

Supplementary Table S1

Occurrence of selected amino acid mutations associated with immune escape within the Spike protein of SARS-CoV-2 in BA.2 and BA.4/5 Omicron sublineages. Modified from https://docs.google.com/spreadsheets/d/1OTWogpyvWNTlK0ww7TlDcl4l_SkZt3Z8nYiSp2YARys/edit?usp=sharing

PAN GO linea ge	nickn ame	Y 144 del	R 34 6	K 35 6	K 44 4	V 44 5	G 44 6	N 45 0	L 45 2	N 46 0	F 48 6	F 49 0	R 49 3	S 49 4
BA.1							S							
BA.1. 1			K				S							
BA.2														
BA.2. 3														
BA.2. 3.2														
BS.1			T						R	K			Q	
BS.1. 1			T	T					R	K			Q	
BS.1. 2			T						R	K			Q	
BA.2. 3.16														
BP.1			T						M					
BA.2. 3.20	Basili sk				R			D	M	K			Q	
CM.1					R			D	M	K			Q	
CM.2					R			D	M	K			Q	
CM.3					R			D	M	K			Q	
CM.4					R			D	M	K			Q	
CM.5					R			D	M	K			Q	
CM.5. 1					R			D	M	K			Q	
CM.6					R			D	M	K			Q	
CM.6. 1					R			D	M	K			Q	
CM.7					R			D	M	K	S		Q	
CM.8					R		S	D	M	K			Q	
CM.8. 1					R		S	D	M	K	S		Q	

CM.9					R			D	M	K			Q	
BA.2.														
3.21													Q	
DD.1			T							K			L	
BA.2.														
10														
BA.2.														
10.1														
BJ.1	Argus		T			P	S					V		
BA.2.														
10.4							S				P		Q	P
BA.2.														
38														
BA.2.														
38.1					N									
BA.2.														
38.2					N									
BA.2.														
38.3														
BH.1							S		Q					
BA.2.														
38.4					N									
BA.2.	Cent													
75	aurus						S			K			Q	
BA.2.														
75.1							S			K			Q	
BL.1			T				S			K			Q	
BL.1.														
1			T				S			K			Q	
BL.1.														
2			T				S			K			Q	
BL.1.														
3			T				S			K		L	Q	
BL.1.														
4			T				S			K		V	Q	
BL.2			T				S			K			Q	
BL.2.														
1			T				S			K			Q	
BL.3							S			K			Q	
BL.4							S			K			Q	
BL.5			S				S			K			Q	
BA.2.	Chiro													
75.2	n		T				S			K	S		Q	

CA.1			T			S		R	K	S		Q	
CA.2			T			S			K	S		Q	P
CA.3			T			S			K	S		Q	
CA.3. 1			T		M	S		R	K	S		Q	
CA.4			T			S			K	P		Q	
CA.5			T			S			K	S		Q	
CA.6			T			S			K	S		Q	
CA.7			T			S		R	K	S		Q	
BA.2. 75.3						S			K			Q	
BM.1						S			K	S		Q	
BM.1. 1			T			S			K	S		Q	
BM.1. 1.1	Mima s		T			S			K	S	S	Q	
CJ.1			T			S			K	P	S	Q	
BM.1. 1.2			T			S			K	S		Q	
BM.1. 1.3			T			S			K	S		Q	
CV.1			T			S		R	K	S		Q	
BM.2			T			S			K			Q	
BM.2. 1			T			S			K	V		Q	
BM.2. 2			T			S			K			Q	
BM.2. 3			T			S			K	I		Q	
BM.3						S			K			Q	
BM.4						S			K			Q	
BM.4. 1						S			K	S		Q	
BM.4. 1.1			T			S			K	S		Q	
CH.1			T		T	S			K	S		Q	
CH.1. 1			T		T	S		R	K	S		Q	
CH.2			T			S			K	S		Q	
BM.5						S			K			Q	
BM.6						S			K			Q	
BA.2. 75.4						S		R	K			Q	

BR.1					M		S		R	K			Q	
BR.1. 1					M		S		R	K			Q	
BR.1. 2					M		S		R	K	S		Q	
BR.2			T				S		R	K	I		Q	
BR.2. 1			T				S		R	K	I		Q	
BR.3			T				S		R	K			Q	
BR.4					T		G		R	K			Q	
BA.2. 75.5				T			S			K			Q	
BN.1	Hydr a		T	T			S			K		S	Q	
BN.1. 1			T	T			S			K		S	Q	P
BN.1. 1.1			T	T			S			K		S	Q	P
BN.1. 2			T	T			S			K		S	Q	
BN.1. 2.1			T	T			S			K		S	Q	
BN.1. 3			T	T			S			K		S	Q	
BN.1. 3.1			T	T			S			K		S	Q	
BN.1. 4			T	T			S			K		S	Q	
BN.1. 5			T	T			S			K		S	Q	
BN.1. 6			T	T			S			K		S	Q	
BN.1. 7			T	T			S			K		S	Q	
BN.2				T			S			K			Q	
BN.2. 1				T			S			K		S	Q	
BN.3				T			S	D		K			Q	
BN.3. 1				T			S	D		K		S	Q	
BN.4				T			S			K		S	Q	
BN.5				T			S			K			Q	
BN.6				T			S			K			Q	

BA.2. 75.6	Dicty s		T				S			K			Q	
BY.1			T				S			K	S		Q	
BY.1. 1			T				S		R	K	S		Q	
BY.1. 1.1			T				S		R	K	S		Q	
BY.1. 2			T				S			K	S		Q	
BY.1. 2.1			T				S			K	S		Q	P
BA.2. 75.7							S			K	S		Q	
BA.2. 75.8							S		Q	K			Q	
BA.2. 75.9			T				S			K			Q	
CB.1			T				S			K	V		Q	
BA.2. 75.10							S			K			Q	
BA.2. 76			T											
BA.4									R		V		Q	
BA.4. 1									R		V		Q	
BA.4. 1.8			T						R		V		Q	
BA.4. 1.9	Cetus		T						R		V		Q	
BA.4. 1.10			T						R		V		Q	
CS.1			T		R				R		V		Q	
BA.4. 6	Aeter na		T						R		V		Q	
BA.4. 6.1			T						R		V		Q	
BA.4. 6.2			T			A			R		V		Q	
BA.4. 6.3			T			N			R	K	V		Q	
BA.4. 6.4			T						R		V		Q	

BA.4.6.5			T						R		V		Q	
DC.1			T						R	S	V		Q	
BA.4.7			T						R		V		Q	
BA.4.8									R		V		Q	
BA.5.1									R		V		Q	
BA.5.1	Sphinx x								R		V		Q	
BA.5.1.18			T						R		V		Q	
BA.5.1.19									R		V		Q	
BA.5.1.20			T						R		V		Q	
BA.5.1.21									R		V		Q	
BT.1									R		V		Q	
BT.2									R		V		Q	
BA.5.1.22									R		V		Q	
DH.1									R		V		Q	
BA.5.1.23									R		V		Q	
DE.1									R		V		Q	
DE.2			T						R		V		Q	
BA.5.1.24									R		V		Q	
BA.5.1.25									R		V		Q	
BA.5.1.26			T						R		V		Q	
CU.1			T						R		V		Q	
BA.5.1.27			T						R		V		Q	
BA.5.1.28			T						R		V		Q	
BA.5.1.29					N				R		V		Q	
CL.1									R	K	V		Q	
BA.5.1.30									R		V		Q	

BA.5.2	Triton								R		V		Q	
BA.5.2.1									R		V		Q	
BF.1									R		V		Q	
BF.1.1									R		V		Q	
BF.2									R		V		Q	
BF.3									R		V		Q	
BF.3.1							S		R		V		Q	
BF.4									R		V		Q	
BF.5									R		V		Q	
BF.6									R		V		Q	
BF.7	Minotaur		T						R		V		Q	
BF.7.1			T						R		V		Q	
BF.7.2			T						R		I		Q	
BF.7.3			T						R		V		Q	
BF.7.4			T						R		V		Q	
BF.7.4.1			T						R		V		Q	
BF.7.4.2			T						R		V		Q	
BF.7.5			T						R		V		Q	
BF.7.5.1			T						R		V		Q	
BF.7.6			T						R		V		Q	
BF.7.7			T						R		V		Q	
BF.7.8			T						R		V		Q	
BF.7.9			T						R		V		Q	
BF.7.10			T						R		V		Q	

BF.7. 11			T						R		V		Q	
BF.7. 12			T						R		V		Q	
BF.7. 13			T						R		V		Q	
BF.7. 13.1			T						R		V		Q	
BF.7. 13.2			T						R		V		Q	
BF.8									R		V		Q	
BF.9									R		V		Q	
BF.10									R		V		Q	
BF.11	Pytho n		T						R		V		Q	
BF.11 .1			T						R		V		Q	
BF.11 .2			T						R		V		Q	
BF.11 .3			T						R		V		Q	
BF.11 .4			T						R		V		Q	
BF.11 .5			T						R		V		Q	
BF.12									R		I		Q	
BF.13			S						R		V		Q	
BF.14								D	R		V		Q	
BF.15									R		V		Q	
BF.16					R				R		V		Q	
BF.17									R		V		Q	
BF.18									R		V		Q	
BF.19									R		V		Q	
BF.20									R		V		Q	
BF.21									R		V		Q	
BF.22									R		V		Q	
BF.23									R		V		Q	
BF.24									R		V		Q	
BF.25					A				R		V		Q	
BF.26									R		V		Q	
BF.27									R		V		Q	
BF.28									R		V		Q	

BF.29									R		V		Q	
BF.30			T						R		V		Q	
BF.31									R		V		Q	
BF.31									R		V		Q	
.1									R		V		Q	
BF.32							D		R		V		Q	
BF.33			I						R	K	V		Q	
BF.34			T						R		V		Q	
BA.5.														
2.3									R		V		Q	
BZ.1									R		V		Q	
BA.5.														
2.6			T						R		V		Q	
CP.1			T						R		V		Q	
CP.1.														
1			T		A				R		V		Q	
CP.1.														
2			T						R		V		Q	
CP.1.														
3			T			S			R		V		Q	
CP.2			T						R		V		Q	
CP.3			T						R	Y	V		Q	
CP.4			T						R		V		Q	
CP.5			T						R		V		Q	
CP.6			T						R		V		Q	
BA.5.														
2.7					M				R		V		Q	
CY.1					M				R	K	V		Q	
BA.5.														
2.13			T						R		V		Q	
BA.5.														
2.16									R		V		Q	
BU.1					M				R	K	V		Q	
BU.2					A				R		V		Q	
BU.3							D		R		V		Q	
BA.5.														
2.18					R				R		V		Q	
CR.1			T		R				R		V		Q	
CR.1.														
1			T		R				R		V		Q	
CR.1.														
2			T		R	A			R		V		Q	
CR.2					R				R		V		Q	

BA.5. 2.19									R		V		Q	
BA.5. 2.20									R		V		Q	
BV.1									R		V		Q	
BV.2					N				R		V		Q	
BA.5. 2.21									R		V		Q	
CN.1								D	R		V		Q	
BA.5. 2.22									R		V		Q	
BA.5. 2.23						A			R		V		Q	
BA.5. 2.24					N				R		V		Q	
CK.1					N				R	K	V		Q	
CK.2					N				R		V		Q	
CK.2. 1					N				R	K	V		Q	
CK.2. 1.1					N				R	K	V		Q	
DG.1					N				R	K	V		Q	
CK.3					N				R	K	V		Q	
BA.5. 2.25			R		T				R		V		Q	
DB.1			T		T				R	K	V		Q	
DB.2			R		T				R		V		Q	
BA.5. 2.26									R		V		Q	
CG.1					M				R		V		Q	
BA.5. 2.27									R		V		Q	
CF.1									R		V		Q	
BA.5. 2.28									R		V		Q	
BA.5. 2.29									R		V		Q	
BA.5. 2.30								D	R		V		Q	
BA.5. 2.31									R		V		Q	
CD.1								D	R		V		Q	
CD.2									R		V		Q	

BA.5. 2.32								D	R		V		Q	
BA.5. 2.33									R		V		Q	
CE.1			I						R		V		Q	
BA.5. 2.34			T						R		V		Q	
BA.5. 2.35			T						R		V		Q	
BA.5. 2.36					T				R		V		Q	
CT.1				T	T				R		V		Q	
BA.5. 2.37									R		V		Q	
BA.5. 2.38									R		V		Q	
DA.1			T						R		V		Q	
BA.5. 2.39			T						R		V		Q	
BA.5. 2.40								D	R		V		Q	
BA.5. 2.41					R				R		V		Q	
BA.5. 3									R		V		Q	
BA.5. 3.1									R		V		Q	
BE.1									R		V		Q	
BE.1. 1									R		V		Q	
BE.1. 1.1					T				R		V		Q	
BQ.1	Typh on				T				R	K	V		Q	
BQ.1. 1	Cerb erus		T		T				R	K	V		Q	
BQ.1. 1.1			T		T				R	K	V		Q	
CZ.1			T		T				R	K	V	I	Q	
BQ.1. 1.2			T		T				R	K	V		Q	
BQ.1. 1.3			T		T				R	K	V		Q	

BQ.1. 1.4			T		T				R	K	V		Q	
BQ.1. 1.5			T		T				R	K	V		Q	
BQ.1. 1.6			T		T				R	K	V		Q	
BQ.1. 1.7			T		T				R	K	V		Q	
BQ.1. 1.8			T		T				R	K	V		Q	
BQ.1. 1.9			T		T				R	K	V		Q	
BQ.1. 1.10			T		T				R	K	V		Q	
BQ.1. 1.11			T		T				R	K	V		Q	P
BQ.1. 1.12			T		T				R	K	V		Q	P
BQ.1. 1.13			T		T				R	K	V		Q	
BQ.1. 1.14			T		T				R	K	V		Q	
CW.1			T		T		S		R	K	V		Q	
BQ.1. 1.15			T		T				R	K	V		Q	
BQ.1. 1.16			T		T				R	K	V		Q	
BQ.1. 1.17			T		T				R	K	V		Q	
BQ.1. 1.18			T		T				R	K	V		Q	
BQ.1. 1.19			T		T				R	K	V		Q	
BQ.1. 1.20			T		T				R	K	V		Q	
BQ.1. 1.21			T		T				R	K	V		Q	
BQ.1. 1.22			T		T				R	K	V		Q	
BQ.1. 1.23			T		T				R	K	V		Q	
BQ.1. 1.24			T		T				R	K	V		Q	

BQ.1. 2					T				R	K	V		Q	
BQ.1. 3					T				R	K	V		Q	
BQ.1. 4					T				R	K	V		Q	
BQ.1. 5					T				R	K	V		Q	
BQ.1. 6					T				R	K	V		Q	
BQ.1. 7					T				R	K	V		Q	
BQ.1. 8					T				R	K	V		Q	
BQ.1. 8.1					T				R	K	V		Q	
BQ.1. 8.2					T				R	K	V		Q	
BQ.1. 9			T		T				R	K	V		Q	
BQ.1. 10					T				R	K	V		Q	
BQ.1. 10.1					T				R	K	V		Q	
BQ.1. 11					T				R	K	V		Q	
BQ.1. 12					T				R	K	V		Q	
BQ.1. 13					T				R	K	V		Q	
BQ.1. 14					T				R	K	V		Q	
BQ.1. 15					T				R	K	V		Q	
BQ.1. 16					T				R	K	V		Q	
BQ.1. 17					M				R	K	V		Q	
BQ.1. 18			T		T				R	K	V		Q	
BQ.1. 19					T				R	K	V		Q	P

BQ.1. 20					T				R	K	V		Q	
BQ.1. 21			S		T				R	K	V		Q	
BQ.1. 22			T		T				R	K	V		Q	
BQ.1. 23					T				R	K	V		Q	
BQ.1. 24			T		T				R	K	V		Q	
BQ.1. 25			T		T				R	K	V		Q	
BQ.1. 26					T				R	K	V		Q	
BQ.2					T				R		V		Q	
BE.1. 1.2									R		V		Q	
CC.1								D	R		V		Q	
BE.1. 2			T						R		V		Q	
BE.1. 2.1			T			A			R		V		Q	
BE.1. 3									R		V		Q	
BE.1. 4									R		V		Q	
BE.1. 4.1									R		V		Q	
BE.1. 4.2			T						R		V		Q	
BE.1. 4.3						A			R		V		Q	
BE.1. 4.4									R		V		Q	
BE.2									R		V		Q	
BE.3									R		V		Q	
BE.4									R		V		Q	
BE.4. 1			T						R		V		Q	
BE.4. 1.1			T		R				R		V		Q	
CQ.1			T		R				R		V		Q	

CQ.1.1			T		R				R		V		Q	
CQ.2			T		R	A			R		V		Q	
BE.4.2					N				R	K	V		Q	
BE.5			T						R		V		Q	
BE.6			S						R		V		Q	
BE.7			T						R		V		Q	
BE.8			T						R		V		Q	
BE.9					T				R	K	V		Q	
BA.5.3.5			T						R		V		Q	
BA.5.5									R		V		Q	
BA.5.5.3									R		V		Q	
BA.5.6									R		V		Q	
BA.5.6.2					T				R		V		Q	
BW.1					T				R	K	V		Q	
BA.5.6.3			T						R		V		Q	
BA.5.6.4			E						R		V		Q	
BA.5.10									R		V		Q	
BA.5.10.1			T						R		V		Q	
DF.1			T						R		V		Q	
BA.5.11			T						R		V		Q	
XBB	Gryphon		T			P	S			K	S	S	Q	
XBB.1			T			P	S			K	S	S	Q	
XBB.1.1			T			P	S			K	S	S	Q	
XBB.1.2			T			P	S			K	S	S	Q	
XBB.1.3			T			P	S			K	S	S	Q	

XBB. 1.4			T			P	S			K	S	S	Q	
XBB. 1.5			T			P	S			K	P	S	Q	
XBB. 2			T			P	S			K	S	S	Q	
XBB. 3			T			P	S			K	S	S	Q	
XBB. 3.1			T			P	S			K	S	S	Q	
XBB. 4			T		R	P	S			K	S	S	Q	
XBB. 4.1			T		R	P	S			K	S	S	Q	
XBB. 5			T			P	S			K	S	S	Q	
XBC							S				P		Q	
XBC. 1							S		M		P		Q	
XBC. 2							S				P		Q	
XBD			T				S		L	K	S		Q	
XBE			T						R		V		Q	
XBF			T				S			K	P	S	Q	
XBG			T						R		V		Q	