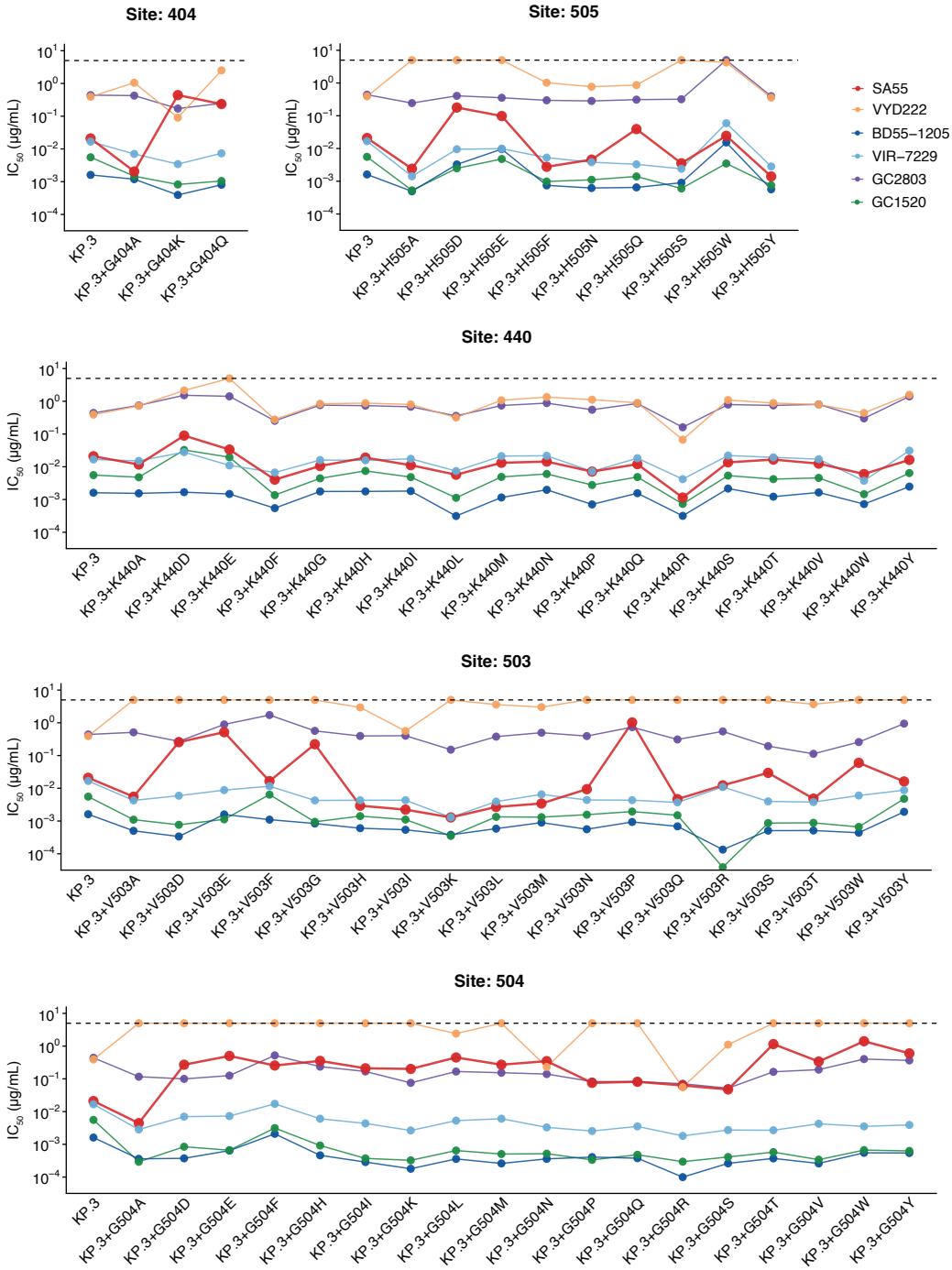

Figure S1. Neutralization activities of KP.3 mutant pseudoviruses by representative RBD-directed monoclonal antibodies (mAbs).

IC_{50} values (μg/mL) were measured against parental KP.3 and KP.3 pseudoviruses carrying the indicated single amino-acid substitutions at RBD residues 404, 440, 503, 504, or 505. Six representative mAbs targeting four RBD epitopes are shown: SA55 and VYD222 (F3), BD55-1205 and VIR-7229 (A1), GC1520 (D3), and GC2803 (E3). Points represent IC_{50} values for individual antibodies. Colors denote individual antibodies, with SA55 additionally emphasized by larger points and thicker connecting lines. The dashed horizontal line indicates the detection limit (IC_{50} = 5 μg/mL).

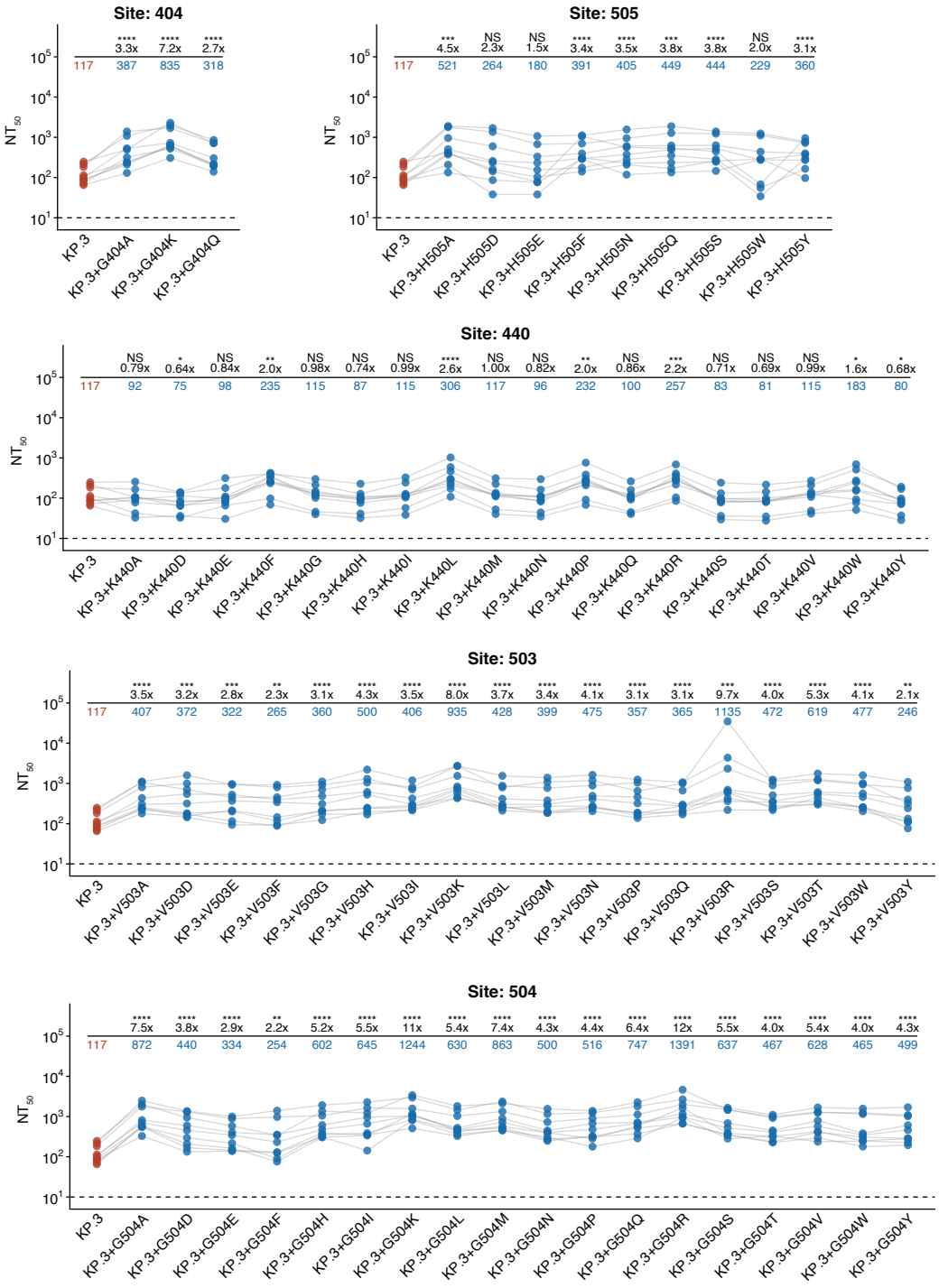

Figure S2. Neutralization activities of KP.3 mutant pseudoviruses by JN.1-convalescent plasma.

NT_{50} values against parental KP.3 and KP.3 pseudoviruses carrying the indicated single amino-acid substitutions at RBD residues 404, 440, 503, 504, or 505 were measured using plasma from nine JN.1-convalescent individuals. Gray lines connect paired measurements from the same individual. Geometric mean titers (GMTs) and fold changes relative to parental KP.3 are indicated above the corresponding groups; fold changes are calculated as GMT(mutant)/GMT(KP.3). The dashed horizontal line indicates the lower limit of detection (LOD, NT_{50} = 10). Statistical significance between each mutant and parental KP.3 was assessed using paired two-sided t-tests on log_{10}-transformed NT_{50} values. NS, $P \geq 0.05$; *, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$; ****, $P < 0.0001$.

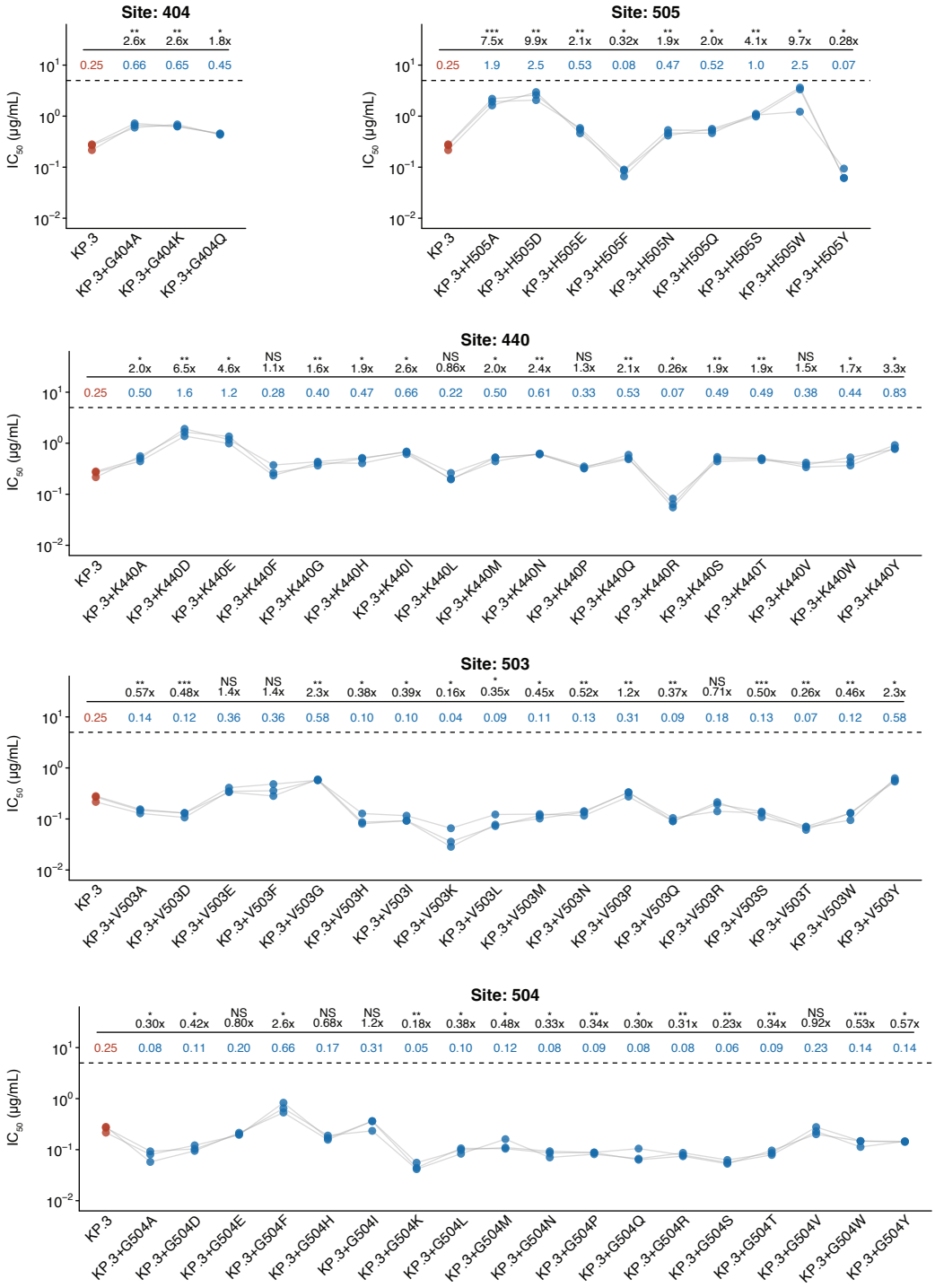

Figure S3. Soluble ACE2 sensitivity of KP.3 mutant pseudoviruses.

IC_{50} values (μg/mL) for soluble ACE2-mediated inhibition were measured against parental KP.3 and KP.3 pseudoviruses carrying the indicated single amino-acid substitutions at RBD residues 404, 440, 503, 504, or 505. Three replicate measurements were obtained for each pseudovirus (n = 3). Gray lines connect paired replicate measurements. Geometric mean IC_{50} values and fold changes relative to parental KP.3 are indicated above the corresponding groups, with fold changes calculated as IC50(mutant)/IC50(KP.3). The dashed horizontal line indicates the detection limit (IC_{50} = 5 μg/mL). Statistical significance between each mutant and parental KP.3 was assessed using paired two-sided t-tests on $\log_{10}$-transformed IC_{50} values. NS, P ≥ 0.05; *, *P < 0.05*; **, *P < 0.01*; ***, *P < 0.001*; ****, *P < 0.0001*.