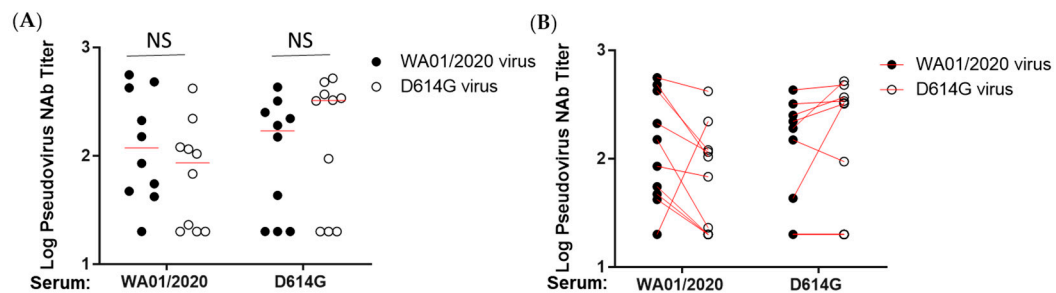


**Figure S1.** Spike cell surface expression. HEK293T cells transfected with spike plasmids was detached by 5 mM EDTA/DPBS digestion buffer and stained with anti-SARS-CoV-2 RBD antibody. The surface expression of spike proteins was analyzed by flow cytometry. The representative flow plot was analyzed by FlowJo and gating by spike fluorescent intensity.



**Figure S2.** The reciprocal neutralizing activity of antisera against WA01/2020 or D614G was determined. Red lines indicate the median titer of each group. Parameters in the early mutant groups were compared with the WA01/2020 group by two-sided Mann-Whitney tests. NS, not statistically significant.