

BA5 vs Wuhan etc: 5 deletions and 26 substitutions (5+26) / 1273 = 2.44%, less poison but more contagious

Alignment of spike proteins from BA.5, BA.2, Omicron, Wuhan strain, and Delta variant

CLUSTAL O(1.2.4) multiple sequence alignment

Omicron	MFVFLVLLPLVSSQCVNLTTRTQLPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFS	60
BA.2	MFVFLVLLPLVSSQCVNLITRTQ---SYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFS	57
BA.5	MFVFLVLLPLVSSQCVNLITRTQ--SYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFS	ds1
Wuhan-spike	MFVFLVLLPLVSSQCVNLTTRTQLPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFS	60
Delta-spike	MFVFLVLLPLVSSQCVNLTTRTQLPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFS	60
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Omicron	NVTWFHVI--SGTNGTKRFDNPVLPFNDGVYFASIEKSNIIRGWIFGTTLDSTQSLIV	118
BA.2	NVTWFHAIHVS G TNGTKRFDNPVLPFNDGVYFASTEKSNIIRGWIFGTTLDSTQSLIV	117
BA.5	NVTWFHAI--SGTNGTKRFDNPVLPFNDGVYFASTEKSNIIRGWIFGTTLDSTQSLIV	d5
Wuhan-spike	NVTWFHAIHVS G TNGTKRFDNPVLPFNDGVYFASTEKSNIIRGWIFGTTLDSTQSLIV	120
Delta-spike	NVTWFHAIHVS G TNGTKRFDNPVLPFNDGVYFASTEKSNIIRGWIFGTTLDSTQSLIV	120
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Omicron	NNATNVVIK VCE FQFCNDPFLD---HKNNKSWMESEFRVYSSANNCTFEYVSQPFLMDLE	175
BA.2	NNATNVVIK VCE FQFCNDPFLDVYYHKNNKGWMESEFRVYSSANNCTFEYVSQPFLMDLE	177
BA.5	NNATNVVIK VCE FQFCNDPFLDVYYHKNNKSWMESEFRVYSSANNCTFEYVSQPFLMDLE	s 2
Wuhan-spike	NNATNVVIK VCE FQFCNDPFLGVYYHKNNKSWMESEFRVYSSANNCTFEYVSQPFLMDLE	180
Delta-spike	NNATNVVIK VCE FQFCNDPFLDVYYHKNNKSWMES--GVYSSANNCTFEYVSQPFLMDLE	178
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Omicron	GKQGNFKNLREFVFKNIDGYFKIYSKHTPIIVREPEDLDPQGFSALEPLVDLPIGINITRF	235
BA.2	GKQGNFKNLREFVFKNIDGYFKIYSKHTPINL--GRDLPQGFSALEPLVDLPIGINITRF	235
BA.5	GKQGNFKNLREFVFKNIDGYFKIYSKHTPINL--GRDLPQGFSALEPLVDLPIGINITRF	s 3
Wuhan-spike	GKQGNFKNLREFVFKNIDGYFKIYSKHTPINL--VRDLPQGFSALEPLVDLPIGINITRF	238
Delta-spike	GKQGNFKNLREFVFKNIDGYFKIYSKHTPINL--VRDLPQGFSALEPLVDLPIGINITRF	236
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Omicron	QTLLALHRSYLTTPGDSSSGWTAGAAAYVGYLQPRTFLLKYNENGTITDAVDCALDPLSE	295
BA.2	QTLLALHRSYLTTPGDSSSGWTAGAAAYVGYLQPRTFLLKYNENGTITDAVDCALDPLSE	295
BA.5	QTLLALHRSYLTTPGDSSSGWTAGAAAYVGYLQPRTFLLKYNENGTITDAVDCALDPLSE	
Wuhan-spike	QTLLALHRSYLTTPGDSSSGWTAGAAAYVGYLQPRTFLLKYNENGTITDAVDCALDPLSE	298
Delta-spike	QTLLALHRSYLTTPGDSSSGWTAGAAAYVGYLQPRTFLLKYNENGTITDAVDCALDPLSE	296

Omicron	TKCTLKSFTVEKGIYQTSNFRVQPTESIVRFPNITNLCPFDEVFNATRFASVYAWNRKRI	355
BA.2	TKCTLKSFTVEKGIYQTSNFRVQPTESIVRFPNITNLCPFDEVFNATRFASVYAWNRKRI	355
BA.5	TKCTLKSFTVEKGIYQTSNFRVQPTESIVRFPNITNLCPFDEVFNATRFASVYAWNRKRI	s 4
Wuhan-spike	TKCTLKSFTVEKGIYQTSNFRVQPTESIVRFPNITNLCPFGEVFNATRFASVYAWNRKRI	358
Delta-spike	TKCTLKSFTVEKGIYQTSNFRVQPTESIVRFPNITNLCPFGEVFNATRFASVYAWNRKRI	356
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Omicron	SNCVADYSVLYNLAPFFTFKCYGVSP TKLNDLCFTNVYADSFVIRGDEV RQIAPGQTGNI	415
BA.2	SNCVADYSVLYNFAPFFAFKCYGVSP TKLNDLCFTNVYADSFVIRGNEVSQIAPGQTGNI	415
BA.5	SNCVADYSVLYNFAPFFAFKCYGVSP TKLNDLCFTNVYADSFVIRGNEVSQIAPGQTGNI	s 5-9
Wuhan-spike	SNCVADYSVLYNSASFSTFKCYGVSP TKLNDLCFTNVYADSFVIRGDEV RQIAPGQTGKI	418
Delta-spike	SNCVADYSVLYNSASFSTFKCYGVSP TKLNDLCFTNVYADSFVIRGDEV RQIAPGQTGKI	416
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Omicron	ADYNYKL PDDFTGCVIAWNSNKLDSKVS GNYNYLYRLFRKSNLKPFERDISTEIIYQAGNK	475
BA.2	ADYNYKL PDDFTGCVIAWNSNKLDSKVS GNYNYLYRLFRKSNLKPFERDISTEIIYQAGNK	475
BA.5	ADYNYKL PDDFTGCVIAWNSNKLDSKVGNYNYRYRLFRKSNLKPFERDISTEIIYQAGNK	s -13

Wuhan-spike	ADYNYKL PDDFT GC VI AWNS NN LD SK VGGN Y N Y L R L FR KS N L KP FERD IS TE IY QAG ST	478
Delta-spike	ADYNYKL PDDFT GC VI AWNS NN LD SK VGGN Y N Y R Y L FRKS N L KP FERD IS TE IY QAG SK	476
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Omicron	PCNGV AG FN CY F P L RSY SFR PT Y GV GH Q P YRVV LS F ELL H AP AT VC G PK K ST N L V K N K C	535
BA.2	PCNGV AG FN CY F P L RSY GFR PT Y GV GH Q P YRVV LS F ELL H AP AT VC G PK K ST N L V K N K C	535
BA.5	PCNGV AG V NCY F P L Q SY GF RPT Y GV GH Q P YRVV LS F ELL H AP AT VC G PK K ST N L V K N K C	s -18
Wuhan-spike	PCNGV E GF NCY F P L Q SY GF QPT NG V GY Q P YRVV LS F ELL H AP AT VC G PK K ST N L V K N K C	538
Delta-spike	PCNGV E GF NCY F P L Q SY GF QPT NG V GY Q P YRVV LS F ELL H AP AT VC G PK K ST N L V K N K C	536
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Omicron	VNFN F N GL K GT GV L TES N KK F L P F Q Q F GR D IAD T TD A VR D P Q T L E I L D IT P C S F G G V S V I	595
BA.2	VNFN F N GL T GT GV L TES N KK F L P F Q Q F GR D IAD T TD A VR D P Q T L E I L D IT P C S F G G V S V I	595
BA.5	VNFN F N GL T GT GV L TES N KK F L P F Q Q F GR D IAD T TD A VR D P Q T L E I L D IT P C S F G G V S V I	
Wuhan-spike	VNFN F N GL T GT GV L TES N KK F L P F Q Q F GR D IAD T TD A VR D P Q T L E I L D IT P C S F G G V S V I	598
Delta-spike	VNFN F N GL T GT GV L TES N KK F L P F Q Q F GR D IAD T TD A VR D P Q T L E I L D IT P C S F G G V S V I	596
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Omicron	TPGT NT SN Q V AV L Y Q GV N CTE V P V AI H AD Q L T P T WR V YST G SN V F Q TR A G L I G A E Y V NN	655
BA.2	TPGT NT SN Q V AV L Y Q GV N CTE V P V AI H AD Q L T P T WR V YST G SN V F Q TR A G L I G A E Y V NN	655
BA.5	TPGT NT SN Q V AV L Y Q GV N CTE V P V AI H AD Q L T P T WR V YST G SN V F Q TR A G L I G A E Y V NN	s -20
Wuhan-spike	TPGT NT SN Q V AV L Y Q D V N CTE V P V AI H AD Q L T P T WR V YST G SN V F Q TR A G L I G A E H V NN	658
Delta-spike	TPGT NT SN Q V AV L Y Q GV N CTE V P V AI H AD Q L T P T WR V YST G SN V F Q TR A G L I G A E H V NN	656
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Omicron	SYEC D I P I G A G I C A S Y Q T Q T K S H R R A R S V A S Q S I I A Y T M S L G A E N S V A Y S N N S I A I P T N F	715
BA.2	SYEC D I P I G A G I C A S Y Q T Q T K S H R R A R S V A S Q S I I A Y T M S L G A E N S V A Y S N N S I A I P T N F	715
BA.5	SYEC D I P I G A G I C A S Y Q T Q T K S H R R A R S V A S Q S I I A Y T M S L G A E N S V A Y S N N S I A I P T N F	s -22
Wuhan-spike	SYEC D I P I G A G I C A S Y Q T Q T NS P R R A R S V A S Q S I I A Y T M S L G A E N S V A Y S N N S I A I P T N F	718
Delta-spike	SYEC D I P I G A G I C A S Y Q T Q T NS R R R A R S V A S Q S I I A Y T M S L G A E N S V A Y S N N S I A I P T N F	716
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Omicron	T I S V T T E I L P V S M T K T S V D C T M Y I C D S T E C S N L L L Q Y G S F C T Q L K R A L T G I A E V Q D K N T	775
BA.2	T I S V T T E I L P V S M T K T S V D C T M Y I C D S T E C S N L L L Q Y G S F C T Q L K R A L T G I A E V Q D K N T	775
BA.5	T I S V T T E I L P V S M T K T S V D C T M Y I C D S T E C S N L L L Q Y G S F C T Q L K R A L T G I A E V Q D K N T	s -23
Wuhan-spike	T I S V T T E I L P V S M T K T S V D C T M Y I C D S T E C S N L L L Q Y G S F C T Q L N R A L T G I A E V Q D K N T	778
Delta-spike	T I S V T T E I L P V S M T K T S V D C T M Y I C D S T E C S N L L L Q Y G S F C T Q L N R A L T G I A E V Q D K N T	776
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Omicron	Q E V F A Q V K Q I Y K T P P I K Y F G G F N F S Q I L P D P S K P S K R S F I E D L L F N K V T L A D A G F I K Q Y G	835
BA.2	Q E V F A Q V K Q I Y K T P P I K Y F G G F N F S Q I L P D P S K P S K R S F I E D L L F N K V T L A D A G F I K Q Y G	835
BA.5	Q E V F A Q V K Q I Y K T P P I K Y F G G F N F S Q I L P D P S K P S K R S F I E D L L F N K V T L A D A G F I K Q Y G	s -24
Wuhan-spike	Q E V F A Q V K Q I Y K T P P I K D F G G F N F S Q I L P D P S K P S K R S F I E D L L F N K V T L A D A G F I K Q Y G	838
Delta-spike	Q E V F A Q V K Q I Y K T P P I K D F G G F N F S Q I L P D P S K P S K R S F I E D L L F N K V T L A D A G F I K Q Y G	836
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Omicron	D C L G D I A A R D L I C A Q K F K G L T V L P P L L T D E M I A Q Y T S A L L A G T I T S G W T F G A G A L Q I P F	895
BA.2	D C L G D I A A R D L I C A Q K F N G L T V L P P L L T D E M I A Q Y T S A L L A G T I T S G W T F G A G A L Q I P F	895
BA.5	D C L G D I A A R D L I C A Q K F N G L T V L P P L L T D E M I A Q Y T S A L L A G T I T S G W T F G A G A L Q I P F	
Wuhan-spike	D C L G D I A A R D L I C A Q K F N G L T V L P P L L T D E M I A Q Y T S A L L A G T I T S G W T F G A G A L Q I P F	898
Delta-spike	D C L G D I A A R D L I C A Q K F N G L T V L P P L L T D E M I A Q Y T S A L L A G T I T S G W T F G A G A L Q I P F	896
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Omicron	A M Q M A Y R F N G I G V T Q N V L Y E N Q K L I A N Q F N S A I G K I Q D S L S S T A S A L G K L Q D V V N H N A Q A	955
BA.2	A M Q M A Y R F N G I G V T Q N V L Y E N Q K L I A N Q F N S A I G K I Q D S L S S T A S A L G K L Q D V V N H N A Q A	955
BA.5	A M Q M A Y R F N G I G V T Q N V L Y E N Q K L I A N Q F N S A I G K I Q D S L S S T A S A L G K L Q D V V N H N A Q A	s -25
Wuhan-spike	A M Q M A Y R F N G I G V T Q N V L Y E N Q K L I A N Q F N S A I G K I Q D S L S S T A S A L G K L Q D V V N Q N A Q A	958
Delta-spike	A M Q M A Y R F N G I G V T Q N V L Y E N Q K L I A N Q F N S A I G K I Q D S L S S T A S A L G K L Q N V V N Q N A Q A	956
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Omicron	L N T L V K Q L S S K F G A I S S V L N D I F S R L D K V E A E V Q I D R L I T G R L Q S L Q T Y V T Q Q L I R A E I	1015
BA.2	L N T L V K Q L S S K F G A I S S V L N D I L S R L D K V E A E V Q I D R L I T G R L Q S L Q T Y V T Q Q L I R A E I	1015

BA.5	LNTLVKQLSSKFGAISSVLNDILSRDKVEAEVQIDRLITGRLQSLQTYVTQQLIRAAEI	s -26
Wuhan-spike	LNTLVKQLSSNFGAISSVLNDILSRDKVEAEVQIDRLITGRLQSLQTYVTQQLIRAAEI	1018
Delta-spike	LNTLVKQLSSNFGAISSVLNDILSRDKVEAEVQIDRLITGRLQSLQTYVTQQLIRAAEI *****.*****.*****	1016
Omicron	RASANLAATKMSECVLGQSKRVDFCGKGYHLMSFPQSAPHGVVFLHVTYVPAQEKNF TTA	1075
BA.2	RASANLAATKMSECVLGQSKRVDFCGKGYHLMSFPQSAPHGVVFLHVTYVPAQEKNF TTA	1075
BA.5	RASANLAATKMSECVLGQSKRVDFCGKGYHLMSFPQSAPHGVVFLHVTYVPAQEKNF TTA	
Wuhan-spike	RASANLAATKMSECVLGQSKRVDFCGKGYHLMSFPQSAPHGVVFLHVTYVPAQEKNF TTA	1078
Delta-spike	RASANLAATKMSECVLGQSKRVDFCGKGYHLMSFPQSAPHGVVFLHVTYVPAQEKNF TTA *****	1076
Omicron	PAICHDGKAHFPREGVFVSNNGTHWFVTQRNFYEPQIITTDNTFVSGNCDVVIGIVNNTVY	1135
BA.2	PAICHDGKAHFPREGVFVSNNGTHWFVTQRNFYEPQIITTDNTFVSGNCDVVIGIVNNTVY	1135
BA.5	PAICHDGKAHFPREGVFVSNNGTHWFVTQRNFYEPQIITTDNTFVSGNCDVVIGIVNNTVY	
Wuhan-spike	PAICHDGKAHFPREGVFVSNNGTHWFVTQRNFYEPQIITTDNTFVSGNCDVVIGIVNNTVY	1138
Delta-spike	PAICHDGKAHFPREGVFVSNNGTHWFVTQRNFYEPQIITTDNTFVSGNCDVVIGIVNNTVY *****	1136
Omicron	DPLQPELDSFKEELDKYFKNHTSPDVDLGDISGINASVVNIQKEIDRLNEVAKNLNESLI	1195
BA.2	DPLQPELDSFKEELDKYFKNHTSPDVDLGDISGINASVVNIQKEIDRLNEVAKNLNESLI	1195
BA.5	DPLQPELDSFKEELDKYFKNHTSPDVDLGDISGINASVVNIQKEIDRLNEVAKNLNESLI	
Wuhan-spike	DPLQPELDSFKEELDKYFKNHTSPDVDLGDISGINASVVNIQKEIDRLNEVAKNLNESLI	1198
Delta-spike	DPLQPELDSFKEELDKYFKNHTSPDVDLGDISGINASVVNIQKEIDRLNEVAKNLNESLI *****	1196
Omicron	DLQELGKYEQYIKWPWYIWLGFIAGLIAIVMVTIMLCMTSCCSCCLKGCCSCGSCCKFDE	1255
BA.2	DLQELGKYEQYIKWPWYIWLGFIAGLIAIVMVTIMLCMTSCCSCCLKGCCSCGSCCKFDE	1255
BA.5	DLQELGKYEQYIKWPWYIWLGFIAGLIAIVMVTIMLCMTSCCSCCLKGCCSCGSCCKFDE	
Wuhan-spike	DLQELGKYEQYIKWPWYIWLGFIAGLIAIVMVTIMLCMTSCCSCCLKGCCSCGSCCKFDE	1258
Delta-spike	DLQELGKYEQYIKWPWYIWLGFIAGLIAIVMVTIMLCMTSCCSCCLKGCCSCGSCCKFDE *****	1256
Omicron	DDSEPV LKG VKLHYT	1270
BA.2	DDSEPV LKG VKLHYT	1270
BA.5	DDSEPV LKG VKLHYT	
Wuhan-spike	DDSEPV LKG VKLHYT	1273
Delta-spike	DDSEPV LKG VKLHYT *****	1271