

A

CAAV SLSLRGAVVNGYIVYTORHLFGSKKQEFACYNNGKGLL...NCKNLE...RSKYDIDSAELIG
BToV GTGFAIDDS.TIVTAKHLFEF..DDLKPTH.L.SVELSCRSYWCT...WKEPNVLSWK...FEG.ENAYI SVEN
EToV GTGFAIDDN.TIVTAKHLFEY..DDLKPTHV.SVEIVTRSHSARSASIIWKEPDKVGT...FKG.ENAYIQVEN
WBV GTFFT...STEIITCAHIGT..SDITAVHK.GITY...DCKVKS...INN.DIAILITTT
EAV GSVWTRNNEVVVLTASHVVG...ANMATLXI.GDAM...LTLTFK...KNG.DFAEAVTT.
PRRSV GGVTFTIDGRRTVVTAAHVVLN...GDTARVT..GDSYN...RMHTFK...TNG.DYAWSHA..
LDV GGVFTINGNPVVVTAASHLLS...DGKARVS..CVGFS...OCLDFK...CAG.DYAFARV..
GAV GDLNGFLSGKSLHFRHIFDT..CTDNLTTR.HIRV...TKGEE...TH.DIELLSEY
TEV TSLYIGIGFPPFIITNKHIFRR..NNGTLLVQ.SLHGVPKVK...NTTTLQOHLIDGRDMIIIRMPK
HAstV-1 GTGFFSGND..IVTAAHVVG...NTFVNVVCYEGLMY...EAKVRY...MPEKDIATITCP.

CAAV T...LIRIPLHDKHSIPHISIHDPDPLSYNGPVTLYLSRYD.TELN.KDVLVCVHTGFMSEGHHDIKTVFGDCGGM
BToV L...RDFYIDFKYLPFQQIECFYKRM EAVTIYSIKYG.SEFATQAWQTVNGHFVCCN...TEGGDSGAPL
EToV L...KDFYIEDFKYLPFQQIEKDFYKRM EPVTIYSVKYG.SEFATQAWQTVNGHFVCCN...TEGGDSGAPL
WBV VNLVSVQIKLDDSSFSQKSDNYQRNFVQVSEFVDQNSDAV.TINN..TVMLPSGHFFAIG...TEAGSGSPY
EAV Q...SELPGN...WP...QLHFAOPTTGPASWCTATG.DEEG...LLSGEVCLAW...TTSGDSGSAV
PRRSV ...DDWQGV...AP...VVKVAKYRGRAYWQTSTG.VEPG...IIGEGFAFCF...TNCGDSGSPV
LDV ...ANWKG...AP...KAELSH.RGRAYCSPLV.LSLD...LLGKNSAFCF...TKCGDSGSPV
GAV D...ATPFKIKVESFAE..ATELKFAKLQRTQHVFVVTADDIRLG...SMSTDGYHNIS...TKDGCDSII
TEV D...FPPFPQKLFREP..QREERICLVTFNFQTKSMSSM.VSDTSCTFPSSDGI FWKHWIQ...TKDGCDSPL
HAstV-1 ...GDLHPTARLKLS...KNPDYSCVTVMAYVNEDLVVSTAA...AMVYGNLTLSYAVR...TODGMSGAPV

CAAV FDPKGR.LLGLHCA..
BToV VWR.DS.VIGVHQG..
EToV VCN.GR.IVGVHQG..
WBV TLN.GN.IIGIHYG..
EAV VQ..GDAVVGVTG..
PRRSV ISESGD.LIGIHTG..
LDV VDEDGN.LLGIHTG..
GAV FDHLGN.VVGAHIV..
TEV VSTRDGF.IVGIHSA..
HAstV-1 CDKYCR.VLAVHQT..

B

CAAV TYN CVVCGFNAYLTCATCER..AF CNSADTNHGSHEOHLQYSGHCTCLVYLNCKTKVCKHHCFTTDINLTYTTERDH
HCoV-229E AGL CVVCGSQTVLRRCGDCLRKRPMLCTKCAVDH.VFGTDH.KFILAITPYV.CNTSGCN...VNDVKLYLGLNY
HCoV-NL63 AGL CVVCGSQTVLRRCGDCLRKRPMLCTKCAVDH.VFGTDH.KFILAITPYV.CNASGCG...VSDVKLYLGLNY
TGEV AGL CVVCGSQTVLRRCGDCLRKRPMLCTKCAVDH.VMGTKH.KFILAIMSITPYV.CSFNCGN...VNDVKLYLGLNY
MHV-A59 VGA CVVCSQSOTSLRCGSCIRKPLLCCKCAYDH.VMSTDH.KYVLSVSPYV.CNSPGCD...VNDVKLYLGLMSY
SARS-CoV VGA CVLCSQSOTSLRCGSCIRKPLLCCKCAYDH.VISTSH.KLVLSVNPYV.CNAPGCD...VNDVKLYLGLMSY
HCoV-OC43 VGA CVVCSQSOTSLRCGSCIRKPLLCCKCAYDH.VMATDH.KYVLSVSPYV.CNAPGCD...VNDVKLYLGLMSY
IBV CGV CVVCSQSOTILRCGNCIRKPLLCCKCAYDH.VMHTDH.KNVLSINPYI.CSOLGCG...EADVTKLYLGLMSY

CAAV YCEAHKPKNAVRI..
HCoV-229E YCVDHKPKHLSFPL..
HCoV-NL63 YCTNHKPKQLSFPL..
TGEV YCMNHKPKQLSFPL..
MHV-A59 YCEDHKPKQYSFKL..
SARS-CoV YCKSHKPKPISFPL..
HCoV-OC43 YCEDHKPKQYSFKL..
IBV YCGNHKPKKLSIPL..

C

CAAV .KYIDTKKT...HCNMGCGKEP..LQOALHNIDVLQGGKSNPQNNMNTHTCD.SEE.HIYFDSHWYKDGGFKKPS
HCoV-229E .GLEDFNFE...HVVG DVSKT..TLGGLHLISQVRLSKMGILKAEFVAASDI.TLKCCVTYLNDDPSKTV
HCoV-NL63 .GLEDFNFE...HVVG DVSKT..TLGGLHLISQVRLSKMGVLFKADDFVTASDT.TLRCCTVYLNDDPSKTV
TGEV .GLEDFNFE...HVVG DVSKT..TIGGLHLISQVRLAKMGLFSVOEFMNSDS.TLKSCCITYADNPPSKNV
MHV-A59 .SLQDYAFE...HVVG SFNQK..IIGGLHLIIGLARRQKSNLVIQEFVT.YDS.SIHSYFITDENSNGSSKSV
SARS-CoV .KLEGYAFE...HIVY GDFSHG..QLGGLHLMIGLAKRSQDSPLKLEDFIP.MDS.TVKNYFITDAQTGSSKCV
HCoV-OC43 .GLEDYAFE...HIVY GNFNQK..IIGGLHLIIGLYRRQTSNLVVOEFVS.YDS.SIHSYFITDEKSSGSSKSV
IBV YG.KDLGLQ...HILYGEVDKP..QLGGLHRTVIGMYRLRANKLNAKSVTN.SDSVDMQNYFVLS.DNGSYKOV
EToV .AIE.T.MPN..NHVVS GDFTEVGTDIGGVHVVVALN...GYKG.SIIPNYVK.PIATGLINVG..RAVK.R
WBV .PNEDEYKSKLGHVSVGDTSNVSWTIGGMHVLTAFQ...NITNYQLVSGPAN.PIMR..INVALERGNKVE
EAV ...EKFAAAH..PHACTGEINKS..TVGGHFIIFSQY...LPPLP.ADA..VALVGLASL.AGKAARAA
PRRSV ...EEAAKEL..PHAFIGDVKGT..TVGGHFIITSKY...LPRLSLP.KDS..VAVVGVSS.PGRAARAV

CAAV YIFS DINKEHYKLGTTG.LCLYL.NSKYA..
HCoV-229E CTYMDLLLDDFVSVLKSL..DLTV.VSKVH..
HCoV-NL63 CTYMDLLLDDFVTIILKSL..DLGV.ISKVVH..
TGEV CTYMDIILLDDFVTIILKSL..DLNV.VSKVV..
MHV-A59 CTVIDLLLDDFVDIVKSL..NLKC.VSKVV..
SARS-CoV CSVIDLLLDDFVEIILKSO..DLSV.ISKVV..
HCoV-OC43 CTVIDIILLDDFVALVKSLL..NLNC.VSKVV..
IBV CTVVDLLLDDFLELLRNILKEYGTNKSKVV..
EToV TLLVDVCANQLYEKVKQO..LEGVVKVSKVI..
WBV TVALDTTL.QDYKIAAT..NK.VTVSKTT..
EAV CSVVDDVYAPSFEPYLHPE...T.LSRVY..
PRRSV CTLTDDVYLPPELRPYLQPE...T.ASKCW..