

# Supplementary Material

cl-2_spike	MLFVFILLPSCIGYIGDFRCIQTVNYNGWNASAPSISTEANDVSHGLGTYTVLDRVYLN	cl-2_spike	EMPLNYFDSYLGCVVWADNRDEALPWCILRMGAGLCVDYSKSRARRSVSTGYRLTTF
JHM-X_spike	MLFVFILLPSCIGYIGDFRCIQTVNYNGWNASAPSISTEANDVSHGLGTYTVLDRVYLN	JHM-X_spike	EMPLNYFDSYLGCVVWADNRDEALPWCILRMGAGLCVDYSKSRARRSVSTGYRLTTF
cl-2_spike	ATLLLTGYYPVDGSMYNNALTGINTLSLTWENPFLSEFNDGIFARVQNLKNTIPTGAT	cl-2_spike	EPMFMILVNDVSVQSVGLIYEMQIPINFTIGHHEEFIQIRAPKVTIDCAAFVCGDMAACRQ
JHM-X_spike	ATLLLTGYYPVDGSMYNNALTGINTLSLTWENPFLSEFNDGIFARVQNLKNTIPTGAT	JHM-X_spike	EPMFMILVNDVSVQSVGLIYEMQIPINFTIGHHEEFIQIRAPKVTIDCAAFVCGDMAACRQ
cl-2_spike	SYFPTIVIGSLFGNTSYTVVLEPYNNIMASVCTYITICQLPYTPCKPNTNGNRVIGFWHT	cl-2_spike	QLVEYGSFCDNVNAILNEVNNLLDNMQQLVASALMQGVITSSRLPDGIGSPIDIDNFSPL
JHM-X_spike	SYFPTIVIGSLFGNTSYTVVLEPYNNIMASVCTYITICQLPYTPCKPNTNGNRVIGFWHT	JHM-X_spike	QLVEYGSFCDNVNAILNEVNNLLDNMQQLVASALMQGVITSSRLPDGIGSPIDIDNFSPL
cl-2_spike	DWKPPICLLKNFTFNUNAFLYHFYQQGGTFYAYAKPSSATTFELFSVYIGDILTIQFP	cl-2_spike	LGCTGSTCAEDGNGPSAIRGRSAIEDLLFDRVKLSOVGFVEATNCTGQGEVADLLCVQS
JHM-X_spike	DWKPPICLLKNFTFNUNAFLYHFYQQGGTFYAYAKPSSATTFELFSVYIGDILTIQFP	JHM-X_spike	LGCTGSTCAEDGNGPSAIRGRSAIEDLLFDRVKLSOVGFVEATNCTGQGEVADLLCVQS
cl-2_spike	VLFPICPTAGSTLAPLYWVTPLLRQYLFNFNEKGVITSADVCASSYISEIKNTQSL	cl-2_spike	FMGINKVLPVULSESQISGTTAGATAAAMPPEPTAAAQVPSLVNQYRIMG LGVTMNVLSE
JHM-X_spike	VLFPICPTAGSTLAPLYWVTPLLRQYLFNFNEKGVITSADVCASSYISEIKNTQSL	JHM-X_spike	FMGINKVLPVULSESQISGTTAGATAAAMPPEPTAAAQVPSLVNQYRIMG LGVTMNVLSE
cl-2_spike	PSTGVYDLGTYVQFVGVTTRVFNLPDCKIEEWLTAKSVPSPLNWEREPQMCNFWLSS	cl-2_spike	NQMIASAFNNALGAIQEGFDATNSALGHQISVNVNNAEALNNLLNQLSNRPGAISLQ
JHM-X_spike	PSTGVYDLGTYVQFVGVTTRVFNLPDCKIEEWLTAKSVPSPLNWEREPQMCNFWLSS	JHM-X_spike	NQMIASAFNNALGAIQEGFDATNSALGHQISVNVNNAEALNNLLNQLSNRPGAISLQ
cl-2_spike	LLRYVQAESLSCNNIDASKVYGMCPGVSVDKFAIPRSQIDLIQIGNSGFLQTANYKIDT	cl-2_spike	EILTRLDAVEAKAQIDRLINGRLTALNAYISNQLSDSTLIFSAQAIEKVNCEVNSQTT
JHM-X_spike	LLRYVQAESLSCNNIDASKVYGMCPGVSVDKFAIPRSQIDLIQIGNSGFLQTANYKIDT	JHM-X_spike	EILTRLDAVEAKAQIDRLINGRLTALNAYISNQLSDSTLIFSAQAIEKVNCEVNSQTT
cl-2_spike	AATSCQLVYISLPNNVTINNNYFSSWNRRTGFNDAGVFGNSHHDVAYAQCCFTVRFSTYCP	cl-2_spike	RIMFCGNGNHLSLVQNAFPGLCFIHESVYVTSFKTANVSPGLCISGDGLAPKAGYFVQ
JHM-X_spike	AATSCQLVYISLPNNVTINNNYFSSWNRRTGFNDAGVFGNSHHDVAYAQCCFTVRFSTYCP	JHM-X_spike	RIMFCGNGNHLSLVQNAFPGLCFIHESVYVTSFKTANVSPGLCISGDGLAPKAGYFVQ
cl-2_spike	CAQPDIVSACTSQTRPMSAYCTPTGTIHRECSLWNGPHLSARVGSCTYTCECTCKENPFDD	cl-2_spike	DNGEWHFTGSNTYTPETITDKNSVVMISCAVNYTHAEFEVFLMNSIPNLPDFKEELDKWFK
JHM-X_spike	CAQPDIVSACTSQTRPMSAYCTPTGTIHRECSLWNGPHLSARVGSCTYTCECTCKENPFDD	JHM-X_spike	DNGEWHFTGSNTYTPETITDKNSVVMISCAVNYTHAEFEVFLMNSIPNLPDFKEELDKWFK
cl-2_spike	TYDLGCGQIKTIIVVNGDRCEGLGVLEDCGNSDPHAGCSCANDSPFGWSDTCLVNDRCQ	cl-2_spike	NQTSIAPDLSLDPEKLNVTFLDLTYEMNR IQDAINKLINESYINLKEVGTYEMTVKWEWTV
JHM-X_spike	TYDLGCGQIKTIIVVNGDRCEGLGVLEDCGNSDPHAGCSCANDSPFGWSDTCLVNDRCQ	JHM-X_spike	NQTSIAPDLSLDPEKLNVTFLDLTYEMNR IQDAINKLINESYINLKEVGTYEMTVKWEWTV
cl-2_spike	IFANILLNGINSCTTCTDLDLQLENTAVATGVCVRDYLYGTTGQGVKEVKADYNSWQAL	cl-2_spike	WLLIGLAGVAVCVLLFFPICCTGCGSCCFKRCGSCCDEYGGHQDSIVIINISAHED
JHM-X_spike	IFANILLNGINSCTTCTDLDLQLENTAVATGVCVRDYLYGTTGQGVKEVKADYNSWQAL	JHM-X_spike	WLLIGLAGVAVCVLLFFPICCTGCGSCCFKRCGSCCDEYGGHQDSIVIINISAHED
cl-2_spike	LYDVNGNLNGFRDLTNNKTYYIRSCYSGRVSAAYHKEAPEPALLYRNIMCSTVFTNNISR		
JHM-X_spike	LYDVNGNLNGFRDLTNNKTYYIRSCYSGRVSAAYHKEAPEPALLYRNIMCSTVFTNNISR		

**Figure S1.** Amino acid sequence alignment of cl-2 and JHM-X spike proteins. The amino acids marked in yellow indicate the 153 amino acid deletion in the HVR of the JHM-X spike protein, and green indicates other mutations.