**Supplementary Methods**

**Evaluation of anti-RBD IgG and NAbs**

Capture chemiluminescence immunoassays were used to detect immunoglobulin (Ig) G antibody against the RBD of SARS-CoV-2 spike protein (anti-RBD IgG) and NAbs in serum samples using MAGLUMI X8 (Snibe, Guangdong, China). The sensitivity and specificity of the kit (45421121401; Snibe) for anti-RBD IgG were 100% and 99.6%, and those for NAbs were 100% and 100% respectively. The cutoff value was 1 AU/mL for anti-RBD IgG and 0.15 μg/mL for NAbs.

**Pseudovirus neutralization assay**

Pseudotyped HIV-1 viruses expressing the spike of SARS-CoV-2 prototype (Wuhan-1) and its subvariants (Omicron BA.2.12.1, BA.4 and BA.5) were prepared by Sino Biological Corporation (Beijing, China). Serially diluted samples or controls were incubated with diluted pseudovirus at 37℃ for 1 h and then added to confluent 293T-ACE2 monolayers (OEC001, Sino Biological) in 96-well plates. The plates were cultured in a 5% CO2 incubator at 37℃ for 70 h. After incubation, the luciferase value [relative light unit (RLU)] was detected by a luminometer (LB9630, Berthold Technologies, Bad Wildbad, Germany). Inhibition rate (%) was calculated as 1 − (average RLU of sample-average RLU of negative control)/(average RLU of positive control − RLU of the negative control). The 50% serum pseudovirus neutralization titers (PVNT50) were calculated by the Reed–Muench method.

**Detection of SARS-CoV-2-specific B cells**

For SARS-Cov-2 specific B cells detection, biotinylated SARS-CoV-2 Spike RBD protein (40592-V08H2-B; Sino Biological, Beijing, China) was mixed with streptavidin BV421 (405225; Biolegend, San Diego, CA, USA) at a 4:1 molar ratio for 1 h at 4℃ to obtain the antigen probe. PBMCs were isolated from heparinized whole blood by Histopaque (10771; Sigma-Aldrich, St. Louis, MO, USA) density gradient centrifugation following the kit manufacturer's instruction. After washing with fluorescence-activated cell sorting buffer (PBS supplemented with 2% fetal bovine serum), PBMCs were then stained for 30 m at 4℃ using an antigen probe (1:33.3) and the following conjugated antibodies: anti-human CD3 (1:50) (300430; Biolegend), anti-human CD19 (1:50) (302212; Biolegend), anti-human CD21 (1:50) (354918; Biolegend), anti-human CD27 (356406, Biolegend, 1:50), anti-human CD38 (1:50) (303504; Biolegend), anti-human IgG Fc (1:50) (410722; Biolegend), and anti-human IgM (1:50) (314524; Biolegend).