

## SUPPLEMENTARY FIGURES

### Surface Glycoprotein Sars-CoV-2 (YP\_009724390.1)

MFVFLVLLPLVSSQCVNLT**TRTQLPPAYTNSFTRGVYY**PDKVFRSSVLHSTQDLFLPFFSN  
 VTWFHAIHVSGTNGTKRFDNPVLPFNDGVYFASTEKSNIIRGWIFGTTLDSTQSLIVNN  
 ATNVVIKVCFFQFCNDPFLG**VYYHKNNKSWMESEFRVY**SSANNCTFEYVSQPFLMDLEGKQ  
 GNFKNLREFVFKNIDGYFKIYKHTPINLVRDLPQGFSALEPLVDLPIGINITRFQTLAL  
 HRSYLTPGDSSSGWTAGAAAYVGYLQPRTELLKYNENGITDAVDCALDPLSETKCTLKS  
 FTVEKGIYQTSNFRVQPTESIVRFPNITNLCPFGEVFNA**TRFASVYAWNRRKRISN**CVADYS  
 VLYNSASFSTFKCYGVSPKTLNLCFTNVYADSFVIRGDEV**RIAPGQTGKIADYNYKLPD**  
 DFTGCVIAWNSNNLD**SKVGGNYNYLYRLFRKSNLKPFERDIST**EIYQAGSTPCNGVEGFNC  
**YFPLQSYGFQPTNGVGY**QPYRVVLSFELLHAPATVCGPKKSTNLVKNKCVNFN**FNGLTGT**  
**GVL****TESNKKFLPFQOQGRDIADTTDAVRDP**QTLIELDITPCSFGGVSVITPGTNTSNQVAV  
 LYQDVNCTEVPVAI**HADQLTPTWRVYSTGSN**VFQTRAGCLIGAETHVNNSECDIPIGAGIC  
**ASYQTQTNSPRRARS**SVASQSI IAYTMSLGAENSVAYSNNNSIAIPTNFTISVTTEILPVSM  
 KTSVDCMTYICGDSTECNLLQYGSFCTQLNRALTGIAVEQDKNTQEVFAQVKQIYKTPP  
 IKDFGGFNFSQ**ILPDPSKPSKRSFIEDLLFNKV**TLADAGFIKQYGDCLGDIAARDLCAQK  
 FNGLTVLPPLLTDEMIAYTSALLAGTITSGWTFGAGAAQIPFAMQMAYRFNGIGVTQNV  
 LYENQKLIANQFNSAIGKIQDSLSTASALGKLQDVVNQNAQALNTLVKQLSSNFGAISV  
 LNDILSRDKVEAEVQIDRLITGRLQSLQTYVTQQLIRAAEIRASANLAATKMSECVLGQS  
 KRVDFCGKGYLHMSFPQSAPHGVVFLHVTYVPAQEKNTTAPAICHGDKAHFPREGVFVSN  
 GTHWFVTQRNFYEPQIITDNTFVSGNCDVVIIGIVNNTVYDPLQPELDS**FKEELDKYFKNH**  
**TSPVDLGL**ISGINASVUNIQKEIDRLNEVAKNLNESLIDLQELGKYEQYIKWPWYIWLGF  
 IAGLIAIVMVTIMLCCMTSCCCLKGCCSCGSCCKFDEDDSEPVLLKGVKLHYT

- S1 subunit: 14-685 aa
  - S1 RBD: 319-541 aa
  - S2 subunit: 686-1273 aa
- Selected epitopes**

### Nucleocapsid Phosphoprotein (YP\_009724397.2)

MSDNGPQNQRNAPRITFGGPSDS**TGSNONGERSGARSKORRPOGL**PNNNTASWFTALTQHGK  
 EDLKFPRGQGVPI**NTNSPDDQIGYYRRATRR**IRGGDGKMKDLSRWYFYLLGTGPEAGLP  
 YGANKDGIWVATEGALNTPKDHIGTRNPANNAIIVLQLPQGTTLPGFYAEGSRGGSQAS  
**SRSSSRSRNSRNSTPGS**SRGTSPARMAGNGGDAALALLLDRLNQLESKMSGKGQQQQ**GO**  
**TVTKKSAAEASKKPRQKRT**ATKAYNVTQAFGRRGPEQTQGNFGDQELIRQGTDYKHWPQIA  
 QFAPSASAFFGMSRIGMEVTPSGTWLTYTGAIKLDDKDPNFKDQVILLNKHIDAYKTFPPT  
 EPKKDKKKKADETQALPQRQKKQQTVTLLPAADLDDFSKQLQSMSSADSTQA

- N protein: 1-419aa
- Selected epitopes**

**Supplementary Figure S1. Identification of linear B-cell epitopes by bioinformatics analysis.**  
 The amino acid sequences of surface glycoprotein (YP\_009724390.1) and nucleocapsid phosphoprotein (YP\_009724397.2) proteins were evaluated by bioinformatics tools. Four linear B-cell epitopes were selected from N protein and eleven from S protein.

## Surface glycoprotein

<b>Sars-CoV-2</b>	--MFVFLVLLPLVS-----SQCVNL <b>TTRTQLPPAYTNSFTRGVVYP</b>
Sars-CoV-1	--MFIFLLFLTLTSGS-----DLDRCTTFDDVQAPNYTQHTSSMRGVVYP
HCoV-229E	--MFVLLVA-----
HCoV-NL63	MKLFLILLVLPLASCFFTCNSNANLSMLQLGVPDSSSTIVTGLLPTHWFCANQSTSVYSA
HCoV-OC43	--MFLILLISLPTAFAVIGDLNCPLDPKLGSGFNNRDTGSPSISTDTVD-VTNGLGTYIV
HCoV-HKU1	---MLLIIIFILPTTLAVIGDFNCTNF-----AINDKNTTVPRISEYVVD-VSYGLGTYII
MERS-CoV	MIHSVFLLMFLLTPTESYVDVGPDSVKSACIEVDIQQTFFDKTWPRPID-VSKADGIYYP
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<b>Sars-CoV-2</b>	DKVFRSSVLHSTQDLFLPF---FSNVTWFHAIHVS GTNGTKRF---DNPVLPFNDGVYF
Sars-CoV-1	DEIFRSDTLYLTQDLFLPF---YSNVTGFHTINHTFGNP-----VIPFKDGIYF
HCoV-229E	-----YALLHIAGCQTNGTN-----
HCoV-NL63	NGFFYIDVGNHRSFALHTGYIDANQYIIYVTNEIGLNASVTL-----KICKFSRNTTF
HCoV-OC43	LDRVYLNNTTLFLNGYYPTSGSTYRNMALKGTDLLSTLWFKPPF-----LSDFINGIFA
HCoV-HKU1	LDRVYLNNTSILFTGYFPKSGANFRDLSLKGTTYLSTLWYQKPF-----LSDFNNGIFS
MERS-CoV	QGRYSNITITYQGLF-PYQGDHGDYVYSAGHATGTTTPQKLFVANYSQDVKQFANGFVV
<b>Sars-CoV-2</b>	ASTEKSN-----IIRGWIFGTTLDSKT-----QSL---LIVNNA
Sars-CoV-1	AATEKSN-----VVRGWVFGSTMNKS-----QSV---IIINNS
HCoV-229E	-----
HCoV-NL63	DFLSNASSSFDCIVN-----LLFTEQLGAPLGITISGETVRLHLYNVTRTFYVPA
HCoV-OC43	KVKNTKVFKGDMYS-----EFPATIGSTFVNTS-----YSV---VVQPRT
HCoV-HKU1	RVKNTKLYVNKTLYS-----EFSTIVIGSVFINNS-----YTI---VVQPHN
MERS-CoV	RIGAAANSTGTVIIISPSTSATIRKIYP AFMLGSSVGNFSDGKMGRFFNHTL---VLLPDG
<b>Sars-CoV-2</b>	TNV-----VIKV-----CEFQFCND-----PFLG <b>VY</b>
Sars-CoV-1	TNV-----VIRA-----CNFELCDN-----PFFAVS
HCoV-229E	-----TSHSVCNGCVGHSENVFAVESGGY
HCoV-NL63	YKLTKL SVKCYFNYSVFSVFNATVTNVNTHNGRVVNYTVCDDCNGYTDNIFSVQQDGR
HCoV-OC43	INSTQDGVNKLQGLLEV-----SVCQYNMCEH-----PHTICH
HCoV-HKU1	-----GVLEI-----TACQYTMCEY-----PHTICK
MERS-CoV	CGT-----LLRAFYCILEPRSGNHCPAGNSHTSFATYHT-----PATDCS
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<b>Sars-CoV-2</b>	<b>YHKNN---KSWMESEFRVY</b> SSANNCTFEY---VSQPFLMDLEGKQGNFKNLR EFVFKNID
Sars-CoV-1	KPMGT-----QTHTMIFDNAFNCTFEY---ISDAFSLDVSEKSGNFKHLREFVFKNKD
HCoV-229E	IPSNFAFNWFLLTNTSSVDGVVRSFQ-----PLLNLCLWSVSGSQFTTG FVYFNGT
HCoV-NL63	IPNGFFFNWFLLTNGSTLVDGVSRLYQ-----PLRLTCLWPVPLKSGTG FVYFNAT
HCoV-OC43	PNLGNHFKEW-HLDTGVVSCLYKRNFTY-----DVNATYLY-----FHFYQEG
HCoV-HKU1	SK-GSFRNESW-HFDKSEPLCLFKKNFTY-----NVSTDWLY-----FHFYQER
MERS-CoV	D--GNYNRNAS-LNSFKEYFNLRNCTFMYTYNITEDEILEWFGITQTAQGVHLFSSR---
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<b>Sars-CoV-2</b>	GY---FKIYSKHTPINLVRDLPQGFSALEPLVDLPIGINI--TRFQTLLALHR-SYLT PG
Sars-CoV-1	GF---LYVYKGYQPIDVVRDLP SGFNTLKPIFKLPLGINI--TNFRAILTAFS-----P
HCoV-229E	GRGA-CKGFYSNASSDVIR-----YNIN-FEENLRRTILFKTSYGAVVFYCTNNTLVSG
HCoV-NL63	GSDVNCNGYQHNSVVDVVR-YNLNFSAN-SLDNLKSGVIVFKTLQYDVLFYCSNSSSGVL
HCoV-OC43	GT---FYAYFTDT-----GFVTK-FLFNVLGMAL--SHYYVMPLTCI-----S
HCoV-HKU1	GT---FYAYADS-----GMPTT-FLFSLYLGTLL--SHYYVLPLTCNAISSNTD
MERS-CoV	-Y---VDLYGG---NMFQ-----FATL-PVYD-----T---IKYYSIIPHSI-RSIQSD
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<b>Sars-CoV-2</b>	DSSSGWTAGAAAYYVGYLQPRTFLLKYNENGTITDAVDCALDPLSETKCTLKSFTVEK-G
Sars-CoV-1	AQDI-WGTSAAYYFVGYLKPTTFMLKYDENGITITDAVDCSQNPLAELKCSVKSFEIDK-G
HCoV-229E	DAHIPSGTVLGNFYCF-----VNTTIGN--ETTSFVGVGALPKTVREFVISRTG
HCoV-NL63	DTTIPFGPSSQPYCF-----INSTINT--THVSTFVGILPPTVREIVVARTG
HCoV-OC43	RRDIGF---TLEYWVTPLTRQYLLAFNQDGIIFNAVDCMSDFMSEIKCKTQSIAPPT-G
HCoV-HKU1	NETLQY-----WVTPLSKRQYLLKFDNRGVITNAVDCSSSFFSEIQCKTKSLLPNT-G
MERS-CoV	RKA--W---AAFYVYKLQPLTFLLDFSVDGYIRRAIDCGFNDLSQLHCSYESFDVES-G
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<b>Sars-CoV-2</b>	IYQTSNFRVQPTESIVRFPNITNLCPFGEVFNA <b>TRFASVYAWNRRKRISN</b> CVADYS-----

Sars-CoV-1 IYQTSNFRVVPSPGDVVRFPNITNLCPFGEVFNAT**KF**PSVYAW**ERK**KISNCVADYS-----  
HCoV-229E HFYINGRYFSLGNV-----EAVNFNVTNAATTVCT---VALASYADVLNVNSQTAIA  
HCoV-NL63 QFYINGFKYFDLGFI-----EAVNFN--VTTASATDFWTVAFATFVDVLNVNSATNIQ  
HCoV-OC43 VYELNGYTVQPIADVYRRKPDLPNCNIEAWLNDKSVSPPLNWERKTFSNCFNMS-----  
HCoV-HKU1 VYDLSGFTVKPVATVHRRIPDLPCDIDKWLNNFNVPSPLNWGRKIFSNCFNLS-----  
MERS-CoV VYSVSSFEAKPSGSVVEQAEGVE-CDFSPLLSGTP-PQVYNFKRLVFTNCNYNLT-----  
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**Sars-CoV-2** -VLYNSASFSTFKCYGVSPTKLNLCFTNVYADSFVIRGDEV**R-QIAPGQTGKIADYNYK**  
Sars-CoV-1 -VLYNSTFFSTFKCYGVSATKLNLCFSNVYADSFVVGDDVR-QIAPGQ**TGVI**ADYNYK  
HCoV-229E NIIYCNSVINRLRCDQLSFDVDPG-FYSTSPIQPVELPVSVISLPVYHKHTFIVLYVNF  
HCoV-NL63 NLLYCDSPFEKLQCEHLQFGLQDG-FYSANFLDDNVPETYVALPIYYQHT---DINFT  
HCoV-OC43 -SLMSFIQADSFTCNNIDAAKIYGMCFSSITIDKFAIPNRRKV-DLQLGNLGYLQSSNYR  
HCoV-HKU1 -TLLRLVHTDSFSCNFDISKIYGSCFKSIVLDKFAIPNSRRS-DLQLGSSGFLQSSNYK  
MERS-CoV -KLLSLFSVNDFTCQISPAAIASNCYSSLLIDYFSYPLSMKS-DLSVSSAGPISQFNYK  
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**Sars-CoV-2** LPDDFTGCVIAWNSNNLDSKVG**G---NY-NYLYRLFRKS**-----  
Sars-CoV-1 LPDDFMGCVLAWNTRNIDATSTG---NY-NYKYRYLRHG-----  
HCoV-229E HQRGPGKC-YNCRPAVINITLANFNETKG-PLCVDTSHT-----TQF  
HCoV-NL63 ATASFGGSCYVCKPHQVNI SLNG---NT-SVCVRTSHFS-----IRY  
HCoV-OC43 IDTTATSCQLYYNLPAANVSVSFRNPSTW-NKRFGFIEDSVFVPQPTGVFTNHSVVYAQH  
HCoV-HKU1 IDTTSSSCQLYSLPAINVTINNYPSSW-NRRYGFNNFN-----LSSHSVVYSRY  
MERS-CoV QSFNPTCLILATVPHNLTITTKPLKYSYINKCSRLLSDD-----  
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**Sars-CoV-2** -----**NLKPFFERDIST**EIYQAGSTPCNGV-----EGF  
Sars-CoV-1 -----KLRPFFERDISNVFSPDGKPCPTP-----AL  
HCoV-229E VDNVK-----LARWSASINTGNCPFSFG-----KV  
HCoV-NL63 IYNRVKSGSPG-----DSSWHIYKSGTCPFSSFS-----KL  
HCoV-OC43 CFKAPKNFCPC-----SSCPGKNNGIGTCPAGTNSLTCDNL-----CTLDPI  
HCoV-HKU1 CFSVNNTFCPCAKPSFASCKSHKPPSASCPIGTNYRSCESTTVLDHTDWCRCSCLPDPI  
MERS-CoV -----RTEVPQLVNAVQYSPCVSI-----VPS

**Sars-CoV-2** NCY**FPLQSYGFQPTN--GVGY**QPYRVVV-----LSFE----L  
Sars-CoV-1 NCYWPLNDYGFYTTT--GIGYQPYRVVV-----LSFE----L  
HCoV-229E INFVKFGSVCFLKYPGGCAMPIMANLV-----NHKSHNIGSLYVSWSDGDVI  
HCoV-NL63 NNFQKFKTICFSTVEVPGSCNFPLEATWH-----YTSYTIYGALYVTWSEGNSI  
HCoV-OC43 TFKAPDTYKCPQTKSLVGIGEHCSGLAVKSDYCG-----NNSCTQPQAFLGWSADSC  
HCoV-HKU1 TAYDPRS--CSQKSLVGVGEHCAGFGVDEEKCGVLDGSYNVSCLCSTDAFLGWSYDTCV  
MERS-CoV TVWEDGDYYRKQLSPLEGGGWLVAS-----GSTVAMTEQLQMGFGITVQY  
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**Sars-CoV-2** LHAPATVC-----GPKKSTNLVKNK-----CVNFNFNGLTGTGVL**TESNKKFL**  
Sars-CoV-1 LNAPATVC-----GPKLSTDLIKNQ-----CVNFNFNGLTGTGVL**PSSKRFL**  
HCoV-229E TGVPKPVE-----GVSSFMNVTLNK-----CTKYNIYDVSGVGIRISNDFTL  
HCoV-NL63 TGVYPYVS-----GIREFSNLVLNN-----CTKYNIYDVGTGIIRSSNQSLA  
HCoV-OC43 QGDKCNIFANFILHDVNGLTCSTDLQKANTEIELGVCVNYDLYGISGQGFVEVNATYY  
HCoV-HKU1 SNNRCNIFSNFILNGINS GTTCSNDLLQSNTEVFTDVCADYDLYGITGQGFKEVS AVYY  
MERS-CoV GTDNTSVCP-----KLEFANDTKIAS---QLGNCVEYSLYGVSGRGVFQNTAVGV  
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**Sars-CoV-2** **P-FQQFGRDI-ADTTDAVRDPQ**TLEILDITPCSFGGVSVITPGTNTSNQVAVLYQDVNCT  
Sars-CoV-1 P-FQQFGRD**V-SDF**TD**S**VRDPKTSEILDISPCSFGGVSVITPGTNASSEVAVLYQDVNCT  
HCoV-229E N-GITYTSTS-GNLLG-FKDVTNGTIYSITPCNPPDQLVVYQQAVVGAMLSNFTSYG--  
HCoV-NL63 G-GITYVSNS-GNLLG-FKNVSTGNIFIVTPCNQPDQVAVYQQSIIGAMTAVNESRYG--  
HCoV-OC43 NSWQNLLYDSNGNLYG-FRDIYITNRTFMIHSCYSGRVSAAYHANSPEP--ALLFRNLKCN  
HCoV-HKU1 NSWQNLLYDSNGNIIG-FKDFTVNTKTYNIFPCYAGRVSAAFHQNASL--ALLYRNLKCS  
MERS-CoV R-QQRFVYDAYQNLVGYYS--DGNYYCLRACVSVPSVVIYDKETKTH--ATLFGSVACE  
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**Sars-CoV-2** EVPVAI--**HADQLTPTRVYSTGSN**VFQTRAGCLIGAEHVNSY---ECDIPIGAGICAS  
Sars-CoV-1 DVSTAI--HADQLTP**AWRI**YSTGNNVFQTAGCLIGAEHVDTSY---ECDIPIGAGICAS  
HCoV-229E -----FSN-VVEMPKFFYASNGTY---NCTDAV-LTYSSF-----GVCAD  
HCoV-NL63 -----LQN-LLQLPNFYVSNNGN---NCTTAV-MTYSNF-----GICAD  
HCoV-OC43 YV-----FNNSLTRQLQPINYSFDSY---LGCVVNA-YNSTAISVQTCDLTVGSGYCV  
HCoV-HKU1 YV-----LNN-ISLATQPY---FDSY---LGCVFNA-DNLTDSVSSCALRMGSGFCVD

MERS-CoV	HISSTMSQYSRSTRSMLKRRDSTYGPLQTPVGCVLG--LVNSSLFVEDCKLPLGQSLCAL
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<b>Sars-CoV-2</b>	<b>YQTQ--TNSPRRARS</b> VASQ---SIIAYTMSLGAENSVAY--SNNSIAIPTNFTISVTTEI
Sars-CoV-1	YHTVS--LLRSTSQKSI-----VAYTMSLGADSSIAI--SNNTIAIPTNFSISITTEV
HCoV-229E	G-----SIIAVQPRNVSYD-----SVSAIVTA-----NLSIPSNWTTTSVQVEY
HCoV-NL63	G-----SLIPVRPRNSSDN-----GISAITA-----NLSIPSNWTTTSVQVEY
HCoV-OC43	Y-----SKNRRSRRAITTGYRFTNFEPFTVNSVNDLSLEPVGGLYEIQIPSEFTIGNMEEF
HCoV-HKU1	YNPSSSSSSRKRRSISASYRFVTFEFPNVSVFVNDIESVGGLYEIKIPTNFTIVGQEEF
MERS-CoV	PDTFS--TLTPRSVRSVPGEMRLASIAFNHPIQVDQLNSS---YFKLSIPTNFSFGVTQEY
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<b>Sars-CoV-2</b>	LPVSMTKTSVDCTMYICGDSTECSNLLQYGSFCTQLNRALTGIAVEQDKNTQEVFAQVK
Sars-CoV-1	MPVSMAKTSVDCNMYICGDSTECANLLQYGSFCTQLNRALSGIAAEQDRNTREVFAQVK
HCoV-229E	LQITSTPIVDCSTYVCNGNVRCVELLKQYTSACKTIEDALRNSAMLESADVSEMLTFDK
HCoV-NL63	LQITSTPIVDCATYVCNGNPRCKNLLKQYTSACKTIEDALRLSAHLETNDVSSMLTFDS
HCoV-OC43	IQTSSPKVTIDCAAFVCGDYAACKLQLVEYGSFCDNINAILTEVNELLDTTQLQVANSML
HCoV-HKU1	IQTNSPKVTIDCSLFVCSNYAACHDLLSEYGTFCDNINSILDEVNGLLDTTQLHVADTLM
MERS-CoV	IQTTIQKVTVDCQYVCNGFQKCEQLLREYQGFCSKINQALHGANLRQDDSVRNLFASVK
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<b>Sars-CoV-2</b>	Q-IYKTPPIKDFGGF-----NFS-QILP----DPSKPSKRSFIEDLLFNKVT
Sars-CoV-1	Q-MYKTPTLKYFGGF-----NFS-QILP----DPLKPTKRSFIEDLLFNKVT
HCoV-229E	K-AFTLANVSSFGDY-----NLS-SVIPSLPRSGSRVAGRSAIEDILFSKLVTSGLGTVD
HCoV-NL63	N-AFSLANVTSFGDY-----NLS-SVLPQRNIRSSRIAGRSAEDLLFSKVVTSGLGTVD
HCoV-OC43	NGVTLSCLKLDGVNFNVDDINF-S-PVLGCLGSECSKASSRSAIEDLLFDKVKLSDVGFVE
HCoV-HKU1	QGVTLSSNLNTNLHFDVDNINF-S-SRSGCLGPHCGS--SSRSFFEDLLFDKVKLSDVGFVE
MERS-CoV	S-SQSSPIIPGFGG-----DFNLTLEPVSISTGSRARSIAIEDLLFDKVTIADPGYMQ
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<b>Sars-CoV-2</b>	Q-YGDCL--GDIAARDLICAQKFNGLTVLPPLLTDEMIAQYTSALLAGTITSGWTFGAGA
Sars-CoV-1	Q-YGECL--GDINARDLICAQKFNGLTVLPPLLTDMIAAYTAALVSGTATAGWTFGAGA
HCoV-229E	ADYKKT--KGLSIADLACAQYYNGIMVLPGVADAERMAMYTGSLIGGIALGGLTSAAS-
HCoV-NL63	VDYKST--KGLSIADLACAQYYNGIMVLPGVADAERMAMYTGSLIGGMVLGGLTSAAS-
HCoV-OC43	A-YNNCT--GGAERDLICVQSYKGIKVLPLLSENQISGYTLAATSASLFPFWTAAAG-
HCoV-HKU1	A-YNNCT--GGSEIRDLLCVQSFNGIKVLPILSESQISGYTTAATVAAMFPWWSAAAG-
MERS-CoV	G-YDDCMQQGPASARDLICAQYVAGYKVLPLMDVNMEAAYTSSLLGSIAGVGWTAGLSS
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<b>Sars-CoV-2</b>	ALQIPFAMQMAYRFNGIGVTVQNVLYENQKLIANQFNQSAIGKIQDSLSTAS-----
Sars-CoV-1	ALQIPFAMQMAYRFNGIGVTVQNVLYENQKLIANQFNKAISIQESLTTTST-----
HCoV-229E	---IPFSLAIQSRNLNYVALQTDVLQENQRILAASFNKAMTNIVDAFTGVNDAITQTSQAL
HCoV-NL63	---IPFSLALQARLNYVALQTDVLQENQKILAASFNKAINNIVASFSSVNDAITQTAEAI
HCoV-OC43	---VPFYLVQYRINGLGVTMVLSQNKLIANAFNNALHAIQQGFATNS-----
HCoV-HKU1	---IPFSLNVQYRINGLGVTMVVLNKNQKLIATAFNNALLSIQNGFSATNS-----
MERS-CoV	FAAIPFAQSIIFYRLNGVGITQQVLSQNKLIANKFNQALGAMQTGFTTTNE-----
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<b>Sars-CoV-2</b>	-----ALGKLQDVVNQNAQALNTLVKQLSSNFGAISSVLNDILSRDKVEAEVQIDRLIT
Sars-CoV-1	-----ALGKLQDVVNQNAQALNTLVKQLSSNFGAISSVLNDILSRDKVEAEVQIDRLIT
HCoV-229E	QTVATALNKIQDVVNQQGNSLNHLTSQLRQNFQAISSSIQAIYDRLDIIQADQQVDRLIT
HCoV-NL63	HTVTIALNKIQDVVNQQGSALNHLTSQLRHNQFQAISSSIQAIYDRLDSIQADQQVDRLIT
HCoV-OC43	-----ALVKIQAVVNANSEALNLLQQLSNRFGAISASLQEILSRDLAEAEQIDRLIN
HCoV-HKU1	-----ALAKIQSVVNSNAQALNSLLQQLFNKFGAISSSLQEILSRDLAEAEQVQIDRLIN
MERS-CoV	-----AFRKVQDAVNNAQALSKLASELSNTFFGAISASIGDIIQRLDVLEQDAQIDRLIN
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<b>Sars-CoV-2</b>	GRLQSLQTYVTQQLIRAAEIRASANLAATKMSECVLGQSKRVDFCGKGYHLSMFPQSAPH
Sars-CoV-1	GRLQSLQTYVTQQLIRAAEIRASANLAATKMSECVLGQSKRVDFCGKGYHLSMFPQAAPH
HCoV-229E	GRLLALNVFVSHTLTKYTEVRASRQLAQKQVNECVKSQSKRYGFCGNGTHIFSLVNAAPE
HCoV-NL63	GRLLALNAFVSQVLNKYTEVRGSRRLAQKQKINECVKSQSNRYGFCGNGTHIFSIVNSAPD
HCoV-OC43	GRLTALNAYVSQQLSDSTLVKFSAAQAMEKVNECVKSQSSRINFCGNGNHISLVQNAPY
HCoV-HKU1	GRLTALNAYVSQQLSDISLVKFGAALAMEKVNECVKSQSPRINFCGNGNHISLVQNAPY
MERS-CoV	GRLTTLNAFVAQQLVRSESAALSQAQLAKDKVNECVKAQSKRSGFCGQGTHIVSFVVNAPN
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<b>Sars-CoV-2</b>	GVVFLHVTYVPAQEKNFTTAPAICHDG---KAHFPREGVFVSNGTH-----WFVTQRNFI
Sars-CoV-1	GVVFLHVTYVPSQERNFTTAPAICHEG---KAYFPREGVFVFNGTS-----WFITQRNFI



HCoV-OC43	ADGNQRQLLPWYFYLLGTGPHAKDQYGTIDGVFWVASNQADVNTPADIVDRDPSSDEA
HCoV-HKU1	ADGQKQLLPWYFYLLGTGPHYASSYGDAHEGIFWVASHQADTSIPSDVSARDPTIQEA
HCoV-229E	RKGRVDLSPKLHFYLLGTGPHKDAKFRERVEGVVWVAVDGAKTEP-TGYGVRKKNSEPE
HCoV-NL63	RRGQRVDLPKVFHYLLGTGPHKDLKFRQRSDGVVWVAKEGAKTVN-TSLGNRKNQKPL
MERS-CoV	GNG-IKQLAPRWYFYTTGTGPEALPFAVKDGIWVHEYGATDAP-STFGTRNPNNDASA
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<b>SARS-CoV-2</b>	IV---LQLPQGTTLPGFYAEGSRGGSQASS <b>SRSSSR--SRNSSRNSTPGSS</b> SRGTSPARMA
SARS-CoV-1	TV---LQLPQGTTLPGFYAEGSRGGSQASSR <b>SSSR--SRGN</b> SRNSTPGSSRGNSPARMA
HCoV-OC43	IP---TRFPPTVLPQGYIEGSG-----RSAPN--SRSTRTSSRAFSAGS--RSRA
HCoV-HKU1	IP---TRFSPGTILPQGYIEGSG-----RSASN--SRPGSRSSRGPNNRS--LSRS
HCoV-229E	IPHFNQKLPGVTVAE---EPDSRAPSRSSQSRSSQSR--SRGESKSSRNPPSSDR--NHNS
HCoV-NL63	EPKFSIALPELSVVE--FEDRSNNSSRASSRSSTRNNSRDSSRSTSRQQSRTRSDSNQS
MERS-CoV	IV---TQFAPGTKLPKNFHIEGTGGNSQSSSRASSV--SRNSSRSSSQSGSRSGN--STRG
	: . : : : * : . * * * . : :
<b>SARS-CoV-2</b>	GNGGDAALALLL-----LDRLNQLESKMSGKGQQQQ <b>G-----QTVTKK</b>
SARS-CoV-1	SGGGETALALLL-----LDRLNQLESKMSGKGQQQQG-----QTVTKK
HCoV-OC43	SSGNRAPTSVGPDMADQ---IASLVLA KLKGDATKPPQVVT-----KHTAKE
HCoV-HKU1	NSNFRHSDSIVKPDMADE---IASLVLA KLKGD-SKPQVVT-----KQNAKE
HCoV-229E	QDDIMKAVAAALKSLGFDKPKQEKDKSAKTGTPKPSRNQSPASSQSAKILARSQSSETK
HCoV-NL63	SSDLVAAVTLALKNLGFD---NQSKSPSSSGTSTPKKPNKP-----LSQPRS
MERS-CoV	TSPGSPSIGAVGGDLLY---LDLLNRLQALESGKVKQSQP-----KVITKK
	. . . . .
<b>SARS-CoV-2</b>	<b>SAAEASKKPRQKRT</b> ATKA--YNVTQAFGRRGPEQTQGNFGDQELIRQGTDYKHWPQIAQF
SARS-CoV-1	SAAEASKKPRQKRTATKQ--YNVTQAFGRRGPEQTQGNFGDQDLIRQGTDYKHWPQIAQF
HCoV-OC43	VRQKILNKPRQKRSPNKQ--CTVQQCFGKRGPNQ---NFGGGEMLKLGTSDPQFPILAEL
HCoV-HKU1	IRHKILMKPRQKRTPNKF--CNVQQCFGKRGPLQ---NFGNSEMLKLGTNDPQFPILAEL
HCoV-229E	EQKHMEQKPRWKRQPNDDVTSNVTQCFGPRDLDH---NFGSAGVVANGVKAKGYPQFAEL
HCoV-NL63	DKPSQLKKPRWKRVPTR--ENVIQCFGPRDFNH---NMGDSDLVQNGVDAGFPQLAEL
MERS-CoV	DAAAANKMRHKRTSTKS--FNMVQAFGLRGPGDLQGNFGDLQLNKLGTEDPRWPQIAEL
	* * . * * . . : : * * * * * * : * : * . : * : * :
<b>SARS-CoV-2</b>	APSASAFFGMSRIGMEVTPS-----GTWLTYTGAIKLDDKDPNFKDQVILLNKH
SARS-CoV-1	APSASAFFGMSRIGMEVTPS-----GTWLTYHGAIKLDDKDPQFKDNVILLNKH
HCoV-OC43	APTAGAFFFGSRLELAKVQNLSGNPDEPQKDVEYELRYNGAIRFDSTLSGFETIMKVLNEN
HCoV-HKU1	APTGAFFFGSKLELFRKDS---DADSPSKDTFELRYSGSIRFDSTLPGFETIMKVLKEN
HCoV-229E	VPSTAAMLFDSHIVSKESGN-----TVVLTFTRVTVPKDHPHLGKFL---EE
HCoV-NL63	IPNQAALFFDSEVSTDEVGD-----NVQITYTYKMLVAKDNKNLPKFI----EQ
MERS-CoV	APTASAFMGMSQFKLTHQNN-----DDHGNPVYFLRYSGAIKLDPKNPNYNKWLLELQEN
	* . . * : * . . : : : : : :
<b>SARS-CoV-2</b>	IDAY-----KTFPPTEPK--KDKKKKADETAQALPQRQKKQQTVTLLPAADLDDF
SARS-CoV-1	IDAY-----KTFPPTEPK--KDKKKKTDEAQLPQRQKKQPTVTLLPAADMDDF
HCoV-OC43	LNAY---QQQDGMNMSPKPRQRGLKNGQGENDNISVASPKSRVQQNKSRELTAEDISL
HCoV-HKU1	LDAYVNSNQNTVSGSLSPKPRQRGRGVKQSPESFDSLNLSDADTQHISN----DFTPEDHSL
HCoV-229E	LNAF-----TREMQQQLLNPSALEFNPSQTSPTATV--EPVRDEVSI
HCoV-NL63	ISAF-----TKPSSIKEMQSSSHVAQNTVLNASIPES-----KPLADDDSA
MERS-CoV	IDAY-----KTFPKKEKKQKAPKEESTDQMSEPPKEQRVQGSIT-QRTRTRPSV
	: . * : . . . : : : :
<b>SARS-CoV-2</b>	SKQLQQSMS--SADSTQA
SARS-CoV-1	SRQLQNSMSGASADSTQA
HCoV-OC43	LKKMDEPY---TEDTSEI
HCoV-HKU1	LATLDDPY---VEDSVA-
HCoV-229E	ETDI-----IDEVN--
HCoV-NL63	IIEI-----VNEVLH-
MERS-CoV	QPGP-----MIDVNTD
	:

**Supplementary Figure S2: Amino acid sequence alignment of N4S11-CoV2 and some other CoV virus of interest.** Alignment was conducted by the CLUSTAL multiple sequence alignment / MUSCLE (3.8). Legend: Asterix (\*) positions with a single, fully conserved residue. Colon (:) positions with conservation between amino acid groups of similar properties. Period (.) positions with conservation between amino acid groups of weakly similar properties. S protein accession numbers: YP\_009724390.1 Surface glycoprotein [SARS-CoV-2], P59594.1 Spike glycoprotein

[SARS-CoV], K9N5Q8.1 Spike glycoprotein [MERS-CoV], QNT54842.1 surface glycoprotein [Human coronavirus 229E], AIX10763.1 Spike glycoprotein [Human coronavirus OC43], YP\_003767.1 spike protein [Human coronavirus NL63], AXT92555.1 spike glycoprotein [Human coronavirus HKU1]. N protein accession number: YP\_009724397.2C Nucleocapsid phosphoprotein [SARS-CoV-2], P59595.1 Nucleocapsid protein [SARS-CoV], K9N4V7.1 Nucleocapsid protein [MERS-CoV], WDE18042.1 surface glycoprotein [Human coronavirus 229E], QDH43730.1 N [Human coronavirus OC43], QED88044.1 nucleocapsid protein [Human coronavirus NL63], AYN64565.1 nucleocapsid phosphoprotein [Human coronavirus HKU1].



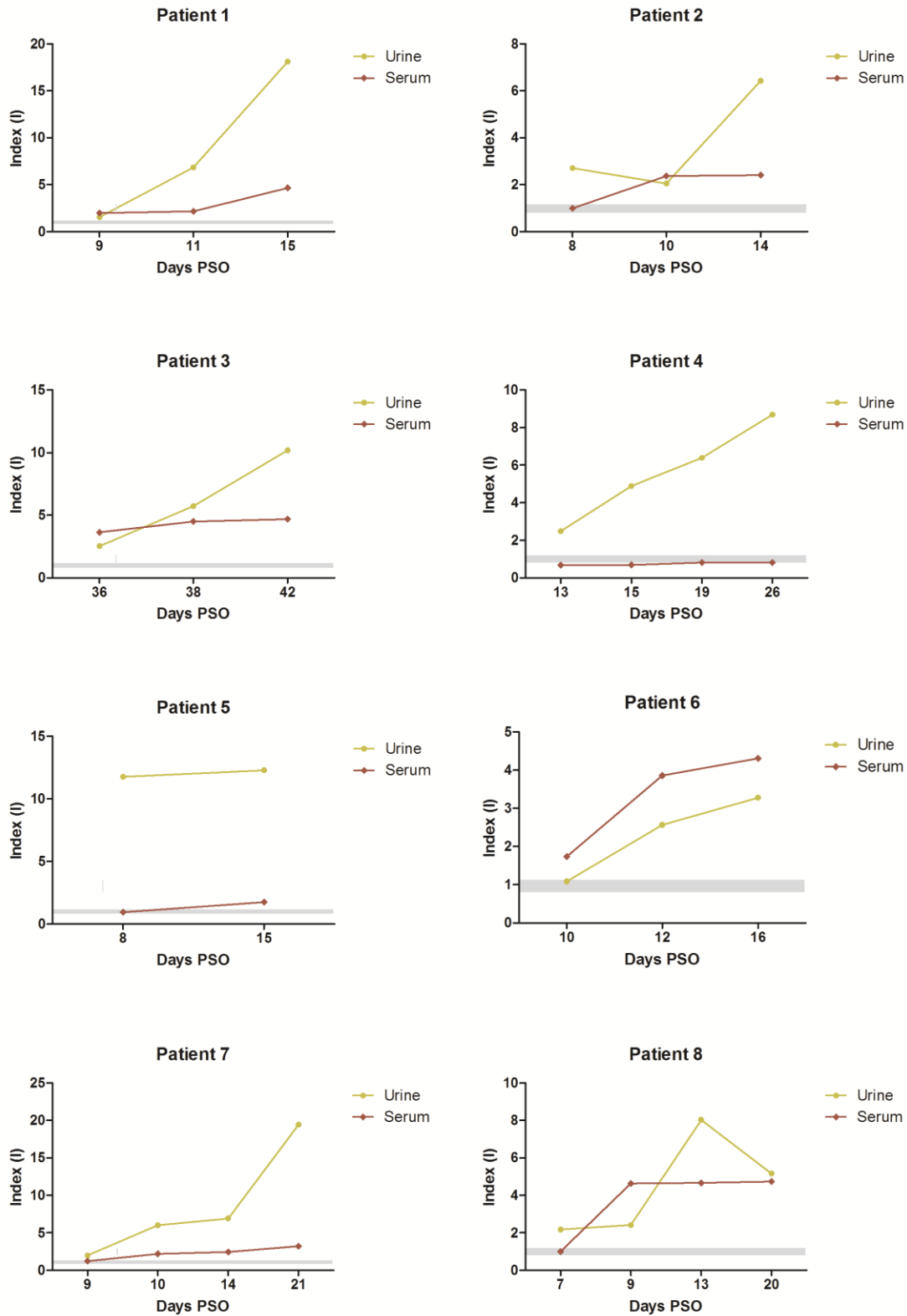
Sars-CoV- 2 Variants	Pep 1 - S1 subunit	Pep 2 - S1 subunit	Pep 4 - RBD S1 subunit	Pep 5 - RBD S1 subunit	Pep 7 - RBD S1 subunit
N4S11-SC2	TRTQLPPAYTNSFTRGVYY	VYYHKNNKSWMESEFRVY	TRFASVYAWNRRKRISN	QIAPGQTGKIADYNYKLP	SKVGGNYNYLYRLFRKSNLKPFFERDIST
Alpha	TRTQLPPAYTNSFTRGVYY	VYYHKNNKSWMESEFRVY	TRFASVYAWNRRKRISN	QIAPGQTGKIADYNYKLP	SKVGGNYNYLYRLFRKSNLKPFFERDIST
Beta	TRTQLPPAYTNSFTRGVYY	VYYHKNNKSWMESEFRVY	TRFASVYAWNRRKRISN	QIAPGQTGNIADYNYKLP	SKVGGNYNYLYRLFRKSNLKPFFERDIST
Gamma	NRTQLPSAYTNSFTRGVYY	VYYHKNNKSWMESEFRVY	TRFASVYAWNRRKRISN	QIAPGQTGKIADYNYKLP	SKVGGNYNYLYRLFRKSNLKPFFERDIST
Delta	TRTQLPPAYTNSFTRGVYY	VYYHKNNKSWMESEFRVY	TRFASVYAWNRRKRISN	QIAPGQTGKIADYNYKLP	SKVGGNYNYLYRLFRKSNLKPFFERDIST
Omicron	TRTQLPPAYTNSFTRGVYY	VYYHKNNKSWMESEFRVY	TRFASVYAWNRRKRISN	QIAPGQTGNIADYNYKLP	SKVSGNYNYLYRLFRKSNLKPFFERDIST

Sars-CoV- 2 Variants	Pep 8 - RBD S1 subunit	Pep 9 - S1 subunit	Pep 10 - S1 subunit	Pep 11 - S1 subunit	Pep 13 - S2 subunit
N4S11-SC2	YFPLQSYGFQPTNGVGY	TESNKKFLPFQQFGRDIADTTDAVRDP	HADQLTPTWRVYSTGSN	SYQTQTNSPRRARS	ILPDPSKPSKRSFIEDLLFNKV
Alpha	YFPLQSYGFQPTNGVGY	TESNKKFLPFQQFGRDIADTTDAVRDP	HADQLTPTWRVYSTGSN	SYQTQTNSHRRARS	ILPDPSKPSKRSFIEDLLFNKV
Beta	YFPLQSYGFQPTNGVGY	TESNKKFLPFQQFGRDIADTTDAVRDP	HADQLTPTWRVYSTGSN	SYQTQTNSPRRARS	ILPDPSKPSKRSFIEDLLFNKV
Gamma	YFPLQSYGFQPTNGVGY	TESNKKFLPFQQFGRDIADTTDAVRDP	HADQLTPTWRVYSTGSN	SYQTQTNSPRRARS	ILPDPSKPSKRSFIEDLLFNKV
Delta	YFPLQSYGFQPTNGVGY	TESNKKFLPFQQFGRDIADTTDAVRDP	HADQLTPTWRVYSTGSN	SYQTQTNSPRRARS	ILPDPSKPSKRSFIEDLLFNKV
Omicron	YFPLRSYSFRPTYGVGY	TESNKKFLPFQQFGRDIADTTDAVRDP	HADQLTPTWRVYSTGSN	SYQTQTNSHRRARS	ILPDPSKPSKRSFIEDLLFNKV

Sars-CoV- 2 Variants	Pep 15 - S2 subunit	N Protein	N Protein	N Protein (CTD)	N Protein (NTD)
N4S11-SC2	FKEELDKYFKNHTSPDVLGD	TGSNQNGERSGARSQRRPQG	RSSSRSRNSSRNSTPGS	GQTVTKKSAAEASKKPRQKRT	TNSSPDDQIGYYRRATR
Alpha	FKEELDKYFKNHTSPDVLGD	TGSNQNGERSGARSQRRPQG	RSSSRSRNSSRNSTPGS	GQTVTKKSAAEASKKPRQKRT	TNSSPDDQIGYYRRATR
Beta	FKEELDKYFKNHTSPDVLGD	TGSNQNGERSGARSQRRPQG	RSSSRSRNSSRNSTPGS	GQTVTKKSAAEASKKPRQKRT	TNSSPDDQIGYYRRATR
Gamma	FKEELDKYFKNHTSPDVLGD	TGSNQNGERSGARSQRRPQG	RSSSRSRNSSRNSTPGS	GQTVTKKSAAEASKKPRQKRT	TNSSRDDQIGYYRRATR
Delta	FKEELDKYFKNHTSPDVLGD	TGSNQNGERSGARSQRRPQG	RSSSRSRNSLRNSTPGS	GQTVTKKSAAEASKKPRQKRT	TNSSPDDQIGYYRRATR
Omicron	FKEELDKYFKNHTSPDVLGD	TGSNQNGERSGARSQRRPQG	RSSSRSRNSSRNSTPGS	GQTVTKKSAAEASKKPRQKRT	TNSSPDDQIGYYRRATR

**Supplementary Figure S3. Comparative analysis of amino acid sequences of selected peptides in N4S11-CoV2 and some SARS-2 variants of interest.** Surface glycoprotein - N4S11-SC2 Peptides (Wuhan-Hu-1, YP\_009724390.1); Alpha (B.1.1.7, QWE88920.1); Beta (B.1.351, UPD30382.1); Gamma (P.1, QVQ47339.1); Delta (B.1.617.2, UHV13980.1); and Omicron (UOX09450.1). Nucleocapsid protein - N4S11-SC02 Peptides (Wuhan-Hu-1, YP\_009724397.2); Alpha (B.1.1.7, QWE88928.1); Beta (B.1.351, UPD30390.1); Gamma (P.1, QVQ47347.1); Delta (B.1.617.2, UHV13987.1); Omicron (UOX09458.1) (Sanches et al., 2021; Alcantara et al., 2022). Red color indicates amino acid variation.





**Supplementary Figure S4. Dynamics of IgG antibody conversion in patient urine and serum samples.** Figures show the IgG levels specific to the N4S11-SC2 for eight patients, with longitudinal collection on different days post-symptom onset. The plotted index values (I) were related to the absorbance ratio on the cut-off.