Scientists discover dual roles of antibodies in COVID-19 infections

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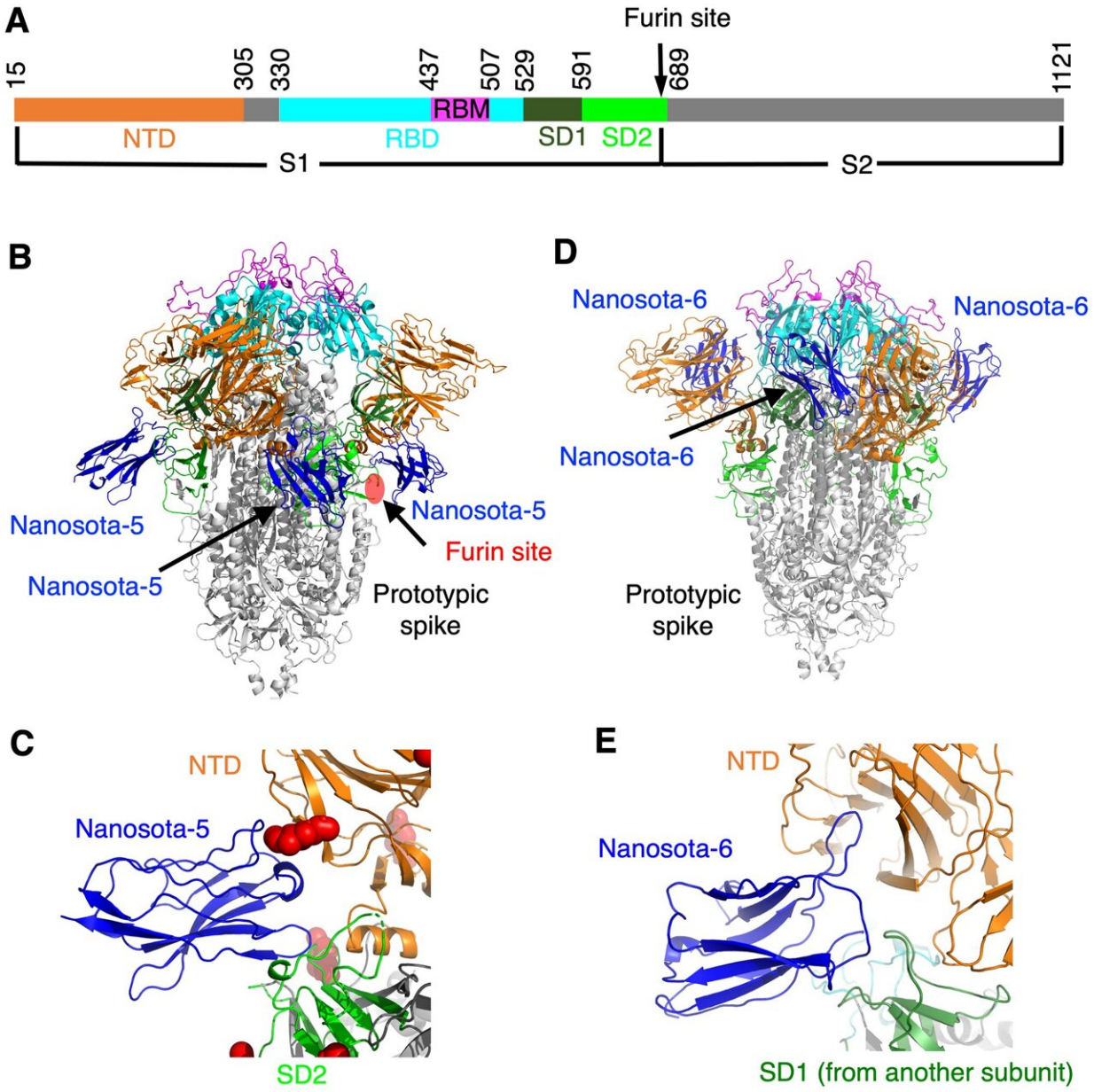

Dual-role epitope on SARS-CoV-2 spike enhances and neutralizes viral entry across different variants. Credit: *PLOS Pathogens* (2024). DOI: 10.1371/journal.ppat.1012493

Scientists at the University of Minnesota and the Midwest Antiviral Drug Discovery (AViDD) Center have made a surprising discovery: antibodies can have opposite effects on viral infections in human cells.

The spike protein of SARS-CoV-2, the virus that causes COVID-19, enables the virus to enter human cells and is the primary target for the body's antibodies. Previous research has shown that antibodies can either block the virus, have no effect, or, in rare cases, assist the virus in infecting cells. While antibody drugs work to block infections, this new study challenges current understanding of their mechanisms.

Published in the journal *PLOS Pathogens*, this study is the first to identify an antibody that can both assist and block the virus. This particular antibody helps pre-omicron variants of the virus infect cells while preventing the omicron variant from doing the same. The study also explains how the antibody aids the pre-omicron virus in invading cells while blocking the omicron virus from succeeding.

The research team, led by Dr. Fang Li, co-director of the Midwest AViDD Center and a professor and endowed chair at the Medical School, along with Dr. Bin Liu, an associate professor at the Hormel Institute, research scientist Dr. Gang Ye, and graduate student Fan Bu from the Department of Pharmacology, made this surprising discovery.

"The battle between viral infection and treatment development is like an arms race. Our findings highlight how complex it can be to develop treatments as viruses evolve," said Dr. Li. "But it's important to note that

the virus-boosting effect of this antibody was only observed in lab-grown cells, and there's no evidence it occurs in people."

At the Midwest AViDD Center, the team has been developing nanobodies—tiny antibodies from animals like llamas and camels—as treatments against viruses. These small antibodies are also excellent tools for studying how the SARS-CoV-2 spike protein works, which led to this unexpected discovery.

More information: Gang Ye et al, Dual-role epitope on SARS-CoV-2 spike enhances and neutralizes viral entry across different variants, *PLOS Pathogens* (2024). DOI: 10.1371/journal.ppat.1012493

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