

**SUPPLEMENTARY TABLE 1. Amino acid deletions and substitutions in the S1 subunit (sites 14–685) of the SARS-CoV-2 spike protein from selected BA.3.2 isolates relative to LP.8.1\***

SARS-CoV-2 Spike Protein Domain	Position	Lineage						
		LP.8.1* (Referent)	BA.3.2.1	BA.3.2.2	RD.1	RD.1.1	RE.1.1	RE.2.1
NTD (14–305)	19	I	T	T	T	T	T	T
	24	-	L	L	L	L	L	L
	25	-	P	P	P	P	P	P
	26	-	L	L	L	L	L	L
	27	S	A	A	A	A	A	A
	31	-	S	S	S	S	S	S
	50	L	S	S	S	S	S	S
	67	A	V	V	V	V	V	V
	95	T	I	I	I	I	I	I
	101	I	T	T	T	T	T	T
	127	F	V	V	V	V	V	V
	136	C	— <sup>†</sup>	—	—	—	—	—
	137	N	—	—	—	—	—	—
	138	D	—	—	—	—	—	—
	139	P	—	—	—	—	—	—
	140	F	—	—	—	—	—	—
	141	L	—	—	—	—	—	—
	142	D	—	—	—	—	—	—
	143	V	—	—	—	—	—	—
	145	Y	—	—	—	—	—	—
	146	H	—	—	—	—	—	—
	147	K	—	—	—	—	—	—
	158	G	R	R	R	R	R	R
	164	N	K	K	K	K	K	K
	172	S	F	F	F	F	F	F
	186	L	F	F	F	F	F	F
	187	K	T	T	T	T	T	T
	190	S	R	R	R	R	R	R
	213	G	V	V	V	V	V	V
	216	F	L	L	L	L	L	L
	227	V	V <sup>¶</sup>	V <sup>¶</sup>	V <sup>¶</sup>	L	V <sup>¶</sup>	V <sup>¶</sup>
	243	A	—	—	—	—	—	—
244	L	—	—	—	—	—	—	
245	N	H	H	H	H	H	H	
251	P	S	S	S	S	S	S	
264	D	A	A	A	A	A	A	
§	326	I	V	V	V	V	V	
RBD (332–527)	332	V	I	I	I	I	I	
	339	H	Y	Y	Y	Y	Y	
	346	T	R	R	R	R	R	
	348	A	P	P	P	P	P	
	356	T	K	T <sup>¶</sup>	K	K	T <sup>¶</sup>	
	376	A	T	T	T	T	T	
	435	A	S	S	S	S	S	
	440	K	R	R	R	R	R	
445	R	A	A	A	A	A		

	446	S	D	D	D	D	D	D
	450	D	N	N	N	N	N	N
	455	S	L	L	L	L	L	L
	456	L	F	F	F	F	F	F
	478	K	N	N	N	N	N	N
	481	K	N	N	N	N	N	N
	483	-	V	V	V	V	V	V
	486	P	F	F	F	F	F	F
	493	E	Q	Q	Q	Q	Q	Q
	496	G	S	S	S	S	S	S
	505	H	Y	Y	Y	Y	Y	Y
<b>S1 C-terminal region (529–685)</b>	529	K	N	N	N	N	N	N
	554	K	D	D	D	D	D	D
	570	V	A	A	A	A	A	A
	575	A	A <sup>¶</sup>	S	A <sup>¶</sup>	A <sup>¶</sup>	S	S
	583	E	D	D	D	D	D	D
	621	S	P	P	P	P	P	P
	625	H	R	R	R	R	R	R
	641	N	K	K	K	K	K	K
	642	V	G	G	G	G	G	G
	654	E	K	K	K	K	K	K
	679	K	R	R	R	R	R	R
	681	R	R <sup>¶</sup>	H	R <sup>¶</sup>	R <sup>¶</sup>	H	H

**Abbreviations:** A = alanine; C = cysteine; D = aspartic acid; E = glutamic acid; F = phenylalanine; G = glycine; H = histidine; I = isoleucine; K = lysine; L = leucine; M = methionine; N = asparagine; NTD = N – terminal domain; P = proline; Q = glutamine; R = arginine; RBD = receptor binding domain; S = serine; T = threonine; V = valine; W = tryptophan; Y = tyrosine. Green shaded sites differ among BA.3.2 sublineages. BA.3.2 sublineages also contain a four amino acid insertion (Alanine – Serine – Aspartic acid – Threonine) after site 214.

\* The LP.8.1 spike protein sequence was used as the reference because of its inclusion in 2024–2025 mRNA COVID-19 vaccines.

<sup>†</sup> Indicates deletion of amino acid.

<sup>§</sup> There is no consistent name for the short stretch of amino acids between the NTD and RBD

<sup>¶</sup> Indicates the same amino acid as the reference sequence.