Dominant omicron subvariants are better at evading vaccines and antibody treatments

July 5 2022

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The latest omicron subvariants—including the BA.4 and BA.5 forms causing new surges in infections in the United States—are even better at

eluding vaccines and most antibody treatments than previous variants, finds a study by researchers at Columbia University Vagelos College of Physicians and Surgeons.

The study, led by David D. Ho, MD, director of the Aaron Diamond AIDS Research Center and the Clyde'56 and Helen Wu Professor of Medicine at Columbia University Vagelos College of Physicians and Surgeons, was published July 5 in *Nature*.

Subvariants BA.2.12.1, BA.4, and BA.5 are rapidly expanding worldwide, with BA.4/5 now making up more than 50% of new COVID cases in the United States. These subvariants are thought to be even more transmissible than prior omicron subvariants, owing to several new mutations in spike proteins.

"The virus is continuing to evolve, as expected, and it is not surprising that these new, more transmissible subvariants are becoming more dominant around the world," says Ho. "Understanding how currently available vaccines and antibody treatments stand up to the new subvariants is critical to developing strategies to prevent severe disease, hospitalizations, and deaths—if not infection."

In laboratory experiments, Ho and his team studied the ability of antibodies from individuals who had received at least three doses of an mRNA vaccine, or got two shots and were then infected with omicron, to neutralize the new subvariants. (Ho's team did not look at individuals who had not received a booster shot, because a previous study found that two doses provide little protection against infection by earlier omicron variants.)

The study revealed that while BA.2.12.1 is only modestly more resistant than BA.2 in individuals who were vaccinated and boosted, BA.4/5 was at least four times more resistant than its predecessor.

In addition, the scientists tested the ability of 19 monoclonal antibody treatments to neutralize the variants and found that only one of the available antibody treatments remained highly effective against both BA.2.12.1 and BA.4/5.

"Our study suggests that as these highly transmissible subvariants continue to expand around the globe, they will lead to more breakthrough infections in people who are vaccinated and boosted with currently available mRNA vaccines," Ho says. Though the current study suggests that the new variants may cause more infections in vaccinated individuals, the vaccines continue to provide good protection against severe disease.

"Efforts in the United States to develop new vaccine boosters aimed at BA.4/5 may improve protection against infection and severe disease," Ho says. "In the current environment, though, we may need to look toward developing new vaccines and treatments that can anticipate ongoing evolution of the SARS-CoV-2 virus."

More information: Qian Wang et al, Antibody evasion by SARS-CoV-2 Omicron subvariants BA.2.12.1, BA.4, & BA.5, *Nature* (2022). DOI: 10.1038/s41586-022-05053-w

Provided by Columbia University Irving Medical Center