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Study discovers key antibodies to counter variants

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NEW DELHI: If the Sars-CoV-2 mutates, the human antibody response too evolves.

In a study published almost exactly a year ago, scientists at the Rockefeller University found that memory B cells, which churn out antibodies, mature over time. Six months after an infection they evolve to become better at neutralising even mutated portions of the coronavirus that they were initially never exposed to.

Now, a study by Swedish researchers have found “several extremely potent neutralising antibodies” that have similarly matured over time and can fight off all existing Sars-CoV-2 variants, including Omicron.

The researchers found this by drawing antibodies from a person infected seven months earlier and analysing a crucial gene known as the IGHV3-53, which most SARS-CoV-2 antibodies use. Some of the antibodies that were thus created from this person were able to neutralise several variants of concern, including Alpha, Beta and Omicron.

Through the experiment, they also found the structural features in the mutated Omicron spike protein that provides the basis for successful cross-neutralisation.

How does this happen?

The study published in January, 2021 identified two factors. First is a natural process that happens in the body wherein portions of a pathogen are chopped up and continually expressed in a certain type of immune cells in the lymph nodes, which allows the immune system to keep learning finer details.

The second factor they found was that the Sars-CoV-2 proteins can also persist in the gut, where they can be in a long-drawn game of cat-and-mouse with the immune system, which keeps learning to defeat it. The gut persistence could be linked to long Covid conditions, but they do not generally mean that people retain the actual virus for long.

In any case, the new findings – which reinforces the ability of the human body to intrinsically evolve to fight the virus – have several implications.

One, the details and the specific subset of antibodies the researchers found can now be used to design lab-grown antibodies for what is called monoclonal antibody therapy. One of the antibodies they found, “CABA17 is 15-fold more potent against Omicron than S309, which is currently the only clinically-approved mAb (monoclonal antibody) with retained activity,” said the authors from the department of microbiology at Karolinska Institutet in Stockholm in their pre-print study.

They might even help fight future variants. “The breadth and potency of these antibodies make them important therapeutic candidates in the context of an antigenically evolving pandemic,” they said.

The second implication is that it strengthens the case for booster doses. The authors cite other studies that have shown that “an additional dose of one of the licensed SARS-CoV-2 vaccines enables substantial improvements in the cross-neutralization of Omicron, suggesting that affinity maturation may broaden responses”.

No cytokine storm?

A second study published this week too pointed to some positive news, reflecting another scientific basis for why the Omicron variant may be leading to milder disease.

In a pre-print study, scientists from Goethe University, Frankfurt am Main, Germany, said the variant is less capable in eliciting the sort of antibody response via interferons, which has been linked to the cytokine storm that is typically the main cause in Covid-19 severity.

Cytokine storm is a condition in which immune cells like interferons flood the body in an overreaction, damaging lung tissue first before rampaging through other vital organs.

“We found that the Omicron variant displays a reduced capability of antagonising the host cell interferon response. This provides a potential mechanistic explanation for the clinically observed reduced pathogenicity of Omicron variant viruses compared to Delta variant viruses,” said the scientists.

This they discovered while studying the effects of current class of antivirals, like remdesivir, molnupiravir, and PF-07321332, the active compound in paxlovid, on Omicron. That part of the study found that the variant remains sensitive to such drugs, meaning they remain effective therapeutics.