against the delta and any other variants that arise in the future, and secondly, how long does protection offered by the current vaccines last and will you need a booster shot to not only increase protection generally, but to also offer protection against new variants?"

Her team is working on [various studies](#), one of which includes the same donors in this study and how the protection they received from the vaccine changes over the course of the year. A further study is looking at how neutralising [antibodies](#) differ between different vaccines, and finally other studies are looking into other variants and their impact on protection.

More information: Matthias Becker et al, Immune response to SARS-CoV-2 variants of concern in vaccinated individuals, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-23473-6](https://doi.org/10.1038/s41467-021-23473-6)

Matthias Becker et al, Exploring beyond clinical routine SARS-CoV-2 serology using MultiCoV-Ab to evaluate endemic coronavirus cross-reactivity, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-20973-3](https://doi.org/10.1038/s41467-021-20973-3)

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