



175

1 GAGCTTGGCCATTGCATACGTTGTATCCATATCATAATATGTACATTTATATTGGCTCATGTCCAACATTACCGCCATGTTGACATTGATTATTGACTA
101 GTTATTAATAGTAATCAATTACGGGGTCATTAGTTCATAGCCCATATATGGAGTTCGCGTTACATAAECTACGGTAAATGGCCCGCTGGCTGACCGCC
201 CAACGACCCCGCCATTGACGTCAATAATGACGTATGTTCCCATAGTAACGCCAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTTACGGTAA
301 ACTGCCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCGCTGGCATTATGCCAGTACA
401 TGACCTTATGGGACTTTCCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGTATGCGGTTTTGGCAGTACATCAATGGCGTGGATA
501 GCGGTTTGACTCACGGGGATTTCCAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTGGTGGCACAAAATCAACGGGACTTTCAAATGTCTGTAAC
601 AACTCCGCCCATGACGCAAAATGGCGGTAGGCGTGTACGGTGGGAGTCTATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCGCTGGAGACGCC
701 ATCCACGCTGTTTTGACCTCCATAGAAGACACCGGACCGATCCAGCCTCCGGTCGACCGATCTGAGAACTTCAGGgtgagtttggggacccttgattg
801 ttctttcttttctgctattgtaaaattcatgtttatatggagggggcaagttttcagggtgttggtttagaatgggaagatgtcccttgtatcacctatgga
901 ccctcatgataattttgtttctttcacttttctactctgttgacaaccattgtctctcttattttctttctttctgttaactttttcgttaaacctta
1001 gcttgcatttgtaaacgaattttaaaattcacttttggttatttgcagattgtaagtacttttctaatcacttttttcaaggcaatcagggtatatt
1101 atattgtacttcagcacagtttttagagaacaattgttataatataatgataaggtagaatatttctgcatataaattctggctggcgtggaaatattctt
1201 attggtagaacaactacaccctggatcatcatcctgcttttctttatggtttacaatgatatacactgtttgagatgaggataaaaactctgagttcca
1301 aaccgggcccctctgctaaccatgttcatgcttcttctcttctctacagCTCCTGGCAACGTGCTGGTTGTTGTGTCTCATATTTGGCAAAGA

Agel (1416) **T19I (1480)** **Δ L24P25P26 + A27S (1495)**

1401 ATTCCTCGACGGATCCACCGGTCAACATGTTTGTGTTCTTGGTGTGCTTCCACTGGTCAGTCCCAATGCGTTAATCTC**ATC**ACCCGAACTCAAT**CTCTA**
1501 TACAAATTCCTTACCAGAGGAGTGTACTATCCTGACAAAGTGTTCGCTCAAGTGTCCCTCACTACTCAGGACCTTTTCTGCCTTTCTTTTCTAAC
25▶ T N S F T R G V Y P D K V F R S S V L H S T Q D L F L P F F S N
Δ H69V70 (1620)

1601 GTTACATGGTTTCATGCAATCTGGGACAAAACGGCACAAACGCTTCGACAACCCTGATTGCCATTCAATGATGGGGTGTACTTTGCCTCCACAGAGA
59▶ V T W F H A I S G T N G T K R F D N P V L P F N D G V Y F A S T E
1701 AATCCAACATCATTGAGGATGGATTTTCGGGACTACTCTGGACTCAAAGACACAGAGCCTGCTGATCGTTAAACAGCCACAAAACGTTGTATCAAAAT
92▶ K S N I I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V
G142D (1834)

1801 GTGCGAATTCAGTTTTGCAATGATCCCTTCTG**GAC**GTGTACTATCACAAGAATAACAAGTCTGGATGGAGAGCGAATTTCCGGTCTACAGCAGCGCA
125▶ C E F Q F C N D P F L D V Y Y H K N N K S W M E S E F R V Y S S A
1901 AACAACTGCACCTTCGAGTACGTGAGTCAACCTTTCTGATGGACCTGGAAAGGAAACAGGGAAACTTCAAGAACCTGAGAGATTTGTCTTTAAGAACA
159▶ N N C T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K N
V213G (2047)

2001 TCGACGGCTATTTAAGATCTATAGTAAGCATACGCTATCAACCTGG**AGG**AGGATCTTCCCGAGGGCTTTTTCAGCCCTGGAACCTTTGGTTGACTTGGC
192▶ I D G Y F K I Y S K H T P I N L G R D L P Q G F S A L E P L V D L P
2101 TATTGGTATCAATATCACCAGATTTCAGACCCCTTCGGCATTGCTTATCTTACTCCAGGTGATTCCTCCTCCGGGTGGACTGCCGGCGCCGCT
225▶ I G I N I T R F Q T L L A L H R S Y L T P G D S S S G W T A G A A
2201 GCCTACTATGTCGGCTATCTGCAACCAAGAAGCTTCTGCTCAAGTACAACGAAACGGCACTATTACGGATGCTGTTGATTGTGCCCTGGACCCTCTGT
259▶ A Y Y V G Y L Q P R T F L L K Y N E N G T I T D A V D C A L D P L
2301 CTGAGACTAAATGCACCCTCAAGAGCTTACCGTTGAGAAGGGATTACCAAAACAGTAATTTCCGGGTCAAACCCACGAAAGCATTGTGCGGTTCCC
292▶ S E T K C T L K S F T V E K G I Y Q T S N F R V Q P T E S I V R F P

G339D (2425)

2401 AAATATCAACATCTGTGTCCTTT**GAT**GAAAGTGTCAATGCTACAAGTTTGTCTCTGTGTACGCATGGAATAGGAAACGCATCTCCAATTTGTGTCGT
325▶ N I T N L C P F D E V F N A T R F A S V Y A W N R K R I S N C V A

T376A (2536)
S373P (2527)
S371F (2521) S375F (2533)

2501 GATTACTCCGTGCTGACAAATTTTGGCC**CAATTCGCCTT**CAAGTGTATGGCGTTTACCTACCAAACCTAACGACCTGTGCTTCACTAATGTGTATG
359▶ D Y S V L Y N F A P F F A F K C Y G V S P T K L N D L C F T N V Y

R408S (2632)
D405N (2623) **K417N (2659)**

2601 CCGACTCTTTTGTGATACGAGG**CAAT**GAAAGT**AGC**CAGATTGCACCAGGGCAGACCGGC**AAC**ATTGCCGACTACAACATAAGCTTCCAGATGACTTTAC
392▶ A D S F V I R G N E V S Q I A P G Q T G N I A D Y N Y K L P D D F T

N440K (2728) **L452R (2764)**

2701 CGGATGTTTATTGCATGGAACCTAAAC**AGC**TGGATTCCAAGTGGGTGGCAACTATAACTAC**AGA**TATAGACTTTCAGGAAATCCAACCTGAAACCA
425▶ G C V I A W N S N K L D S K V G G N Y N Y R Y R L F R K S N L K P

S477N, T478K (2839) **F486V (2866)**
E484A (2860)

2801 TTCGAGCGAGATATAAGCACAGAAATCTACCAGGCTGGA**AACAAA**CCCTGCAACGGCGTGG**CT**GGG**GTG**AACTGCTACTTCCATTG**CAG**AGTTACGGAT
459▶ F E R D I S T E I Y Q A G N K P C N G V A G V N C Y F P L Q S Y G

N501Y (2911)
Q498R (2902) Y505H (2923)
2901 TCAGACCTACATACGGGGTGGGTACCAACCCCTACTGTCGTAGTCTGAGTTTTGAGCTCCATGCCCCAGCCACAGTCTGTGGCCCCAAGAAAA
492▶ FRPTYG VGHQP YRVV VLSF ELLHAPATVCGPKKS

3001 CACCAATCTGGTGAAGAACAAATGCGTGAACCTTAACTTAAACGGACTCACAGGAACCGGCGTATTGACGGAGTAACAAGAAGTTCCTGCCATCCAG
525▶ TNLVK NKCVNF NFNGLTGTGVLT ESNKKKFLPFQ

3101 CAGTTCGGTCGCGATATTGCCGACACTACCGACGCTGTCGAGATCCCCAGACATTGGAGATTCCTGATATCACACCCTGTAGTTTCGGCGGAGTGAGCG
559▶ QFGRDIADTTDAVRDPQTLEILDITPCSF GGV S

3201 TGATTACGCCCGAACAATACAGCAATCAGGTTGCCGTCCTGTATCAGGGCGTGAATTGACCCGAGGTACCTGTGCGCATCCACGCTGACCAACTTAC
592▶ VITPGTNTSNQVA VLYQGVNCTEVPVAIHADQLT

3301 ACCACATGGCGAGTATATCCACCGGCTCCAACGCTTTTCAGACACGCTGCTGGATGCTGATCGGTGCAGAAATATGTTAATAATAGCTACGAGTGTGAT
625▶ PTWRVYSTGSNV FQTRAGCLIGAEYVNNNSYECD

3401 ATCCCATCGGTGCTGGAATATGCGCCTTTATCAAACCTCAAACCAAATCTCACAGCGGGCACGTAGTGTAGCATCCCAAAGTATCATTGCTACACAA
659▶ IPIGAGICASYQTQTKSHRRARSVASQSIIAYT
3501 TGAGCCTCGGTGCTGAGAATCTGTGCGCTACAGCAACAACCTCATTGCTATCCCTAACTTACAATCAGTGTGACAACGAAATTCGCCCGTATC
692▶ MSLGAENSVA YSNNSIAIPTNF TISVTTEILPV S
3601 TATGACCAAAACAGCGTGTGACTGCACCATGTACATCTGTGGCGATTCTACCGAATGTAGCAATCTCCTCCTCAATACGGATCATTCTGCACCTAGCTG
725▶ MTKTTSVDCTMYICG DSTEC SNLL LQYGSFCTQL

3701 AAGCGTCCCTCACAGGATTGCAAGTGTGAGCAGGACAAGAATACGCGAAGGTGTTGCCAGGTGAAGCAAATCTACAAAACCTCCACCATAAAAATAC
759▶ KRALTGIAVEQDKNTQEVFAQVKQIYKTPPIKY
3801 TTGGCGGATTCATTTCTCACAGATCTGCCGATCCCTCAAACCTCAAAGCGTAGCTTTATCGAGGATCTGCTCTTCAACAAGGTAACCTCGCAGA
792▶ FGFNF S QILPDP SKR SFI EDLLFNKVLAD
3901 TGCCGGTTTCATCAAGCAGTATGGCGATTGTCTGGGAGACATCGCCGCTCGGACCTGATCTGTGCACAGAAGTCAATGGACTGACCGTGTGCTGCC
825▶ AGFIKQYGDCLGDIAARDL ICAQKFNGLTVLPP
4001 TTGCTGACCCGAGATGATAGCCCAATACACTAGCGCCCTGCTGGCCGACCATCACTTCTGGTGGACATTGCGAGCTGGCGCTGCCCTTCAGATTC
859▶ LLTDEMIAQYTSALLLAGTITSGWTFGAGAAALQI
4101 CTTTTGCTATGCAGATGCCCTACCGCTTAAACGGCATCGGTGTGACACAAAACGTTCTGTATGAAAACAGAAACTCATGCCAACAGTTCAACAGTGC
892▶ PFAMQMA YRFNGIGV TQNVLYENQKL IANQFNSA

4201 TATCGGTAAGATACAGGATAGCCTGTCCACTGCCAGCGCATTGGGAAAGTTCAGGATGTAGTGAACCAATGCCAGGCCTTAAACACCTGGTG
925▶ IGKIQD SLSSTA S ALGKLQD VVNHNNAQAALNTLV

4301 AAACAGCTCTCTTCAAAGTTTGGTGCCATTTTAGCGTGTGAATGACATACTGAGCCGGTTGGACAAGGTGGAGGCTGAAGTGCAGATTGATAGGCTGA
959▶ KQLSSSKFGA ISSV LNDILSR LDKVEAEVQIDRL
4401 TAACTGGGCGCCTTCAAGTCTTTCAGACCTATGTGACCCAGCAGCTCATCCGCGCTGCTGAAATTCGCGCATCCGCTAACCTGGCAGCAACAAAATGTC
992▶ ITGRLQ S LQTYVTQQ LIRAAEIRASANLAATKMS
4501 CGAGTGTGTGCTGGTCAAGAGAGTGGACTTTTGGCGGAAGGGTATCACCTGATGTCTTTTCCCTCAGTGCACCCCATGGTGTGGTCTTCTG
1025▶ ECVL GQSKRVDFC GKG YHLS FFPQ SAPHGVVFL
4601 CACGTGACTTATGTCCAGCTCAGGAAAAGAACTTCACTACAGCCCAGCCATCTGCCACGATGGGAAAAGCCACTTCCAGGGAAGCGTATTGCTGT
1059▶ HVTYVPAQEKNF TTA PAICH D GK A H F P R E G V F V
4701 CCAATGGTACTCATTGGTCTCACTCAGAGAAATTTCTACGAGCCCGAGATTAAACCACTGACAATACATTTGTATCCGGCAATTGTGATGTGGTTAT
1092▶ SNGTHW FVTQRNFYEPQ IITTDNTFVSGNCDVVI
4801 CGGATTGTGAATAACTGTTTACGATCTTTGACGCCAGAGCTGGACTCCTTCAAGGAGGAGCTTGACAAATATTTAAGATCACACATCACCTGAC
1125▶ GIVNNTVYDPLQPELDSFK EELDKYFKNHTSPD
4901 GTCGACCTCGGAGATATTCAGGAATCAATGCTTCCGTGGTCAATATTCAGAAGGAGATAGACAGGCTGAATGAGGTTGCCAAGAACCTCAACGAGTCTC
1159▶ VD L GD ISGINASV VNIQKEIDRLNEVAKNL NES
5001 TGATCGATCTGCAGGAGTTGGCAAGTACGAACAGTATATCAAATGGCCTTGGTACATTTGGCTTGGGTTTCTGCTGGGCTGATAGCTATCGTCATGGT
1192▶ LIDLQELGKYEQYIKWPWYIW LGF IAGLIAIVMV

N969K (4315)
N954H (4270)
N679K (3445) Furin cleavage site
P681H (3451)
N764K (3700)
D796Y (3796)
Q954H (4270)
Nhel (5177)

5101 GACAATTATGTTGTGTCATGACATCCTGCTGATGTTGTCTGAAGGGCTGCTGCTCATGCGGACGCTGTTGCTAAAGCTAGCCTCGAGGGATCCGTCGA
1225▶ TIMLC CMTSCC SCLKGC C S C G S C C •
5201 GGAATCACTCCTCAGGTG CAGGCTGCCTATCAGAAGGTGGTGGCTGGTGGCCAATGCCCTGGCTCACAATAACCACTGAGATCTTTTCCCTCTGCC

5301 AAAAATTATGGGGACATCATGAAGCCCTTGAGCATCTGACTTCTGGCTAATAAAGGAAATTTATTTTCATTGCAATAGTGTGTTGGAATTTTTGTGTC

5401 TCTCACTCGGAAGGACATATGGGAGGGCAAATCATTAAACATCAGAATGAGTATTTGGTTAGAGTTGGCAACATATGCCATATGCTGGCTGCCAT

5501 GAACAAGGTTGGCTATAAAGAGGTATCAGTATATGAAACAGCCCCCTGCTGCCATTCTTATCCATAGAAAAGCCTTGACTTGAGGTTAGATTTTT

5601 TTTATATTTGTTTGTGTTATTTTTTTCTTAAACATCCCTAAAATTTCTTACATGTTTACTAGCCAGATTTTTCTCTCTCTGACTACTCCAG

5701 TCATAGCTGCCCTCTCTTATGGAGATCCCTCGACGGATCGCCGCAATTCGTAATCATGT CATAGCTGTTTCTGTGAAATTGTTATCCGCTCA

5801 CAATTCACACAACATACGAGCCGGAAGCATAAAGTGAAGGCTGGGTGCCTAATGAGTGAAGTAACTCACATTAATGGCTTGGCTCACTGCCCGC
5901 TTTCAGTGGGAAACCTGTGTCGACGCTGCAATTAATGAATCGGCAACCGCGGGGAGAGCGGTTTGCATATGGGCGCTTCCGCTTCTCGCTC
6001 ACTGACTCGCTCGCTCGGTGCTGGCTGGCGAGCGGTATCAGCTCACTCAAAGCGGTAATACGGTTATCCACAGAATCAGGGGATAACGAGGAA

6101 AGAACATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAACCTAAAAGGCCGCTTGTGGCTTTTTCCATAGGCTCGCCCCCTGACGAGCATCACAA

6201 AAATCGACGCTCAAGTCAGAGGTGGC GAAACCCGACAGGACTATAAAGATACCAAGCGTTTCCCCTGGAAGCTCCCTCGTGCCTCTCTGTTCCGACC

6301 CTGCCGCTTACCGGATACCTGTCCGCTTTCTCCCTGGGAAGCGTGGCCTTTCTCATAGCTCAGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTT

6401 GCTCCAAGCTGGGCTGTGTGCACGAACCCCGCTTACGCCGACCGTGCCTTATCCGGTAACTATCGTCTTGAGTCCAACCCGGAAGACACGACTT
6501 ATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGCGGTGCTACAGAGTCTTGAAGTGGTGGCCTAACTACGGCTACACT
6601 AGAAGAACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAAACAAACCACCGCTGGTAGCG
6701 GTGGTTTTTTTGTGCAAGCAGCAGATTACGGCGAGAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGGAAACGA
6801 AAACTCACGTTAAGGGATTTTGGTCATGAGATTATCAAAAAGGATCTTACCTAGATCCTTTAAATTAATAAAGTAAAGTTTAAATCAATCTAAAGTATA
6901 TATGAGTAAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTTTCGTTTCATCCATAGTTGCCTGACTCCCCG
287 • W H K I L S A G I E A I Q R N R E D M T A Q S G T
7001 TCGTGTAGATAACTACGATACGGGAGGGCTTACCATCTGGCCCCAGTGTGCAATGATACCGCGAGACCCAGCTCACCAGCTCCAGATTTATCAGCAAT
261 T Y I V V I R S P K G D P G L A A I I G R S G R E G A G S K D A I
7101 AAACAGCCAGCCGGAAGGGCCGAGCGCAGAAGTGGTCTGCAACTTTATCCGCTCCATCCAGTCTATTAATTGTTGCCGGGAAGCTAGAGTAAGTAGT
228 F W G A P L A S R L L P G A V K D A E M W D I L Q Q R S A L T L L
7201 TCGCCAGTTAATAGTTTGCACAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTACGCTCGTCTTGGTATGGCTTATTGAGTCCGCTCCCAAC
194 E G T L L K R L T T A M A V P M T T D R E D N P I A E N L E P E W R
7301 GATCAAGGCAGTTACATGATCCCCATGTTGTGCAAAAAGCGGTTAGCTCCTTCGGTCTCCGATCGTTGTCAGAAGTAAGTTGGCCGAGTGTATC
161 D L R T V H D G M N H L F A T L E K P G G I T T L L L N A A T N D
7401 ACTCATGGTTATGGCAGCACTGCATAATTCTTACTGTATGCCATCCGTAAGATGCTTTTCTGTGACTGGTGAAGTACTCAACCAAGTATTCTGAGAA
128 S M T I A A S C L E R V T M G D T L H K E T V P S Y E V L D N Q S
7501 TAGTGTATGCGGCACCGAGTTGCTCTTGGCCGGCGTCAATACGGGATAATACCGGCCACATAGCAGAACTTTAAAAGTGTCTCATTGAAAAAGCTT
94 Y H I R R G L Q E Q G A D I R S L V A G C L L V K F T S M M P F R E
7601 CTTCCGGGGCAAAAACCTCAAGGATCTTACCGCTGTTGAGATCCAGTTCGATGTAACCCACTCGTGCACCAACTGATCTTCAAGCATCTTTACTTTTAC
61 E P R F S E L I K G S N L D L E I Y G V R A G L Q D E A D K V K V
7701 CAGCGTTTCTGGGTGAGCAAAAACAGGAAGGCAAAATGCCGCAAAAAGGGAATAAGGGCGACACGGAATGTTGAATACTCATACTCTCTTTTTCAA
28 L T E P H A F V P L C F A A F F P I L A V R F H Q I S M
7801 TATTATTGAAGCATTATCAGGGTTATTGTCTCATGAGCGGATACATATTTGAATGATTTAGAAAAATAAACAAATAGGGGTTCCGGGCACATTTCCCC
7901 GAAAAGTGCACCTAAATTGTAAGCGTAAATTTTTGTTAAAATTCGCGTAAATTTTTGTTAAATCAGCTCATTTTTTAACCAATAGGCGGAAATCGGC
8001 AAAATCCCTTATAAATCAAAAGAATAGACCGAGATAGGGTTGAGTGTGTTCCAGTTTGAACAAGAGTCCACTATTAAGAAGCTGGACTCCAACGTCA
8101 AAGGGCGAAAAACCGTCTATCAGGGCGATGGCCACTACGTGAACCATCACCTAATCAAGTTTTTTGGGGTGGAGTCCCGTAAAGCACTAAATCGGAA
8201 CCCTAAAGGGAGCCCCGATTTAGAGCTTGACGGGAAAGCCGGCGAACGTGGCAGAAAGGAAAGGAAAGGAAAGGAAAGGAGCGGGCGCTAGGGCGCTG
8301 GCAAGTGTAGCGGTACGCTGCGCGTAACCAACACCCCGCGCTTAATGCGCCGTACAGGGCGCGTCCCATTCGCCATTGAGGCTGCGCAACTGTT
8401 GGAAGGGCGATCGGTGCGGGCTCTTCGCTATTACGCCAGTGGCGAAAGGGGATGTGCTGCAAGGCGATTAAGTTGGGTAACGCCAGGGTTTTCCCA
8501 GTCACGACGTTGTAACGACGCGCAGTGAAGCGCGTAATACGACTCACTATAGGGCGAATTGGAGCTCCACCGCGGTGGCGGCGCTCTAGA