

COVID-19 vaccine booster provides good antibody protection against Omicron

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A third 'booster' dose of COVID-19 vaccine successfully raises antibody levels that neutralize the Omicron variant, according to laboratory findings from the Francis Crick Institute and the National Institute for

Health Research (NIHR) UCLH Biomedical Research Center, published today (Wednesday) as a Research letter in *The Lancet*.

Researchers found that antibodies generated in people who had received only two doses of either the Oxford/AstraZeneca [vaccine](#) or the Pfizer/BioNTech vaccine were less able to neutralize the Omicron variant as compared to the Alpha and Delta variants.

They also found that antibody levels dropped off in the first three months following the second dose but that a third 'booster' dose raised levels of antibodies that effectively neutralize the Omicron variant.

In people who had received the Pfizer/BioNTech vaccine for all three doses, antibody levels against Omicron after a third dose were similar to those previously reached against Delta after only two doses. Overall, [antibody levels](#) were nearly 2.5x higher against Omicron after three doses compared to after two.

Higher levels of antibodies against the Omicron variant were also found in people who received two doses of either vaccine and also reported previously having COVID-19 symptoms, compared to those had not previously had COVID-19 symptoms.

Whilst levels of antibodies alone do not predict vaccine effectiveness, they are a very good indicator of protection against severe COVID-19. This study confirms that three doses of COVID-19 vaccine are essential to boost antibodies to quantifiable levels and maximize the amount of protection against severe disease and hospitalization.

Researchers have submitted their findings to the Genotype-to-Phenotype National Virology Consortium (G2P-UK), the New and Emerging Respiratory Virus Threats Advisory Group (NERVTAG) and the Joint Committee on Vaccination and Immunization (JCVI).

As part of the SARS-CoV-2 Legacy study, led by the Crick and partners at UCL and University College London Hospitals NHS Foundation Trust (UCLH), healthcare workers and staff from the institutions have been donating regular blood and swab samples so that researchers can track changing risk of infection and response to vaccination.

The Legacy team analyzed 620 blood samples from 364 people who enrolled in the study. They used robust high throughput viral neutralization assays, developed at the Crick, to test the ability of antibodies to block entry of the virus into cells, so called 'neutralizing antibodies', against different variants of SARS-CoV-2, including Omicron.

Higher antibody titres (the greatest dilution level that still blocks 50% of virus infection in the lab) are a good predictor of vaccine efficacy and greater protection against COVID-19.

Importantly, they also included synthetic neutralizing antibodies that are currently in [clinical use](#) for COVID-19 treatment, in their analysis, to test if these [synthetic antibodies](#) have neutralizing activity against variants of SARS-CoV-2 including Omicron.

The researchers found that Xevudy (sotrovimab), a recently-approved synthetic monoclonal antibody used to prevent and treat patients at risk of developing severe COVID-19, was able to neutralize the Omicron variant.

Dr. Emma Wall, UCLH Infectious Diseases consultant and Senior Clinical Research Fellow for the Legacy study, said: "People who have queued outside vaccinations centers should be reassured that a vaccine booster is the best way of protecting them from Omicron. And for people who haven't yet had a booster or even a first dose, it's not too late.

"This new variant can overcome the immune blockade put in place by two vaccine doses, but thankfully following the third dose, neutralizing activity is robust in the vast majority of people. A [third dose](#) builds our defenses higher, making it harder for the virus to cause severe COVID-19."

David LV Bauer, Group Leader of the Crick's RNA Virus Replication Laboratory and member of the G2P-UK National Virology Consortium, said: "While the Omicron variant has considerably more mutations than other recent variants, such as Alpha and Delta, our data show that the boosters push our immune system to make a broad response capable of tackling it."

Bryan Williams, UCLH Director of Research said "This research shows the power of the partnership between the Crick and the NHS, through our NIHR Biomedical Research Center. As well as this key vaccine efficacy data, we have really important early data to suggest that at least some versions of synthetic [antibodies](#) that we currently use to treat certain patients, are likely to be effective against this new variant."

Charles Swanton, Legacy Chief Investigator at the Crick and Consultant Oncologist at UCLH said: "Our results are an estimate of protection in the community and as boosters are rolled out at record speeds, many can be confident in their level of vaccine protection after three doses."

Sonia Gandhi, Legacy Chief Investigator at the Crick and Consultant Neurologist at UCLH, said: "Now that we have established that boosters are effective against the Omicron [variant](#), future research will need to address the duration and persistence of this booster response. New variants of concern will continue to emerge as the pandemic evolves, so effective immune monitoring is needed to stay responsive and remain protected."

More information: Mary Wu et al, Three-dose vaccination elicits neutralising antibodies against omicron, *The Lancet* (2022). [DOI: 10.1016/S0140-6736\(22\)00092-7](https://doi.org/10.1016/S0140-6736(22)00092-7)

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