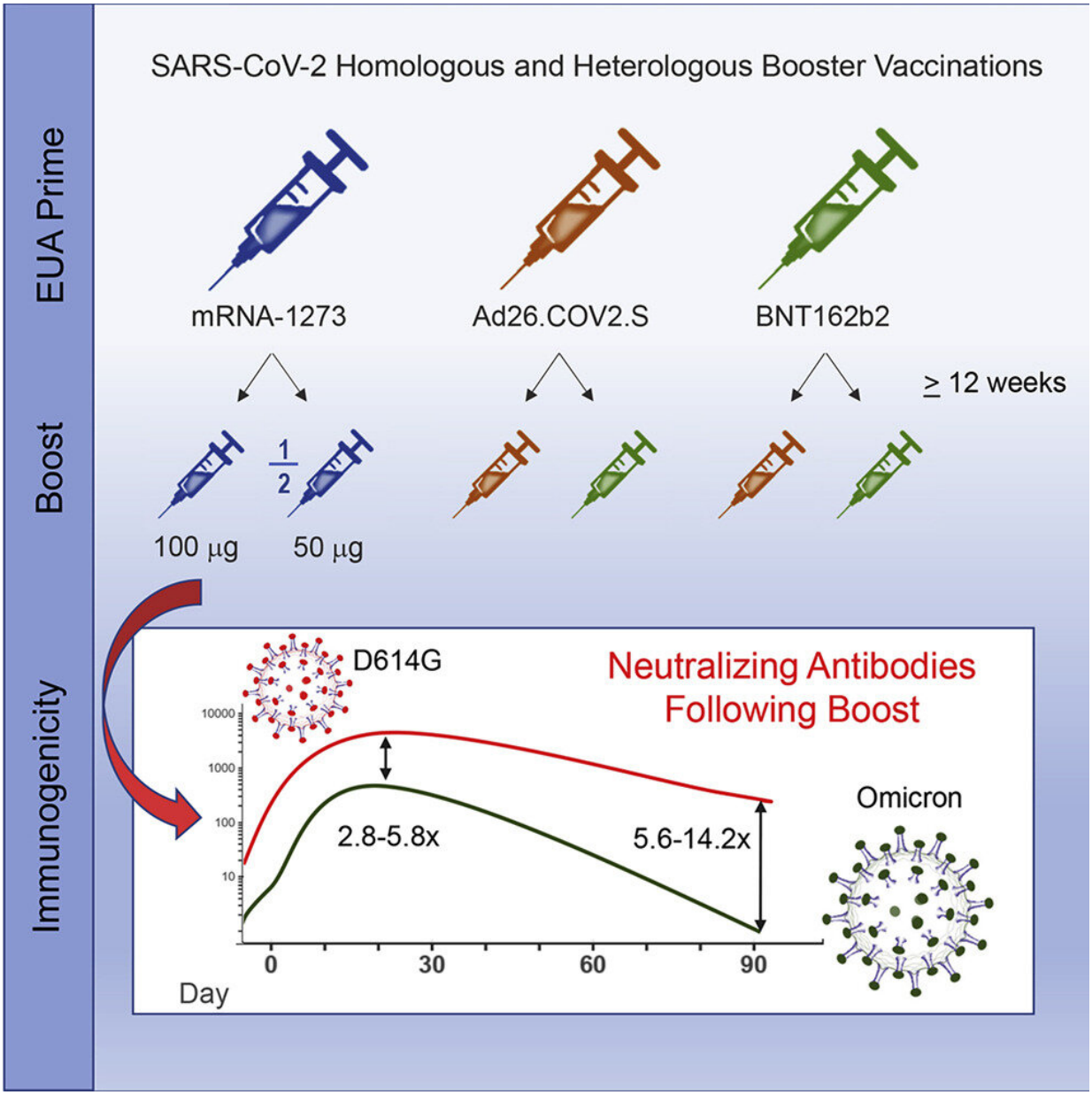
Vaccine-induced immune response to omicron wanes substantially over time

July 19 2022



Graphical abstract. Credit: *Cell Reports Medicine* (2022). DOI: 10.1016/j.xcrm.2022.100679

Although COVID-19 booster vaccinations in adults elicit high levels of neutralizing antibodies against the omicron variant of SARS-CoV-2, antibody levels decrease substantially within 3 months, according to new clinical trial data. The findings, published today in *Cell Reports Medicine*, are from a study sponsored by the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health. The trial was led by NIAID's Infectious Diseases Clinical Research Consortium.

As part of a "mix and match" clinical trial, investigators administered COVID-19 booster vaccines to adults in the United States who had previously received a primary COVID-19 vaccination series under Emergency Use Authorization. Some participants received the same vaccine as their primary series, and others received a different vaccine. Investigators then evaluated immune responses over time. Results previously reported in *The New England Journal of Medicine* showed all combinations of primary and booster vaccines resulted in increased neutralizing antibody levels in the recipients.

In the new analysis, investigators report that nearly all vaccine combinations evaluated elicited high levels of neutralizing antibodies to the omicron BA.1 sub-lineage. However, antibody levels against omicron were low in the group that received Ad26.COV2.S as both a primary vaccine and boost. Moreover, immune responses to omicron in all groups waned substantially, with neutralizing antibody levels decreasing 2.4- to 5.3-fold by three months post-boost.

Primary Vaccination Series	Single Booster Vaccination
Two doses of mRNA-1273 administered 28 days apart	mRNA-1273 (100 microgram dose)
Two doses of mRNA-1273 administered 28 days apart	mRNA-1273 (50 microgram dose)
One dose of Ad26.COV2.S	Ad26.COV2.S
Two doses of BNT162b2 administered 21 days apart	BNT162b2
One dose of Ad26.COV2.S	BNT162b2
Two doses of BNT162b2 administered 21 days apart	Ad26.COV2.S

The table above shows the COVID-19 vaccine combinations from the "mix & match" study evaluated in this report. Credit: NIAID

Omicron sub-lineages BA.2.12.1 and BA.4/BA.5 were 1.5 and 2.5 times less susceptible to neutralization, respectively, compared to the BA.1 sub-lineage, and 7.5 and 12.4 times less susceptible relative to the ancestral D614G strain. BA.5 currently is the dominant variant in the U.S.

The authors note that the findings are consistent with real-world reports showing waning protection against SARS-CoV-2 infection during the omicron wave in people who received a primary vaccine series plus a booster shot. Additionally, the immune response to omicron sub-lineages show reduced susceptibility to these rapidly emerging subvariants. The

data could be used to inform decisions regarding future vaccine schedule recommendations, including the need for variant vaccine boosting.

More information: Kirsten E. Lyke et al, Rapid decline in vaccine-boosted neutralizing antibodies against SARS-CoV-2 Omicron variant, *Cell Reports Medicine* (2022). DOI: 10.1016/j.xcrm.2022.100679

Provided by NIH/National Institute of Allergy and Infectious Diseases