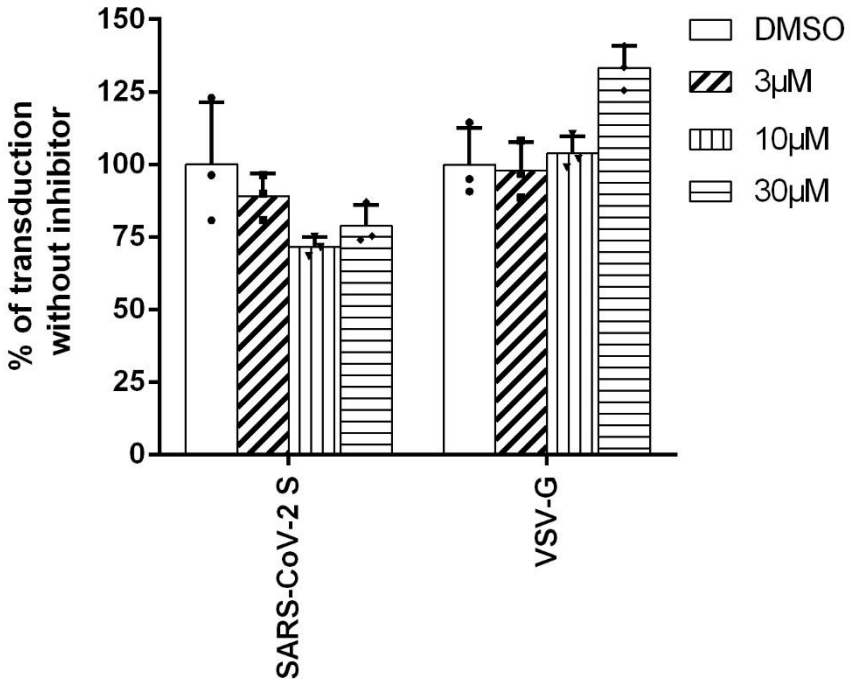
Supplementary information

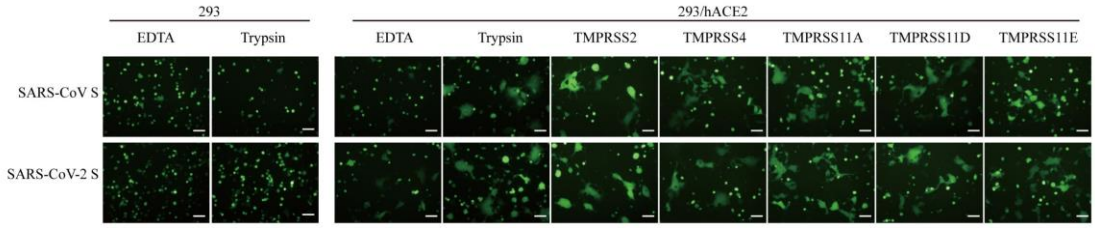
Characterization of spike glycoprotein of SARS-CoV-2 on virus entry and its immune cross-reactivity with SARS-CoV

Ou *et al.*



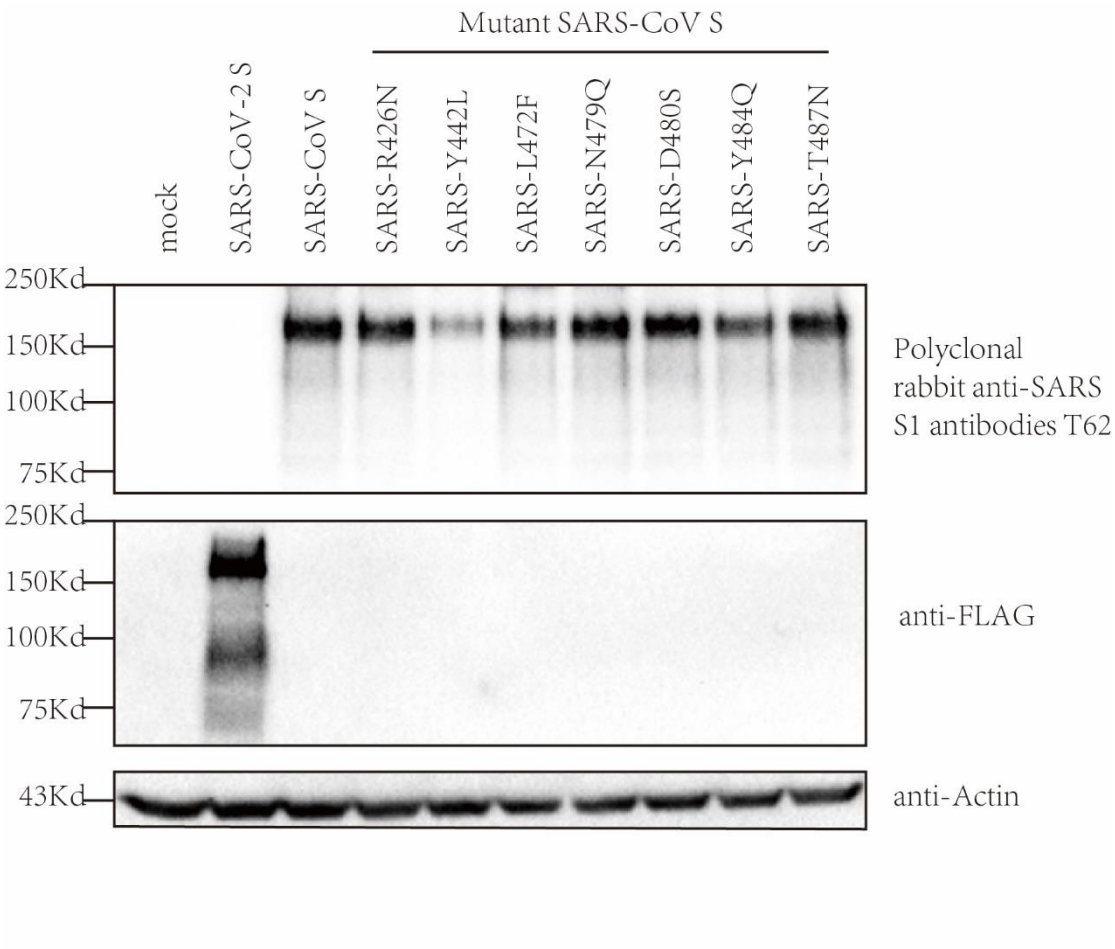
Supplementary Figure 1. Effect of entry of SARS-CoV-2 S pseudovirions on 293/hACE2 by TRPML1 inhibitor.

HEK 293/ACE2 cells were transduced with either SARS-CoV-2 S pseudovirions or VSV-G pseudovirions in the presence of 3, 10, 30μM 130. The luciferase activity were measured at 40 hrs post inoculation. The experiments were done triplicate and repeated three times.



Supplementary Figure 2. Effect of type II membrane serine proteases (TMPRSS) on SARS-CoV-2 S protein mediated cell-cell fusion.

HEK-293T cells transiently expressing CoV S glycoprotein and eGFP were lifted with either trypsin (0.25%) or 1mM EDTA, then overlaid on 293/hACE2 cells transiently expressing type II membrane serine protease (TMPRSS) 2, 4, 11A, 11D, or 11E. After 4 hrs incubation, images of syncytia were captured.



Supplementary Figure 3. Western blot analysis of expression of SARS-CoV mutant S proteins.

Top panel: polyclonal rabbit anti-SARS S1 antibodies T62; middle panel: anti-FLAG bottom panel: anti-actin.

Supplementary Table 1. Primers used in this study.

Constructs used in mutagenesis study	Forward primer sequence (5′-3′)	Reverse primer sequence (5′-3′)
SARS-CoV-2 S	CCGAAGCTTCACCATGTTC GTTTTCCTTGTTC	CCGGGATCCGCAACATGATCCGCAA GAGCAGC
SARS-CoV S-R426N	GTGCTGGCTTGGAACACTA ACAACATTGATGCTACCTC	GAGGTAGCATCAATGTTGTTAGTGT TCCAAGCCAGCAC
SARS-CoV S-Y442L	CTACAACTACAAGTATCGT CTGCTGCGTCATGGTAAGC TG	CAGCTTACCATGACGCAGCAGACG ATACTTGTAGTTGTAG
SARS-CoV S-L472F	CTTGCACTCCTCCAGCTTT CAACTGCTACTGGCCTC	GAGGCCAGTAGCAGTTGAAAGCTG GAGGAGTGCAAG
SARS-CoV S-N479Q	CTGCTACTGGCCTCTGCAG GATTACGGTTTCTACAC	GTGTAGAAACCGTAATCCTGCAGA GGCCAGTAGCAG
SARS-CoV S-D480S	CTACTGGCCTCTGAACTCT TACGGTTTCTACACC	GGTGTAGAAACCGTAAGAGTTCAG AGGCCAGTAG
SARS-CoV S-Y484Q	GAACGATTACGGTTTCCAG ACCACTACCGGCATTGG	CCAATGCCGGTAGTGGTCTGGAAA CCGTAATCGTTC
SARS-CoV S-T487N	GTTTCTACACCACTAACGG CATTGGCTACC	GGTAGCCAATGCCGTTAGTGGTGTA GAAAC

Supplementary Table 2. Codon-optimized DNA sequences of spike gene.

SARS-CoV-2 S	ATGTTCGTTTTCCTTGTTCTGTTGCCTCTCGTTAGTAGCCAATGCGTCAAC CTTACTACTAGAACCCAGCTCCCTCCAGCATATACCAACTCTTTCACCAGG GGCGTATATTACCCGGACAAAGTGTTCCGCTCAAGTGTGCTGCATTCTAC GCAGGACCTTTTCTTGCCCTTTTTCAGTAATGTTACTTGGTTTCATGCTATC CATGTGTCTGGAACTAACGGAACCAAGCGCTTTGACAACCCCGTCCTCC CTTTCAACGATGGCGTGTACTTCGCTTCCACGGAAAAGTCAAACATAATT CGCGGCTGGATCTTTGGTACAACACTCGACTCAAAGACGCAGAGCCTGC TGATCGTTAATAACGCTACAAATGTTGTGATAAAGGTGTGTGAATTTCAGT TCTGCAATGATCCCTTCCTGGGTGTGTACTACCATAAGAATAACAAGAGC TGGATGGAATCCGAATTTAGGGTTTACAGTTCCGCTAACAACTGCACATT CGAATACGTAAGCCAGCCATTTCTTATGGATCTTGAGGGCAAGCAAGGAA ACTTCAAGAACTTGAGGGAGTTCGTGTTCAAAAATATCGACGGCTATTTT AAGATATATAGCAAGCACACTCCAATAAACTTGGTGCGCGACCTGCCCCA GGGATTCTCTGCTCTGGAGCCCCTGGTGGATCTGCCCATTGGAATAAACA TAACTCGCTTTCAAACACTGCTCGCCCTGCATCGCAGTTACCTCACCCCT GGTGATAGTAGTTCAGGATGGACAGCAGGAGCCGCCGCATACTACGTCG GCTACCTGCAGCCTAGGACCTTCTTGCTGAAGTACAACGAGAACGGTAC AATAACTGACGCTGTGGACTGCGCTCTGGACCCTCTGTCCGAGACGAAG TGCACCCTGAAGAGCTTTACTGTTGAAAAAGGCATTTACCAAACCAGCA ACTTCCGCGTCCAGCCAACCGAGAGCATCGTCAGATTTCCCAACATTACA AATCTGTGTCCCTTCGGCGAGGTGTTCAACGCCACACGCTTCGCTTCAGT GTACGCATGGAACCGCAAGCGCATATCTAACTGCGTCGCGGATTATTCTG TCCTCTACAACTCCGCCTCTTTCTCCACCTTCAAGTGCTACGGAGTGTCA CCGACTAAGCTGAACGATCTCTGCTTTACCAACGTCTACGCGGACTCCTT CGTGATAAGAGGTGATGAAGTGAGACAAATAGCCCCAGGTCAGACTGGT AAGATCGCAGATTACAACTACAAATTGCCTGATGATTTCACTGGTTGCGT TATCGCGTGGAACTCTAATAACCTCGATTCTAAGGTCGGTGGTAACTACA ATTACCTGTACCGCTTGTTTAGGAAGTCAAACCTGAAGCCTTTCGAGAGG GATATTTCAACCGAAATCTATCAAGCGGGTTCAACACCGTGTAACGGTGT GGAAGGATTTAACTGCTACTTCCCCCTGCAGTCTTACGGATTCCAGCCAA CCAATGGCGTGGGTTACCAACCTTATCGCGTGGTGGTTCTGAGTTTCGAA CTGTTGCACGCTCCCGCCACGGTATGCGGTCCCAAGAAGAGCACTAACT TGGTGAAGAATAAGTGCGTGAATTTCAATTTCAATGGCCTCACTGGAACT GGAGTGCTGACCGAATCCAATAAGAAGTTCTTGCCCTTCCAGCAGTTCGG AAGAGACATTGCTGACACAACCGACGCGGTGCGCGATCCTCAGACTCTG GAGATATTGGACATTACACCATGTTCTTTCGGCGGTGTGTCTGTCATTACT CCGGGCACGAATACTAGCAACCAGGTAGCCGTGCTGTACCAAGACGTGA ATTGCACAGAGGTTCCCGTCGCAATTCACGCTGACCAGCTGACCCCCAC GTGGAGGGTTTACAGCACTGGTAGTAACGTCTTCCAGACGAGAGCCGGT TGCTTGATCGGAGCGGAACATGTGAATAACTCCTACGAGTGCGACATCCC CATCGGAGCCGGTATATGCGCCTCTTATCAGACACAAACTAACTCACCCA GGAGAGCCCGCAGTGTGGCTTCTCAAAGCATTATAGCATACACTATGTCT CTTGGTGCCGAAAATTCCGTGGCCTATTCTAACAATTCAATCGCCATCCCA

	ACCAACTTCACAATTAGCGTGACTACCGAAATACTGCCTGTGAGCATGAC GAAAACCAGCGTAGACTGCACTATGTATATCTGTGGAGACTCCACTGAGT GCTCCAACCTTCTCCTGCAGTACGGTAGCTTCTGTACCCAATTGAACCGC GCCCTTACAGGCATCGCTGTTGAGCAAGATAAGAATACCCAGGAAGTTTT TGCCCAGGTTAAGCAGATATACAAAACACCGCCCATTAAGGACTTCGGAG GCTTCAACTTCTCTCAGATACTGCCTGACCCCTCCAAGCCATCAAAACGC AGCTTCATTGAGGACCTCTTGTTCAACAAAGTGACTCTGGCTGATGCTGG CTTCATTAAGCAGTACGGAGATTGCCTGGGAGATATTGCTGCCAGGGACC TCATCTGCGCCCAGAAGTTTAATGGCCTGACAGTCTTGCCCCCACTTCTG ACAGACGAGATGATTGCTCAGTACACATCTGCCCTCCTCGCTGGCACCAT AACATCCGGATGGACATTTGGTGCTGGTGCTGCCCTCCAGATTCCCTTCG CAATGCAGATGGCGTATCGCTTTAACGGCATCGGTGTCACACAAAACGTG TTGTATGAGAACCAAAAGCTCATCGCTAACCAGTTTAATTCTGCTATTGGT AAGATTCAGGACAGCCTGTCATCAACCGCGTCTGCCCTTGGTAAGTTGCA GGACGTGGTGAACCAGAATGCTCAGGCTTTGAATACTCTGGTGAAGCAA CTCTCTTCAAATTTCGGCGCTATCTCTTCTGTGTTGAACGACATCCTGAGT CGCCTTGATAAGGTGGAAGCTGAAGTTCAAATTGATAGATTGATTACTGG CAGGCTCCAGTCTTTGCAGACCTACGTTACACAGCAGCTGATTAGGGCGG CTGAAATTAGAGCTTCCGCCAATCTGGCTGCAACCAAGATGTCCGAATGC GTCCTGGGTCAGTCAAAGCGCGTTGACTTTTGTGGTAAAGGCTACCACCT CATGTCATTTCCCCAGTCAGCACCTCACGGAGTAGTGTTCCTCCACGTCA CCTACGTTCCAGCACAGGAAAAGAATTTTACCACTGCGCCGGCAATCTGT CACGACGGTAAGGCACACTTCCCCCGCGAGGGCGTATTCGTGTCTAACG GAACTCATTGGTTCGTCACACAGAGAAACTTCTATGAGCCTCAGATCATT ACCACCGACAATACATTTGTGTCCGGTAACTGCGACGTTGTGATTGGAAT CGTCAACAACACTGTGTACGATCCACTTCAGCCAGAACTGGATAGCTTCA AGGAAGAATTGGACAAATATTTCAAAAATCACACTTCACCCGATGTGGAC CTGGGTGACATTAGTGGTATCAATGCGTCCGTGGTCAATATTCAAAAAGA GATTGACAGGCTCAACGAAGTGGCCAAGAACCTGAACGAAAGTCTTATC GATCTGCAAGAATTGGGAAAGTATGAGCAGTACATCAAGTGGCCGTGGT ACATTTGGTTGGGTTTTATCGCCGGTCTGATCGCCATCGTTATGGTTACCA TTATGCTTTGCTGCATGACGAGCTGTTGCTCCTGTCTGAAGGGATGCTGC TCTTGCGGATCATGTTGCAAGTTCGATGAAGACGATAGCGAACCAGTTCT GAAGGGCGTCAAGCTGCATTACACA
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SARS-CoV S/nRBD	ATGTTCATCTTTCTGCTGTTCCTGACACTGACCAGCGGCTCCGACCTGGA TAGGTGCACCACATTTGACGATGTGCAGGCCCCCAACTATACCCAGCACA CAAGCTCCATGCGGGGCGTGTACTATCCTGATGAGATCTTCAGATCCGAC ACCCTGTATCTGACACAGGACCTGTTCCTGCCCTTTTACTCTAATGTGACC GGCTTCCACACAATCAATCACACCTTTGGCAACCCTGTGATCCCATTCAA GGATGGCATCTACTTTGCCGCCACAGAGAAGAGCAACGTGGTGAGGGGC TGGGTGTTCGGCTCCACCATGAACAATAAGTCTCAGAGCGTGATCATCAT CAACAATTCCACCAACGTGGTCATCCGCGCCTGCAATTTTGAGCTGTGCG ACAACCCATTCTTTGCCGTGTCTAAGCCCATGGGCACACAGACCCACACA ATGATCTTTGATAATGCCTTCAACTGTACCTTTGAGTATATCTCCGATGCCT TTTCTCTGGACGTGTCTGAGAAGAGCGGCAACTTCAAGCACCTGCGGGA GTTCGTGTTTAAGAATAAGGACGGCTTCCTGTACGTGTATAAGGGCTACC AGCCAATCGATGTGGTGAGAGACCTGCCCAGCGGCTTCAACACCCTGAA GCCTATCTTTAAGCTGCCACTGGGCATCAATATCACAAACTTCAGGGCCAT CCTGACCGCCTTTTCTCCTGCACAGGACATCTGGGGCACCAGCGCCGCA GCATATTTCGTGGGCTACCTGAAGCCAACCACCTTCATGCTGAAGTATGAT GAGAACGGCACCATCACAGACGCCGTGGATTGCAGCCAGAATCCTCTGG CCGAGCTGAAGTGTTCCGTGAAGTCTTTCGAGATCGACAAGGGCATCTA CCAGACATCCAACTTTCGGGTGCAGCCAACCGAGTCTATCGTGAGATTCC CTAATATCACAAACCTGTGCCCATTCGGCGAGGTGTTTAATGCCACCCGC TTTGCCTCCGTGTACGCCTGGAATCGGAAGAGAATCAGCAACTGCGTGG CCGACTATTCCGTGCTGTACAACTCCGCCTCTTTCAGCACCTTTAAGTGCT ATGGCGTGAGCCCCACAAAGCTGAATGACCTGTGCTTCACCAACGTGTA CGCCGATTCCTTTGTGATCAGGGGCGACGAGGTGCGCCAGATCGCACCT GGACAGACAGGCAAGATCGCCGACTACAACTATAAGCTGCCAGACGATT TCACCGGCTGCGTGATCGCCTGGAATAGCAACAATCTGGATTCCAAAGTG GGCGGCAACTACAATTATCTGTACAGGCTGTTCCGCAAGAGCAACCTGA AGCCATTTGAGCGGGACATCAGCACAGAGATCTACCAGGCAGGATCCAC CCCATGCAATGGAGTGGAGGGCTTCAACTGTTATTTTCCTCTGCAGTCCT ACGGCTTCCAGCCAACCAATGGCGTGGGCTATCAGCCCTACAGAGTGGT GGTGCTGTCTTTTGAGCTGCTGCACGCACCAGCAACAGTGTGCGGACCT

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	CGAGGACGACTCCGAGCCCGTGCTGAAGGGCGTGAAGCTGCACTACACC
MERS-CoV S	ATGATTCACTCCGTGTTCCTCCTGATGTTCCTGCTCACTCCTACCGAAAGT TATGTGGATGTGGGTCCCGATAGCGTCAAGTCCGCATGCATCGAGGTGGA TATTCAGCAGACATTCTTTGACAAGACCTGGCCTCGGCCAATCGATGTCT CCAAAGCCGACGGCATCATTTACCCTCAGGGACGCACCTATAGCAACATC ACTATTACATACCAGGGCCTGTTCCCATATCAGGGCGACCACGGAGATATG TACGTGTATTCTGCCGGACATGCTACTGGCACCACTCCTCAGAAACTGTT CGTGGCAAATTACTCCCAGGACGTCAAGCAGTTCGCCAACGGTTTTGTG GTCAGGATCGGCGCCGCTGCAAACTCTACCGGCACTGTGATCATTAGCCC TTCTACTTCAGCCACAATCAGAAAAATTTACCCAGCTTTTATGCTGGGCTC CAGCGTGGGAAACTTCTCCGATGGCAAGATGGGCCGTTTCTTTAATCACA CTCTGGTCCTGCTCCCTGACGGATGCGGTACACTGCTCCGCGCTTTCTAC TGTATCCTGGAGCCCAGGAGCGGAAATCACTGCCCTGCCGGTAACTCTTA CACCTCATTCGCCACCTATCATACTCCAGCTACAGACTGTTCTGATGGCAA TTATAACAGAAATGCCAGTCTGAACTCCTTCAAGGAATACTTTAATCTCCG TAACTGCACATTCATGTACACCTATAATATCACTGAGGACGAAATTCTGGA GTGGTTCGGTATCACACAGACCGCTCAGGGCGTGCACCTGTTTTCTTCAC GCTACGTCGATCTCTATGGCGGAAACATGTTCCAGTTTGCCACTCTGCCC GTGTACGACACAATCAAGTACTATTCCATCATTCCTCATAGCATCCGGTCT ATTCAGTCAGACCGCAAGGCTTGGGCCGCTTTCTACGTGTATAAACTGCA GCCTCTCACCTTCCTGCTCGATTTTTCCGTGGACGGATACATCCGCAGGG CCATTGATTGCGGTTTCAACGACCTGAGCCAGCTCCACTGTAGTTATGAA TCCTTCGATGTGGAGAGTGGTGTGTACTCCGTCAGTTCCTTTGAGGCTAA GCCCAGTGGTTCCGTGGTCGAGCAGGCAGAAGGCGTGGAGTGCGACTTC AGCCCTCTGCTCTCTGGCACACCCCCTCAGGTGTATAACTTCAAAAGGCT GGTCTTTACCAACTGTAATTACAACCTGACTAAGCTGCTCAGCCTCTTCTC TGTGAACGACTTTACCTGCTCACAGATCAGTCCCGCAGCCATTGCTTCAA ATTGTTACAGCTCTCTGATCCTCGATTACTTCAGTTATCCTCTGTCCATGAA AAGCGACCTCTCTGTGTCAAGTGCTGGCCCAATCTCCCAGTTTAATTACA AGCAGAGCTTCTCTAACCCTACCTGCCTGATTCTCGCCACTGTGCCACAC AACCTGACAACCATCACAAAGCCCCTCAAGTACAGCTACATCAACAAGT GCTCAAGGCTGCTCAGTGACGATAGAACCGAAGTGCCACAGCTGGTCAA TGCCAACCAGTACTCCCCATGTGTGAGCATCGTCCCCTCTACCGTGTGGG AAGACGGAGATTACTATAGGAAGCAGCTGTCCCCCCTGGAGGGTGGAGG ATGGCTGGTGGCATCAGGTAGTACAGTCGCCATGACCGAGCAGCTCCAG ATGGGCTTCGGAATCACTGTGCAGTACGGCACTGATACAAATTCCGTCTG CCCAAAGCTGGAATTTGCTAACGACACAAAAATCGCAAGCCAGCTGGGC AATTGCGTGGAGTACTCCCTCTATGGAGTGAGCGGTCGTGGCGTCTTCCA GAACTGTACTGCAGTGGGAGTCAGGCAGCAGAGGTTTGTGTACGATGCT TATCAGAACCTGGTCGGCTACTATAGCGACGATGGAAATTACTATTGCCTC CGCGCTTGTGTGTCAGTCCCCGTGAGTGTCATCTACGACAAGGAAACCA AAACTCACGCAACCCTGTTCGGCTCTGTGGCCTGCGAGCATATTTCCAGC ACTATGTCACAGTACTCCAGGAGCACAAGAAGTATGCTGAAGAGACGTG ACTCCACATACGGACCCCTCCAGACCCCTGTGGGTTGCGTCCTGGGCCTC

	GTGAACTCTTCACTGTTCGTCGAAGATTGCAAGCTGCCTCTCGGACAGTC CCTGTGTGCCCTCCCAGACACCCCCAGCACACTGACCCCACGTTCAGTG CGGAGTGTCCCCGGCGAGATGCGTCTGGCATCTATCGCCTTCAATCACCC AATTCAGGTGGATCAGCTGAACAGTTCCTACTTTAAGCTCTCTATCCCCAC AAACTTCTCATTTGGCGTGACCCAGGAGTACATCCAGACTACAATTCAGA AGGTGACCGTGGACTGCAAACAGTACGTGTGTAACGGATTCCAGAAATG CGAACAGCTGCTCCGCGAGTACGGCCAGTTTTGTAGCAAGATCAATCAG GCACTGCATGGCGCCAACCTCCGTCAGGACGATAGCGTGCGGAACCTGT TCGCTTCTGTCAAGAGCTCTCAGTCAAGTCCTATCATTCCAGGTTTCGGT GGCGACTTTAACCTGACCCTGCTCGAACCAGTGTCTATCTCAACTGGCAG TCGCTCCGCTAGGAGCGCAATCGAGGATCTGCTCTTCGACAAGGTGACC ATTGCCGACCCCGGATACATGCAGGGTTATGACGATTGCATGCAGCAGGG ACCTGCCTCTGCTAGGGATCTGATCTGTGCTCAGTACGTGGCAGGTTATA AGGTCCTGCCACCCCTCATGGACGTGAACATGGAAGCTGCATACACCTCC AGCCTGCTCGGTTCCATCGCCGGAGTCGGTTGGACTGCTGGCCTGTCTTC ATTCGCCGCTATCCCCTTTGCTCAGTCTATTTTCTACAGACTGAACGGCGT GGGAATCACCCAGCAGGTCCTGTCAGAGAATCAGAAGCTCATTGCCAAT AAATTCAACCAGGCCCTGGGAGCTATGCAGACTGGTTTTACCACTACAAA CGAGGCCTTCCAGAAAGTGCAGGACGCAGTCAACAATAACGCACAGGC CCTGAGCAAGCTCGCTTCCGAGCTGAGCAACACCTTCGGAGCAATCAGC GCCTCTATTGGTGATATCATTCAGAGGCTGGACGTGCTCGAACAGGATGC CCAGATCGACAGACTGATTAATGGCCGTCTGACCACTCTCAACGCTTTCG TGGCACAGCAGCTGGTCCGGTCAGAAAGTGCAGCCCTGTCCGCCCAGCT CGCTAAGGACAAAGTGAACGAGTGCGTCAAGGCTCAGTCTAAAAGATCA GGATTTTGTGGTCAGGGCACCCACATCGTGAGCTTCGTGGTCAATGCCCC AAACGGCCTGTACTTTATGCACGTCGGATACTATCCCTCAAACCATATCGA GGTCGTCAGTGCTTACGGCCTGTGCGATGCTGCAAATCCTACAAACTGTA TTGCCCCAGTGAACGGATACTTCATCAAGACCAACAACACTAGAATTGTG GACGAATGGTCTTACACCGGCAGTTCCTTCTATGCACCCGAGCCTATCAC TTCACTGAACACAAAGTACGTGGCCCCCCAGGTCACTTATCAGAATATCA GTACAAACCTGCCTCCACCACTGCTCGGCAACTCCACCGGAATTGACTTC CAGGATGAACTGGACGAGTTCTTTAAGAATGTGTCCACAAGCATCCCTAA CTTTGGAAGCCTGACCCAGATTAACACAACCCTGCTCGATCTCACTTACG AGATGCTGAGCCTCCAGCAGGTGGTCAAGGCTCTGAATGAATCTTACATC GACCTGAAAGAGCTCGGTAATTATACATACTATAACAAGTGGCCCTGGTA CATCTGGCTGGGTTTCATTGCAGGACTCGTGGCTCTGGCACTCTGCGTCT TCTTTATCCTGTGCTGTACCGGATGCGGTACTAATTGTATGGGCAAGCTGA AATGTAACCGCTGTTGCGACCGGTACGAGGAGTACGACCTGGAGCCCCA CAAGGTGCACGTGCAC
MHV S	ATGCTGTTCGTGTTCATCCTGTTCCTGCCCAGCTGCCTGGGCTACATCGGC GACTTCCGGTGCATCCAGCTGGTGAACAGCAACGGAGCAAACGTGAGC GCACCAAGCATCAGCACCGAGACCGTGGAGGTGAGCCAGGGACTGGGC ACCTACTACGTGCTGGACAGAGTGTACCTGAACGCCACCCTGCTGCTGA CCGGCTACTACCCCGTGGACGGCAGCAAGTTCAGGAACCTGGCCCTGAC

	CGGCACCAACAGCGTGAGCCTGAGCTGGTTCCAGCCCCCCTACCTGAGC CAGTTCAACGACGGCATCTTCGCCAAGGTGCAGAACCTGAAGACCAGCA CCCCCAGCGGCGCCACCGCCTACTTCCCCACCATCGTGATCGGCAGCCTG TTCGGCTACACCAGCTACACCGTGGTCATCGAGCCCTACAACGGCGTGAT CATGGCCAGCGTGTGCCAGTACACCATCTGCCAGCTGCCCTACACCGACT GCAAGCCCAACACCAACGGCAACAAGCTGATCGGCTTCTGGCACACCGA CGTGAAGCCCCCCATCTGCGTGCTGAAGCGCAACTTCACCCTGAACGTG AACGCCGACGCCTTCTACTTCCACTTCTACCAGCACGGCGGCACCTTCTA CGCCTACTACGCCGACAAGCCCAGCGCCACCACCTTCCTGTTCAGCGTGT ACATCGGCGACATCCTGACCCAGTACTACGTGCTGCCCTTCATCTGCAAC CCAACCGCAGGCAGCACCTTCGCACCAAGGTACTGGGTGACCCCACTGG TGAAGAGACAGTACCTGTTCAACTTCAACCAGAAGGGCGTGATCACCAG CGCCGTGGACTGCGCCAGCAGCTACACCAGCGAGATCAAGTGCAAGACC CAGAGCATGCTGCCCAGCACCGGAGTGTACGAGCTGAGCGGATACACCG TGCAGCCAGTGGGAGTGGTGTACAGGAGGGTGGCAAACCTGCCAGCATG CAACATCGAGGAGTGGCTGACCGCACGGAGCGTGCCCAGCCCCCTGAAC TGGGAGAGAAAGACCTTCCAGAACTGCAACTTCAACCTGAGCAGCCTGC TGAGATACGTGCAGGCCGAGAGCCTGTTCTGCAACAACATCGACGCCAG CAAGGTGTACGGCCGCTGCTTCGGCAGCATCAGCGTGGACAAGTTCGCC GTGCCCCGGAGCAGACAGGTGGACCTGCAGCTGGGCAACAGCGGCTTC CTGCAGACCGCCAACTACAAGATCGACACCGCCGCCACCAGCTGCCAGC TGCACTACACCCTGCCCAAGAACAACGTGACCATCAACAATCACAACCC CAGCAGCTGGAACAGGCGCTACGGCTTCAACGACGCCGGCGTGTTCGGC AAGAACCAGCACGACGTGGTGTACGCCCAGCAGTGCTTCACCGTGCGGA GCAGCTACTGCCCATGCGCACAGCCAGACATCGTGAGCCCATGCACCAC CCAGACCAAGCCAAAGAGCGCCTTCGTGAACGTGGGCGACCACTGCGA GGGACTGGGAGTGCTGGAGGACAACTGCGGAAACGCCGACCCCCACAA GGGATGCATCTGCGCCAACAACAGCTTCATCGGCTGGAGCCACGACACC TGCCTGGTGAACGACAGATGCCAAATCTTCGCCAACATCCTGCTGAACG GCATCAACAGCGGCACCACCTGCAGCACCGACCTGCAGCTGCCCAACAC CGAGGTGGTGACCGGCATCTGCGTGAAGTACGACCTGTACGGCATCACC GGCCAGGGCGTGTTCAAGGAGGTGAAGGCCGACTACTACAACAGCTGG CAGACCCTGCTGTACGACGTGAACGGCAACCTGAACGGCTTCAGGGACC TGACCACCAACAAGACCTACACCATCCGCAGCTGCTACAGCGGCCGGGT GAGCGCAGCATTCCACAAGGACGCACCAGAGCCAGCCCTGCTGTACAGA AACATCAACTGCAGCTACGTGTTCAGCAACAACATCAGCAGGGAGGAGA ACCCCCTGAACTACTTCGACAGCTACCTGGGATGCGTGGTGAACGCAGA CAACAGGACCGACGAGGCCCTGCCAAACTGCGACCTGAGGATGGGAGC AGGACTGTGCGTGGACTACAGCAAGAGCAGAAGGGCCCACCGCAGCGT GAGCACCGGCTACAGACTGACCACCTTCGAGCCCTACACCCCCATGCTG GTGAACGACAGCGTGCAGAGCGTGGACGGCCTGTACGAGATGCAGATCC CCACCAACTTCACCATCGGCCACCACGAGGAGTTCATCCAGACCCGGAG CCCCAAGGTGACCATCGACTGCGCCGCCTTCGTGTGCGGCGACAACACC GCCTGCAGACAGCAGCTGGTGGAGTACGGCAGCTTCTGCGTGAACGTGA

	ACGCCATCCTGAACGAGGTGAACAACCTGCTGGACAACATGCAGCTGCA GGTGGCCAGCGCACTGATGCAGGGAGTGACCATCAGCAGCAGGCTGCCA GACGGAATCAGCGGCCCCATCGACGACATCAACTTCAGCCCCCTGCTGG GATGCATCGGCAGCACCTGCGCAGAGGACGGAAACGGACCAAGCGCAA TCCGCGGCCGGAGCGCCATCGAGGACCTGCTGTTCGACAAGGTGAAGCT GAGCGACGTGGGCTTCGTGGAGGCCTACAACAACTGCACCGGCGGCCA GGAGGTGAGAGACCTGCTGTGCGTGCAGAGCTTCAACGGCATCAAGGTG CTGCCACCAGTGCTGAGCGAGAGCCAGATCAGCGGATACACCACCGGAG CAACCGCTGCCGCAATGTTCCCACCCTGGAGCGCTGCCGCAGGCGTGCC CTTCAGCCTGAGCGTGCAGTACAGGATCAACGGCCTGGGCGTGACCATG AACGTGCTGAGCGAGAACCAGAAGATGATCGCCAGCGCCTTCAACAACG CCCTGGGCGCCATCCAGGACGGCTTCGACGCCACCAACAGCGCCCTGGG CAAGATCCAGAGCGTGGTGAACGCCAACGCCGAGGCCCTGAACAACCT GCTGAACCAGCTGAGCAACAGGTTCGGAGCAATCAGCGCCAGCCTGCA GGAGATCCTGACCCGGCTGGAGGCAGTGGAGGCAAAGGCACAGATCGA CAGACTGATCAACGGCAGGCTGACCGCCCTGAACGCCTACATCAGCAAG CAGCTGAGCGACAGCACCCTGATCAAGGTGAGCGCCGCCCAGGCCATCG AGAAGGTGAACGAGTGCGTGAAGAGCCAGACCACCCGCATCAACTTCT GCGGCAACGGCAACCACATCCTGAGCCTGGTGCAGAACGCCCCCTACGG CCTGTACTTCATCCACTTCAGCTACGTGCCAATCAGCTTCACCACCGCAA ACGTGAGCCCAGGACTGTGCATCAGCGGCGACAGGGGCCTGGCCCCAA AGGCAGGCTACTTCGTGCAGGACGACGGCGAGTGGAAGTTCACCGGCA GCAGCTACTACTACCCCGAGCCCATCACCGACAAGAACAGCGTGATCATG AGCAGCTGCGCCGTGAACTACACCAAGGCCCCCGAGGTGTTCCTGAACA CCAGCATCCCCAACCCTCCCGACTTCAAGGAGGAGCTGGACAAGTGGTT CAAGAACCAGACCAGCATCGCCCCCGACCTGAGCCTGGACTTCGAGAAG CTGAACGTGACCCTGCTGGACCTGACCTACGAGATGAACAGAATCCAGG ACGCCATCAAGAAGCTGAACGAGAGCTACATCAACCTGAAGGAAGTGG GCACCTACGAGATGTACGTGAAGTGGCCCTGGTACGTGTGGCTGCTGATC GGCCTGGCCGGAGTGGCAGTGTGCGTGCTGCTGTTCTTCATCTGCTGCTG CACCGGCTGCGGCAGCTGCTGCTTCAAGAAGTGCGGCAACTGCTGCGAC GAGTACGGCGGCCACCAGGACAGCATCGTGATCCACAACATCAGCAGCC ACGAGGAC