



PRESS RELEASE

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Unmasking the secret of broadly neutralising COVID-19 therapeutic antibodies

Despite the high number of break-through infections from the Omicron variant of the SARS CoV-2 virus, researchers found that antibodies present in previously infected patients can neutralise variants of the COVID-19 disease

Singapore, 22 March 2023 — The rapid evolution and emergence of new SARS-CoV-2 variants, such as the Omicron variant, renders it highly capable of evading the host immunity.

At the same time, vaccines based on original wild-type strain of SARS CoV-2 shows reduced protection against newer variants, particularly for the Omicron variant. This results in break-through infections among those vaccinated and highly infectious among non-vaccinated individuals.

Thus, it remains uncertain whether new emerging variants of the COVID-19 disease can escape the protective immune response triggered by vaccines and whether pre-existing antibodies present in patients who have recovered from COVID-19 can neutralise them.

Homing in on this, Associate Professor Justin Chu, Director of the Biosafety Level 3 (BSL-3) Core Facility and Associate Professor in the Department of Microbiology and Immunology, and Infectious Diseases Translational Research Programme at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), led a joint study conducted by the BSL-3 Core Facility and Tsinghua University in China, to investigate how broadly neutralising antibodies acquire their ability to neutralise all variants of SARS-CoV-2 tested. The study is published in [Nature Immunology](#).

The researchers aimed to analyse the unique features of broadly neutralising antibodies present in nine individuals who had been infected with the original wild-type strain of the SARS CoV-2 virus. The neutralising antibodies were isolated and studied.

A detailed analysis revealed that these antibodies have unique biochemical and structural features, which are naturally strong binders to the receptor binding domain on the virus surface, facilitating the uptake of the virus into human cells. Therefore, these antibodies are able to block the binding of the virus onto the surface of human cells, preventing infection of the human cells by the virus.

In laboratory studies, the neutralising antibodies demonstrated protective effects. When tested with the Beta variant, the neutralising antibodies provide protection from severe disease outcomes and there were also no detectable levels of the virus in both the lung and brain tissues. Similar protective functions were also demonstrated using the Omicron variant, resulting in no disease symptoms and no loss in weight.

These results highlight that a natural infection with the wild type of SARS-CoV-2 virus could generate broadly neutralising and protective antibodies, which can protect individuals against infection from the Omicron subvariants. In addition to the vaccine booster taken by past infected patients, it is highly likely that these antibodies contribute to hybrid immunity against the variants.

This study provides evidence to support the virus receptor protein in the antibodies as a viable and possible target for new vaccine strategies against the SARS-CoV-2 virus.

“The next part of our study aims to understand how the memory immune cells that produce these broadly neutralising antibodies will be crucial for developing next generation vaccines, that can selectively enhance the production of such highly effective and broadly neutralising antibodies,” said Assoc Prof Chu, Principal Investigator of the study.

For media enquiries, please contact:

Natalie TAN
Executive, Communications
Yong Loo Lin School of Medicine
National University of Singapore
DID: +65 9011 1459
Email: nat_tan1@nus.edu.sg

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Our multidisciplinary and real-world approach to education, research and entrepreneurship enables us to work closely with industry, governments and academia to address crucial and complex issues relevant to Asia and the world. Researchers in our faculties, research centres of excellence, corporate labs and more than 30 university-level research institutes focus on themes that include energy; environmental and urban sustainability; treatment and prevention of diseases; active ageing; advanced materials; risk management and resilience of financial systems; Asian studies; and Smart Nation capabilities such as artificial intelligence, data science, operations research and cybersecurity.

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