



SEACOVARIANTS

Longitudinal analysis of neutralizing antibodies against SARS-CoV-1 and different SARS-CoV-2 strains in breakthrough and unvaccinated COVID-19 patients in Thailand

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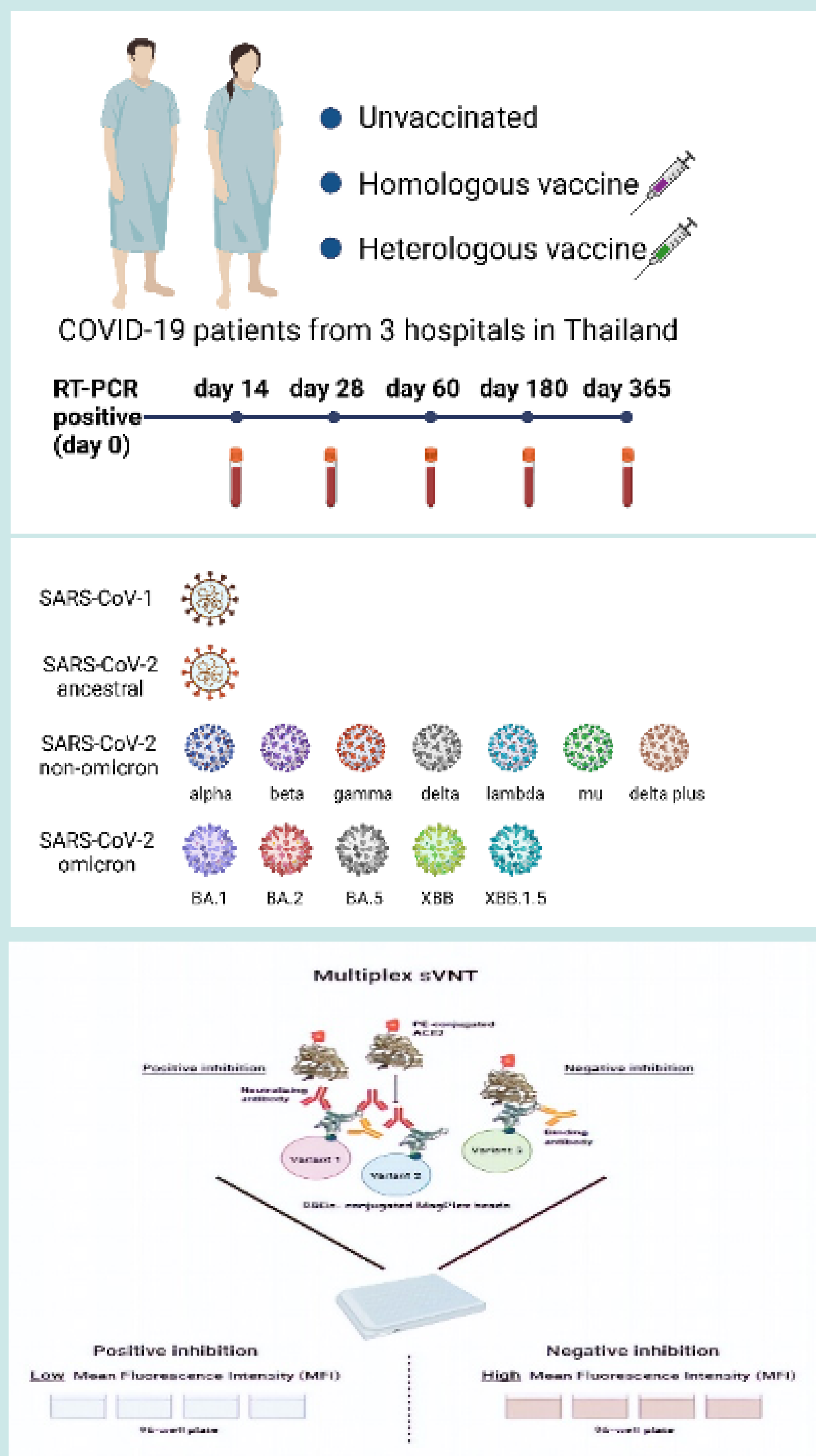
Introduction

The emergence of SARS-CoV-2 variants that evade immune responses poses significant challenges to effective prevention. Antibodies, whether from natural infection or vaccination, tend to wane over time, making the durability and effectiveness of circulating neutralizing antibodies (nAbs) against these variants critical for viral clearance. Despite the importance of understanding antibody dynamics, longitudinal studies on nAbs against emerging SARS-CoV-2 variants in Asia remain limited. This study aims to fill that gap by providing insights into the long-term behavior of nAbs in response to evolving viral threats and by supporting policymakers with evidence-based decisions.

Objective

To longitudinally assess the nAb response against SARS-CoV-1, the ancestral strain of SARS-CoV-2, and 12 SARS-CoV-2 variants in COVID-19 patients.

Method



We prospectively enrolled 111 COVID-19 patients in Thailand between July 2021 and December 2022, who received homologous or heterologous vaccines or were unvaccinated. Plasma neutralizing antibody (nAb) levels against SARS-CoV-1 and 13 SARS-CoV-2 strains were measured using a multiplex surrogate virus neutralization test (sVNT) assay

Conclusion

Our findings highlight the diverse longitudinal immune responses influenced by vaccination, age, and clinical conditions. These results provide valuable insights for policymakers to optimize vaccination strategies, monitor breakthrough infections, and implement variant-specific vaccines to combat the evolving SARS-CoV-2 variants.

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Results

nAb levels against SARS-CoV-1 and SARS-CoV-2 strains in COVID-19 patients

- The nAb levels increased on days 14 and 28 but started to decline by day 60.
- The nAb levels in COVID-19 patients showed strong inhibition against the ancestral SARS-CoV-2 and non-omicron variants (median level 91.1%), but lower responses against omicron variants (median level 50.8%).
- The nAb levels in COVID-19 patients did not inhibit SARS-CoV-1.

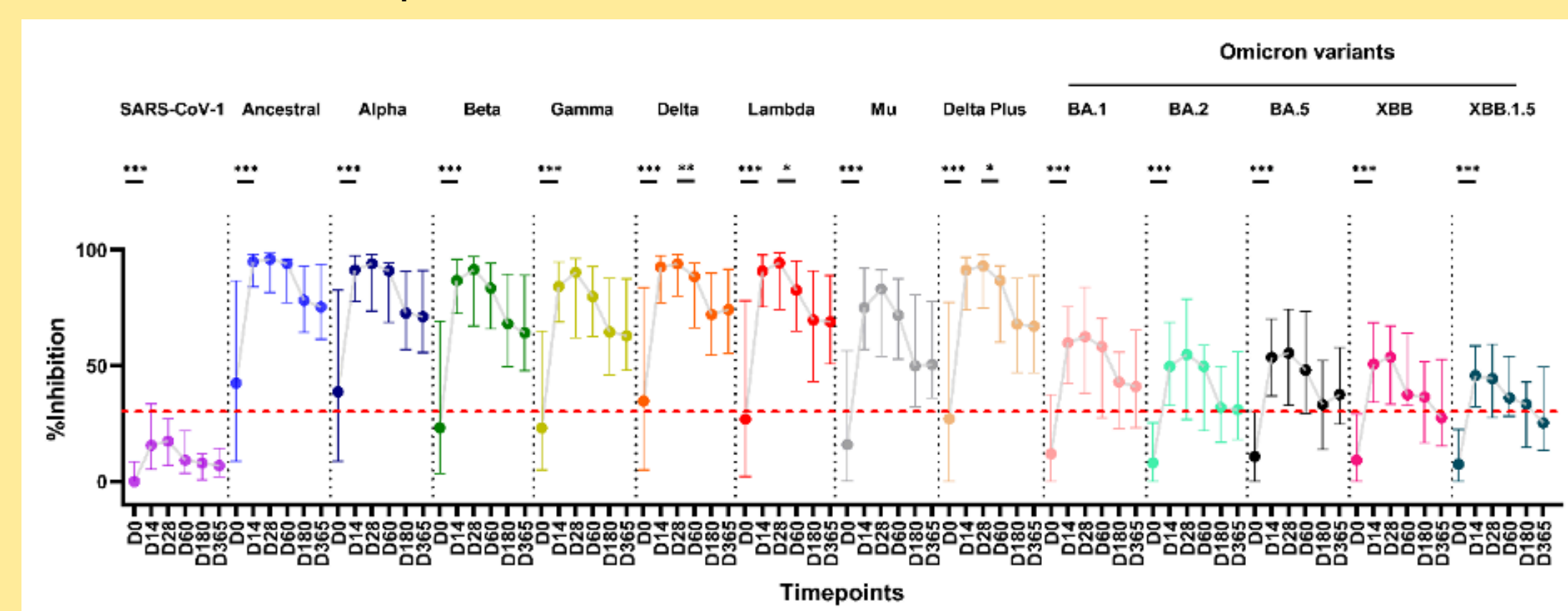


Figure 1. nAb response against SARS-CoV-1 and SARS-CoV-2 variants in COVID-19 patients. The percentage of inhibition less than 30% was interpreted as negative result (dotted red line).

nAb levels against SARS-CoV-2 variants in patients who received different vaccine regimens

- Breakthrough patients with heterologous vaccines had higher nAb levels on day 0 compared to other groups.

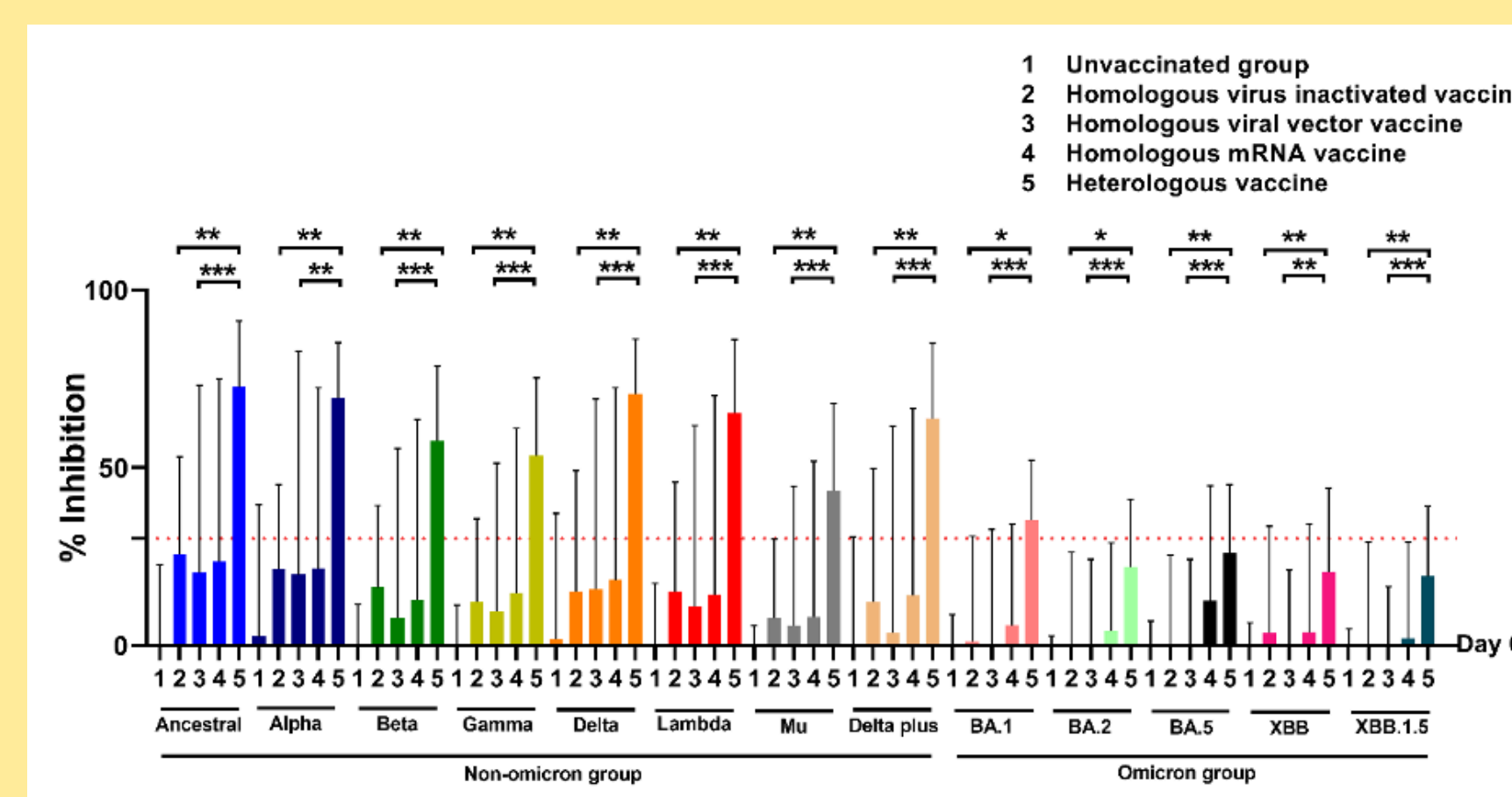


Figure 2. nAb against the SARS-CoV-2 ancestral strain and variants on day 0 in 111 COVID-19 patients who were unvaccinated or had different vaccine regimens.

nAb levels against SARS-CoV-2 variants in COVID-19 patients with different conditions

- nAb levels were lower in breakthrough patients with pneumonia than in those with other conditions.
- Breakthrough patients aged ≥ 60 exhibited rapid declines in antibody levels.

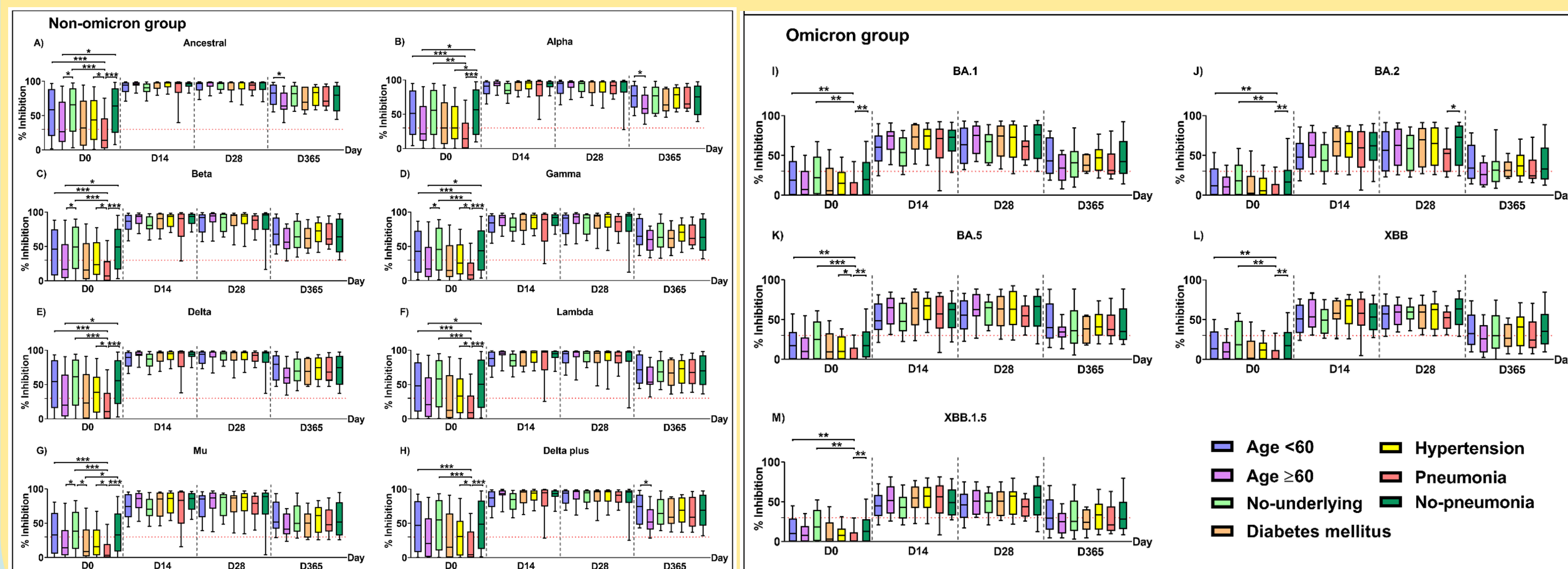


Figure 3. nAb against the SARS-CoV-2 ancestral strain and variants in breakthrough patients with different conditions.