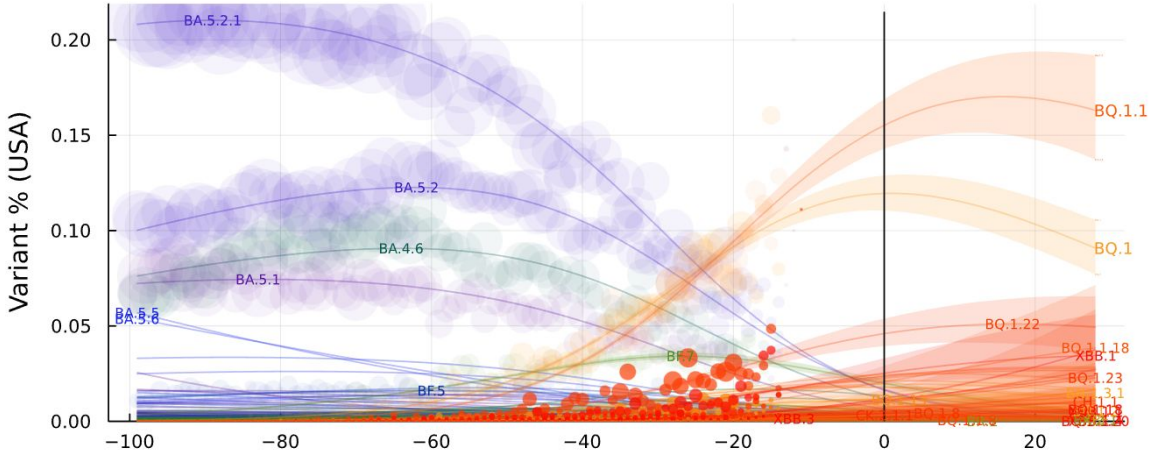
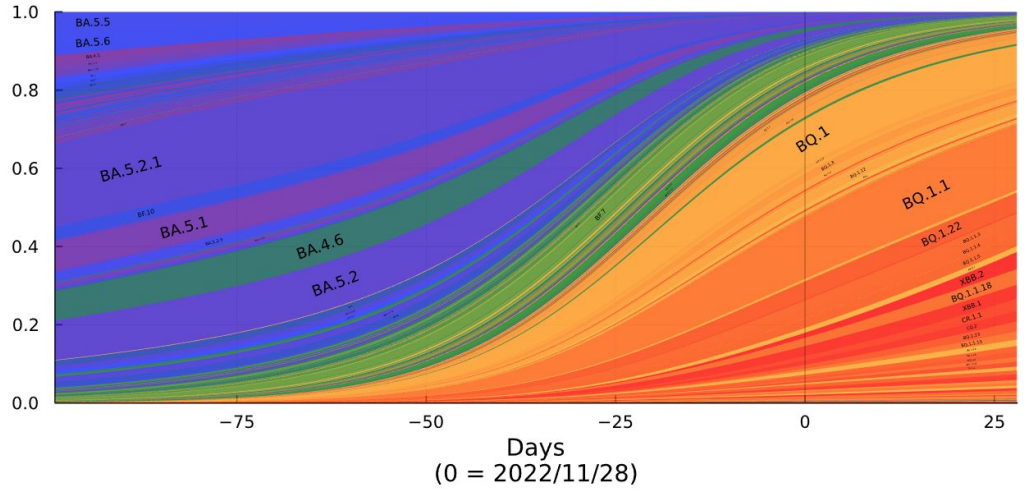
Viral diversity & antibody breadth

Daniel Sheward

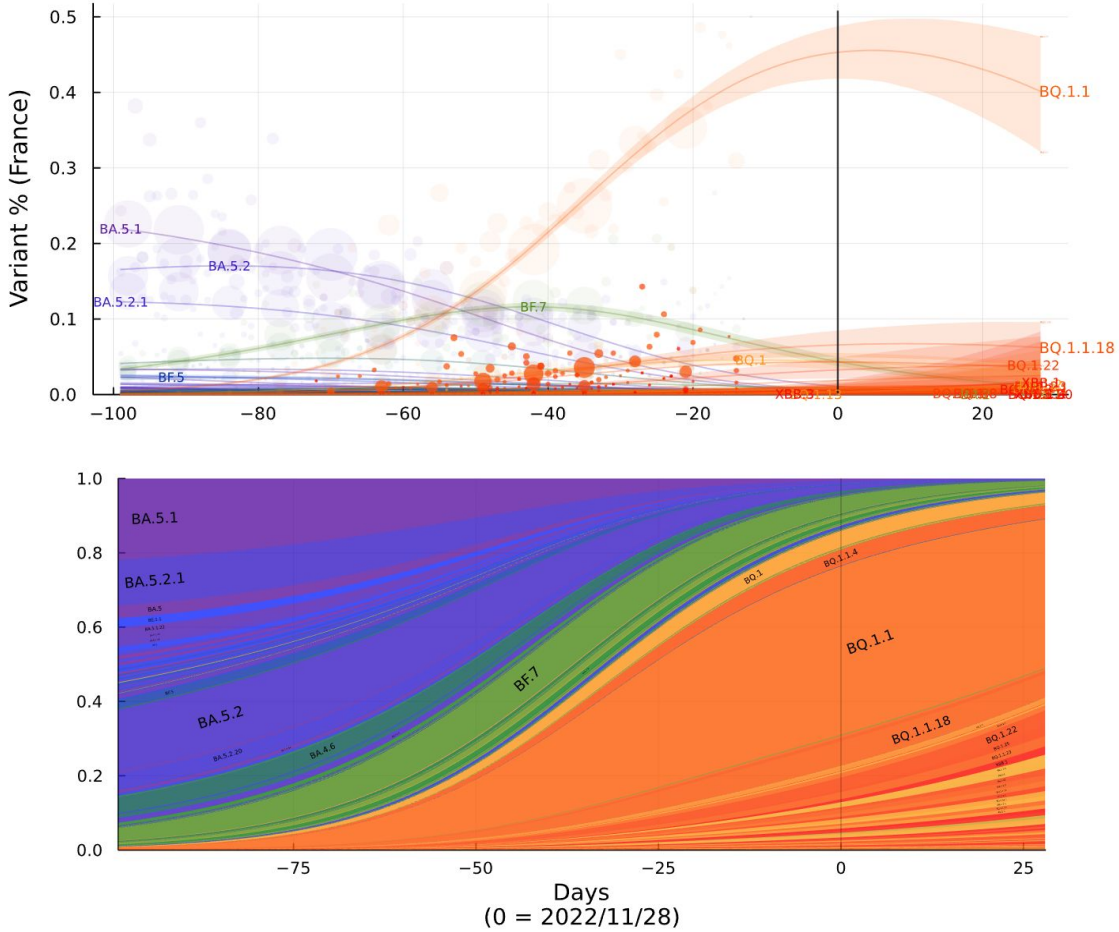
Joint EMA-FDA Workshop:
Efficacy of monoclonal antibodies in the context of rapidly evolving SARS-CoV-2 variants
15 December 2022

Karolinska Institutet
Erling-Persson Foundation
SciLifeLab
Horizon 2020





https://github.com/MurrellGroup/lineages



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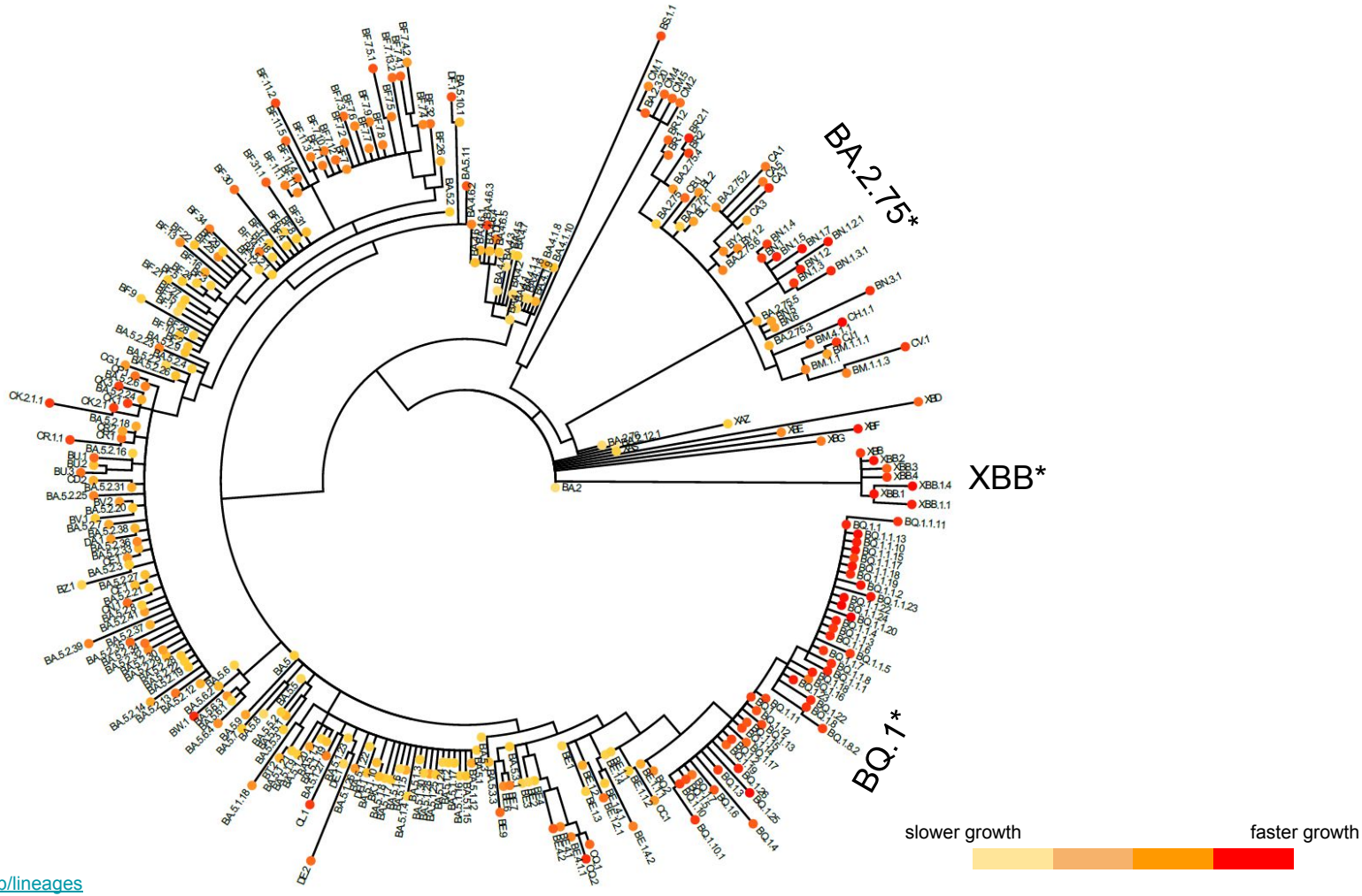
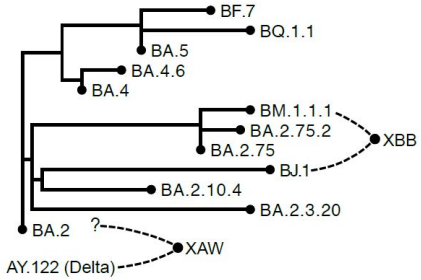
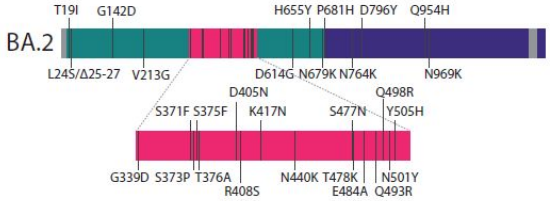
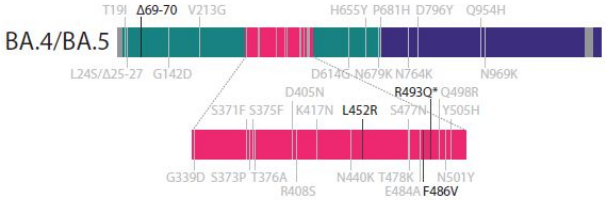
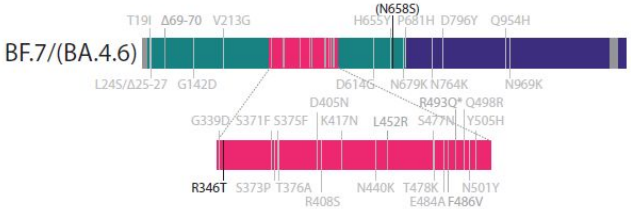


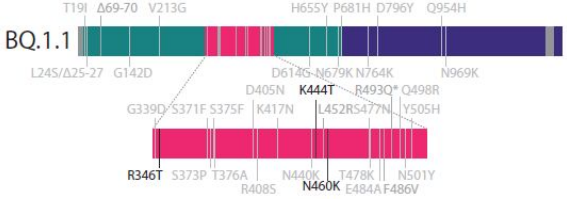
https://github.com/MurrellGroup/lineages

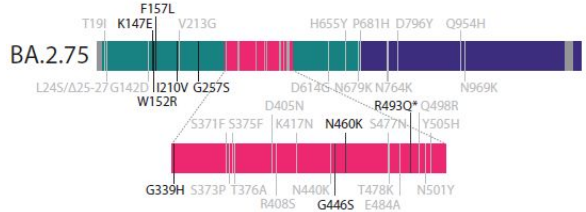

BF.7
BQ.1.1
BA.5
BA.4.6
BA.4
BM.1.1.1
BA.2.75.2
BA.2.75
XBB
BJ.1
BA.2.10.4
BA.2.3.20
BA.2
?
XAW
AY.122 (Delta)

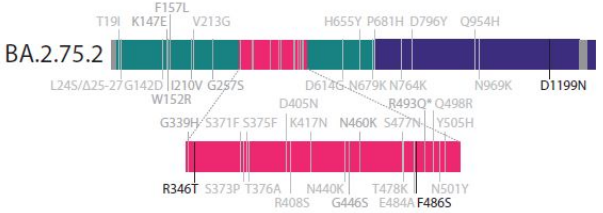

BA.2
T19I G142D H655Y P681H D796Y Q954H
L24S/Δ25-27 V213G D614G N679K N764K N969K
D405N Q498R
S371F S375F K417N S477N Y505H
G339D S373P T376A N440K T478K N501Y
R408S E484A Q493R

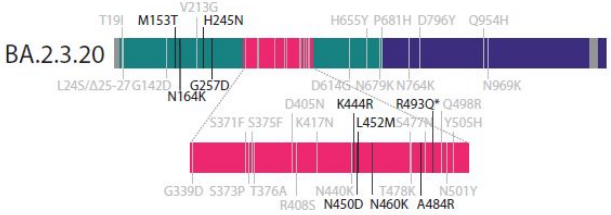

BA.4/BA.5
T19I Δ69-70 V213G H655Y P681H D796Y Q954H
L24S/Δ25-27 G142D D614G N679K N764K N969K
D405N R493Q* Q498R
S371F S375F K417N L452R S477N Y505H
G339D S373P T376A N440K T478K N501Y
R408S E484A F486V

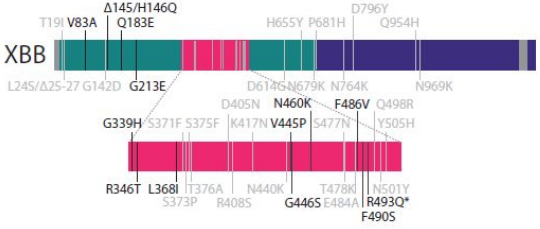

BF.7/(BA.4.6)
(N658S)
T19I Δ69-70 V213G H655Y P681H D796Y Q954H
L24S/Δ25-27 G142D D614G N679K N764K N969K
D405N R493Q* Q498R
G339D S371F S375F K417N L452R S477N Y505H
R346T S373P T376A N440K T478K N501Y
R408S E484A F486V

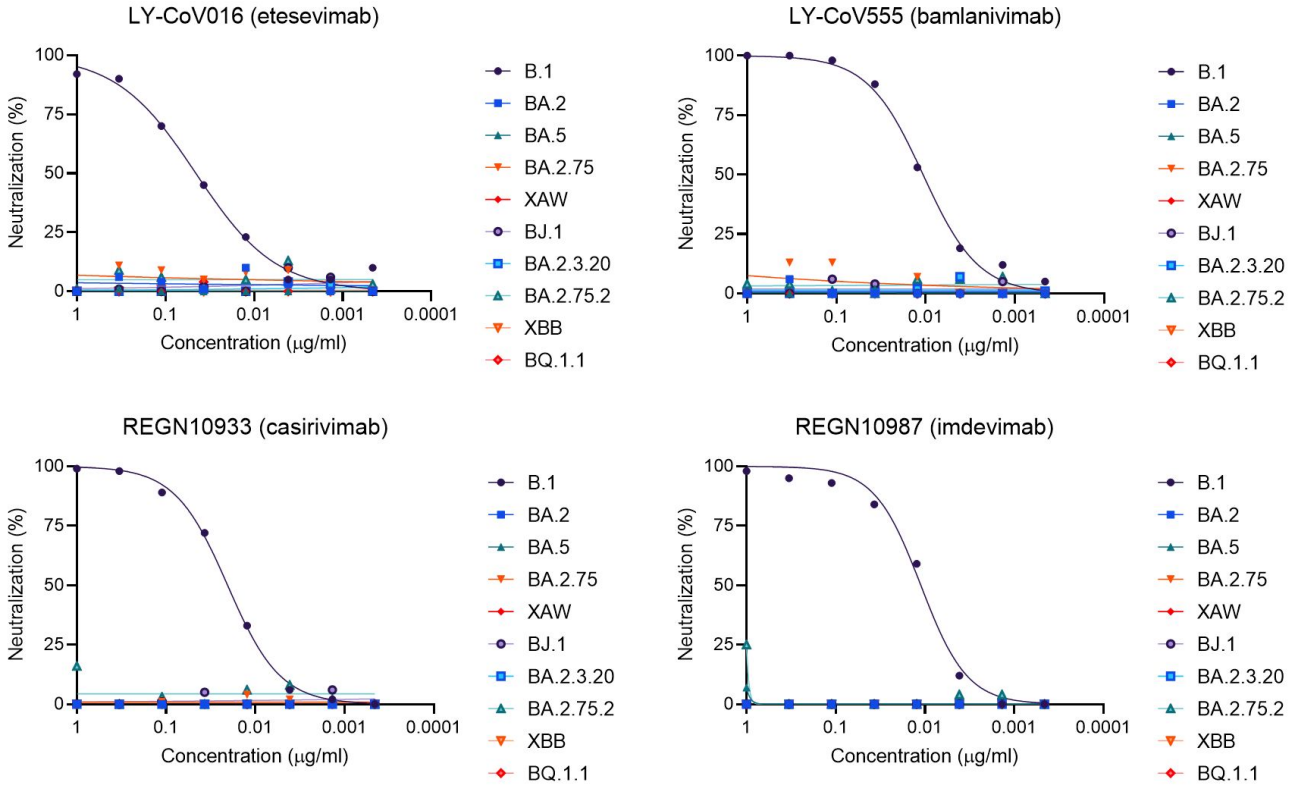

BQ.1.1
T19I Δ69-70 V213G H655Y P681H D796Y Q954H
L24S/Δ25-27 G142D D614G N679K N764K N969K
D405N K444T R493Q* Q498R
G339D S371F S375F K417N L452R S477N Y505H
R346T S373P T376A N440K T478K N501Y
R408S N460K E484A F486V


BA.2.75
F157L
T19I K147E V213G H655Y P681H D796Y Q954H
L24S/Δ25-27 G142D I210V G257S D614G N679K N764K N969K
W152R D405N R493Q* Q498R
S371F S375F K417N N460K S477N Y505H
G339H S373P T376A N440K T478K N501Y
R408S G446S E484A


BA.2.75.2
F157L
T19I K147E V213G H655Y P681H D796Y Q954H
L24S/Δ25-27 G142D I210V G257S D614G N679K N764K N969K D1199N
W152R D405N R493Q* Q498R
G339H S371F S375F K417N N460K S477N Y505H
R346T S373P T376A N440K T478K N501Y
R408S G446S E484A F486S

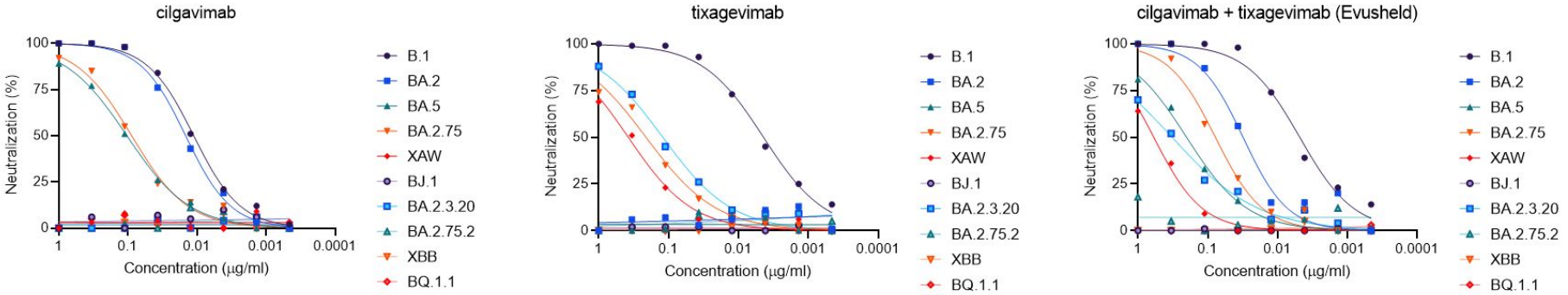

BA.2.3.20
V213G
T19I M153T H245N H655Y P681H D796Y Q954H
L24S/Δ25-27 G142D G257D D614G N679K N764K N969K
N164K D405N K444R R493Q* Q498R
S371F S375F K417N L452M S477N Y505H
G339D S373P T376A N440K T478K N501Y
R408S N450D N460K A484R


XBB
Δ145/H146Q
T19I V83A Q183E D796Y
H655Y P681H Q954H
L24S/Δ25-27 G142D G213E D614G N679K N764K N969K
D405N N460K F486V Q498R
G339H S371F S375F K417N V445P S477N Y505H
R346T L368I T376A N440K T478K N501Y
S373P R408S G446S E484A R493Q*
F490S

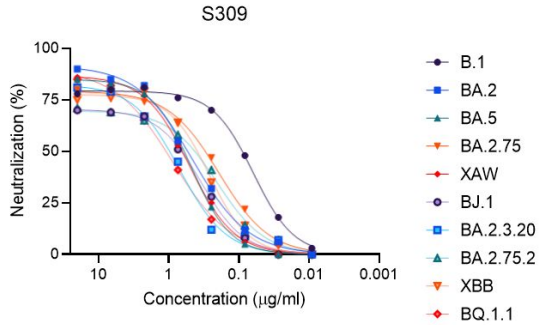


Sheward et al., (unpublished data)

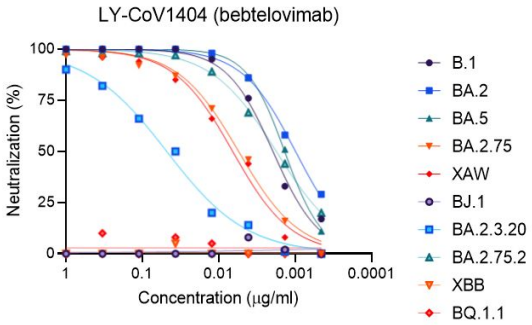
Evusheld



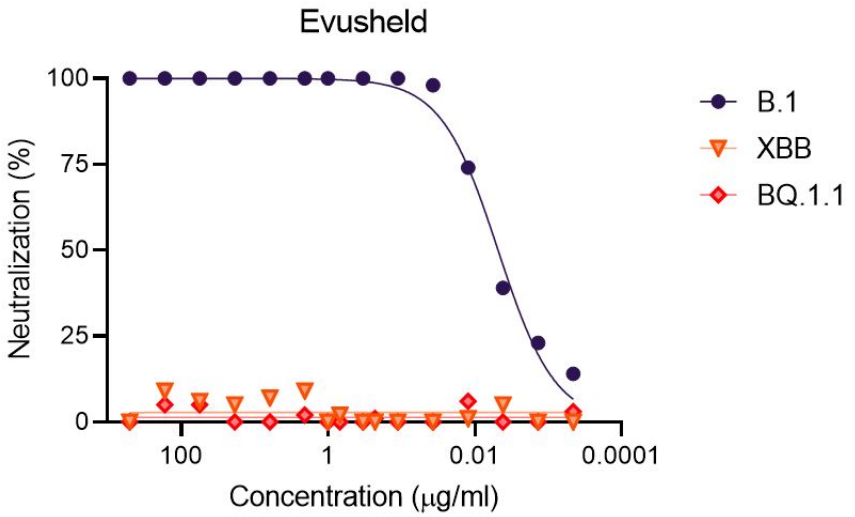
sotrovimab

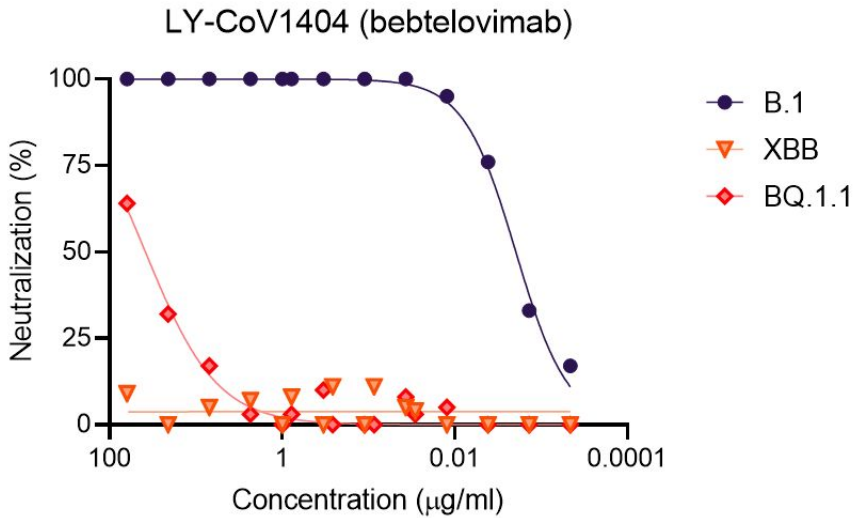


bebtelovimab



Sheward et al., (unpublished data)





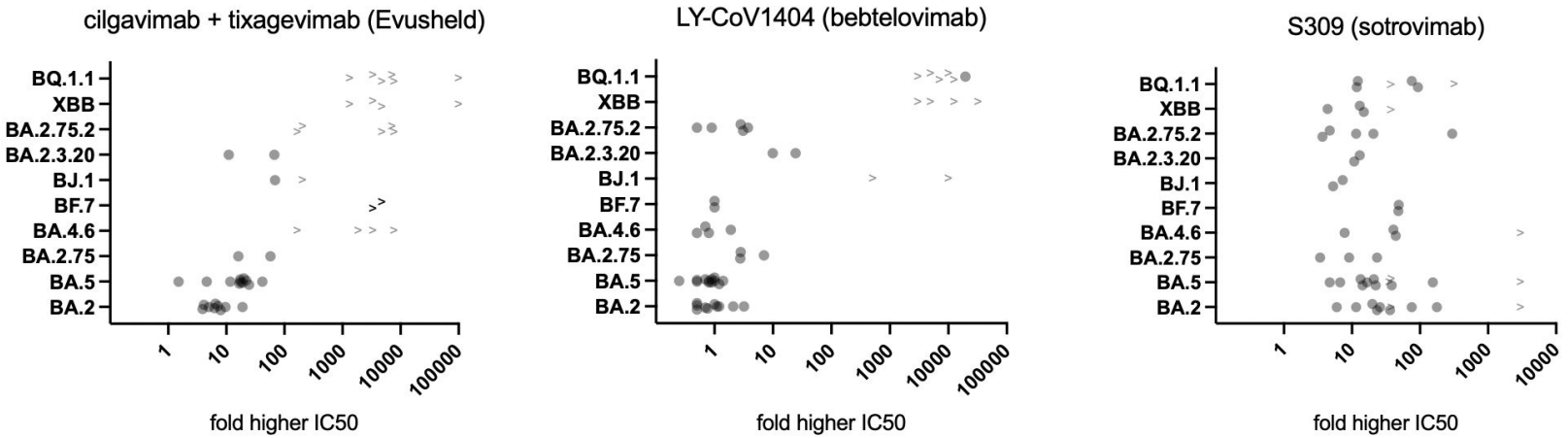
Sheward et al., (unpublished data)

IC_{50} (ng/ml)

	B.1	BA.2	BA.5	BA.2.75	XAW	BJ.1	BA.2.3.20	BA.2.75.2	XBB	BQ.1.1
cilgavimab	11	15	103	88	>1000	>1000	>1000	>1000	>1000	>1000
tixagevimab	4	>1000	>1000	210	377	>1000	121	>1000	>1000	>1000
Evusheld	5	31	201	78	592	>1000	323	>1000	>500000	>500000
bebtelovimab	2	1	1	6	7	>1000	48	2	>63000	38530
LY-CoV016 (etesevimab)	45	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000
LY-CoV-555 (bamlanivimab)	11	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000
REGN10933 (casirivimab)	20	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000
REGN10987 (imdevimab)	11	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000
S309 (sotrovimab)	89	536	602	301	641	654	969	423	391	1089

Sheward et al., (unpublished data)

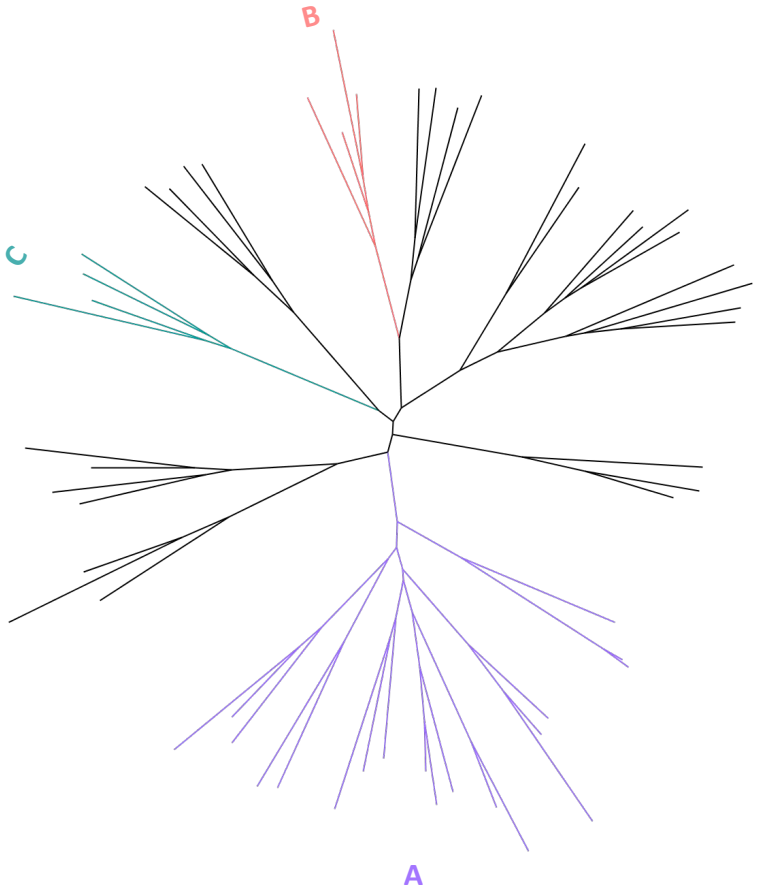
Concordance across labs/assays



> Lower bound (IC_{50} greater than highest concentration tested)

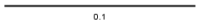
Sheward *et al.*, *unpublished data*; Sheward *et al.*, *LID* (2022) ; Cao *et al.*, *bioRxiv* (2022). Wang *et al.*, *bioRxiv* (2022); Wang *et al.*, *LID* (2022) ; Arora *et al.*, *LID* (2022); Planas *et al.*, *bioRxiv* (2022); Imai *et al.*, *NEJM* (2022); Yamasoba *et al.*, *LID* (2022); Wu *et al.*, *Lancet* (2022); Takashita *et al.*, *NEJM* (2022); Gruell *et al.*, *LID* (2022);

Env (HIV)



HA (H3N2)

Spike (SARS-CoV-2)



Acknowledgements

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- Sandra Muschiol
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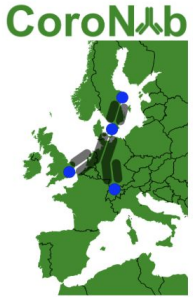

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