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Is Omicron really so bad? What, Research has revealed till now

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ABSTRACT

The quantity and variety of neutralising epitopes targeted by polyclonal antibodies in SARS-CoV-2 convalescent and vaccinated persons, as well as the genetic barrier to viral escape, are critical variables in neutralisation breadth. We show that human polyclonal antibodies target various neutralising epitopes, both inside and outside the receptor-binding domain, using HIV-1 pseudotypes and plasma selection studies with vesicular stomatitis virus/SARS-CoV-2 chimaeras5. Antibody targets correspond to spike sequences in wild SARS-CoV-2 populations that are rich in variation. The authors discovered that 20 naturally occurring mutations in the SARS-CoV-2 spike protein are sufficient to generate pseudotypes with near-complete resistance to polyclonal neutralising antibodies generated by convalescent or mRNA vaccine recipients by combining variants of concern-associated and antibody-selected spike substitutions into a single polymutant spike protein. Plasma from people who had been infected and then underwent mRNA vaccination, on the other hand, neutralised pseudotypes with this more resistant SARS-CoV-2 polymutant spike, as well as other sarbecovirus spike proteins. As a result, adequately elicited human polyclonal antibodies to SARS-CoV-2 should be resistant to significant future SARS-CoV-2 mutation and may provide protection against future sarbecovirus pandemics

KEYWORDS: SARS-CoV-2, Omicron, Sarbecovirus Spike Proteins

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INTRODUCTION

It's been less than a week since scientists in Botswana and South Africa warned the world about Omicron, a fast-spreading new SARS-CoV-2 mutation. Researchers from all around the world are scrambling to comprehend the harm that the variation presents to the world, which has already been verified in more than 20 nations. Scientists may need weeks to get a better understanding of Omicron, including its disease transmission and lethality, as well as its ability to resist vaccinations and produce reinfections.

Specific antibodies generated by previous infection or vaccination are likely a major component of SARS-CoV-2 acquired immunity. The most strong neutralising antibodies cloned from convalescent patients target the receptor-binding domain (RBD) of the spike protein, which is considered to dominate the neutralising action of convalescent or vaccination recipient plasma.(1)

WHAT IS THE SPREAD RATE OF OMICRON?

Researchers are especially worried about the rapid rise of Omicron in South Africa, as it indicates that the mutation might cause an increase in COVID-19 cases elsewhere. On December 1, South Africa recorded 8,561 cases, up from 3,402 on November 26 and several hundred each day in mid-November, with the majority of the increase occurring in Gauteng Province, which encompasses Johannesburg.

To track the evolution of an epidemic, epidemiologists use Gauteng's R, which is the average number of new cases disseminated by each illness. According to the National Institute for Communicable Disease (NICD) in Johannesburg, South Africa, R was higher than 2 in Gauteng in late November. As per Richard Lessels, an extremely contagious physician at KwaZulu-Natal University in Durban, South Africa, some of this growth was last observed during the pandemic's early stages.

To acquire a better grasp of Omicron's transmissibility, researchers will analyse how it spreads in different parts of

South Africa and throughout the world, according to Christian Althaus, a computational epidemiologist at the University of Bern in Switzerland. Because of heightened surveillance in South Africa, researchers may exaggerate Omicron's rapid spread. However, Althaus feels that if this pattern is duplicated in other countries, it is extremely strong evidence that Omicron has a transmission advantage. "It shows things are a little more nuanced and significantly depending on the immunological environment if it doesn't happen in European nations, for example." "We'll have to wait as a result."

Despite the fact that genome sequencing is necessary to identify Omicron cases, specific PCR assays can discover a distinctive characteristic of the mutation that distinguishes it from Delta. Preliminary findings based on this signal suggest that, despite their uncommon, incidents are growing in the United Kingdom. "That's not what we want to see right now," says Althaus, "and it suggests that Omicron may have a transmission advantage in the UK as well."(1-2)

Is Omicron capable of overcoming immunization or infection-induced immunity?

The rapid spread of the strain in South Africa suggests that it has the potential to bypass immunity. Based on increased mortality rates since the start of the pandemic, it's likely that a considerable portion of the population was infected with SARS-CoV-2 in earlier waves.

Omicron's prevalence in southern Africa may be attributable in part to its ability to infect persons who have recovered from COVID-19 cases caused by Delta and other variations, as well as those who have been vaccinated. Reinfections in South Africa have grown as Omicron has expanded, according to a preprint1 released on December 2 by researchers at the NICD. "Unfortunately, this provides the ideal conditions for immunological escape variants to emerge."

How well the mutation spreads, according to Aris Katzourakis, a viral evolution specialist at the University of Oxford in the United Kingdom, is dependent on factors such as vaccination and previous infection rates. "If you throw it into the mix in a strongly vaccinated population that has given up on other control efforts, it may have the edge there."

Researchers want to see how well Omicron can resist immune responses and how well it protects itself. A team headed Penny Moore, a research scientist at the NICD and the University of Witwatersrand in Johannesburg, is testing the efficiency of neutralization, or virus-blocking, antibodies elicited by previous infection and vaccination to prevent Omicron virus from infecting cells in a laboratory test. Her team is working on 'pseudo virus' particles — a synthetic form of HIV that infects cells using the protein from the SARS-spike CoV-2 — to match Omicron, which has up to 32 changes to the spike protein.

In the face of Omicron, how will vaccinations fare?

Even though Omicron is impervious to neutralising antibodies, immunological responses induced by immunisation and earlier exposure may provide some protection against the variation. "Immunity studies demonstrate that relatively modest levels of neutralising antibodies may protect patients from severe types of COVID-19," says Miles Davenport, an immunologist at the University of New South Wales in Sydney, Australia.

Other immune system cells, particularly T cells, may be less affected by Omicron's alterations than antibody responses. Researchers in South Africa aim to explore the function of T cells and another immune component known as natural killer cells, which may be especially important for protection against severe COVID-19, according to Shabir Madhi, a vaccinologist at the University of Witwatersrand.

Will the present boosters help with Omicron defensive strategy?

Omicron's threat has encouraged several wealthy nations, like as the United Kingdom, to speed up and expand the distribution of COVID vaccination booster doses. However, it's unclear how effective these extra dosages will be.

The third dose enhances neutralising antibody responses, which Bieniasz believes will operate as a barrier to Omicron's ability to escape these antibodies. People who had overcome from COVID-19 months before having their immunizations still had antibodies capable of blocking the mutant increase, according to his findings. Those who've been exposed to the SARS-spike CoV-2 protein numerous times, whether through infection or a booster dose, are "extremely likely to have neutralising activity against Omicron," according to Bieniasz.

Is Omicron associated with a milder or more severe illness than other variants?

Controlling for the various confounding circumstances that might impact the course of disease, especially when outbreaks are geographically limited, is a key difficulty when determining the severity of a variation. Reports of mild illness from Omicron virus in South Africa, for example, are likely due to the nation's young population, many of whom have already been exposed to SARS-CoV-2.

It's unclear whether Omicron infection produces more severe illness than infections caused by other variations, such as Delta. According to early estimates, hospitalisation rates in South Africa are growing, although this might be attributable to an increase in the overall number of vulnerable patients rather than a specific Omicron infection. There is no indication that the complications similar with Omicron are unique from those associated with other variants at this time. Although identifying the severity of the Omicron variant would take weeks or even months, the first cases of infection were amongst university students, who were younger and had a milder disease. All COVID-19 variants, including the widely distributed Delta form, can cause serious illness or death, particularly in the most vulnerable individuals, thus prevention is always the best approach.(3)

Data on Omicron outbreaks in other nations will be sought by researchers. Researchers will have a better understanding of how generalizable the early tales are as the number of instances grows, thanks to the geographic distribution and greater sample size. Researchers will eventually really would like to establish case-controlled studies in which Omicron-infected individuals' demographics are precisely linked to the demographics of a control group. As an outcome, scientists will be able to better control for crucial factors such as age, immunization records, and health conditions. Because the number of hospitalizations might be impacted by general hospital capacity in a region, data from both groups will need to be collected in real time.

It will take some time to do all of this. "We believe one of the final tangles we'll be able to disentangle will be the severity question." With Delta, it was the same way.

What is the status of Omicron and how are scientists tracking it?

Omicron has been found in over 20 countries so far, a figure that is continuously increasing as attempts to track the variation grow throughout the world.

However, because the ability to sequence viruses from positive COVID tests quickly is concentrated in wealthy countries, early data on Omicron's spread will be skewed.

As per virologist Renato Santana of the Federal University of Minas Gerais in Brazil, activities in relation in Brazil and several other countries are employing a distinct result on specific COVID PCR testing that may allow them to pick suspected Omicron cases for decoding. The test looks for fragments of three viral genes, one of which encodes spike protein. Because mutations in Omicron's spike gene prohibit it from being recognised in the test, samples with the variant will only test positive for two of the genes.

Actions that Countries Should Take

WHO suggests that countries improve scenario of surveillance and sequencing, share genome sequences on publicly available databases like GISAID, report initial instances or clusters to WHO, and conduct field investigation, prosecution and laboratory evaluations to better understand if Omicron has different propagation or disease characteristics, or has an impact on vaccine effectiveness.(3)

Countries should continue to utilise a risk analysis and science-based approach to implement effective public health initiatives to reduce COVID-19 circulation. To deal with a rise in instances, they need expand some public health and medical capacity. WHO provides help and advise to nations in terms of both readiness and reaction.

Furthermore, discrepancies in COVID-19 vaccine access must be quickly addressed to guarantee that vulnerable populations worldwide, including as health professionals and the elderly, receive their first and second doses, as well as fair access to treatment and diagnostics.

Actions that individuals should do

Individuals can help prevent the spread of the COVID-19 virus by keeping a physical distance of at least 1 metre between themselves and those around, wearing a well-fitting mask, opening windows to improve air circulation, avoiding unventilated or public places, keeping their hands clean, coughing or sneezing into a bent elbow or tissue, and obtaining immunised when their schedule allows.(3)

As additional information becomes available, especially following TAG-VE meetings, WHO will continue to provide updates. In addition, the WHO's digital and social media channels will be updated with new information.

CONCLUSION

India's lifestyle with low case counts and a consistent vaccination effort, India has returned to routine. So far, the government has recorded less than 10,000 new cases each day and has vaccinated about 80% of the 940 million eligible individuals with at least one shot.

However, the latter has slowed, and the advent of a new, potentially more contagious form has created the spectre of a third wave - a terrifying prospect considering how the second wave decimated India in April and May, with hospitals running out of beds, oxygen, and medications.

After detecting the first case of Omicron on November 24, South Africa informed the entire world about the specific strain. Since then, a number of nations have issued travel restrictions.

According to preliminary findings, Omicron has a greater chance of re-infection. However, experts estimate that it will take another three weeks to determine how the extensively altered form affects the efficacy of other vaccinations.

REFRENCES

I. Schmidt F, Weisblum Y, Rutkowska M, Poston D, DaSilva J, Zhang F, et al. High genetic barrier to SARS-CoV-2 polyclonal neutralizing antibody escape. Nature [Internet]. 2021; Available from: http://dx.doi.org/10.1038/s41586-021-04005-0

II. Callaway E, Ledford H. How bad is Omicron? What scientists know so far. Nature [Internet]. 2021; Available from: http://dx.doi.org/10.1038/d41586-021-03614-z

III. Update on Omicron [Internet]. Who.int. [cited 2021 Dec 3]. Available from: https://www.who.int/news/item/28-11-2021-update-on-omicron