



1 GAGCTTGGCCCATTCATACGTTGTATCCATATCATAATATGTACATTTATATTGGCTCATGTCCAACATTACCGCCATGTTGACATTGATTATTGACTA
101 GTTATTAATAGTAATCAATTACGGGGTCATTAGTTCATAGCCCATATATGGAGTTCGCGTTACATAAATTACGGTAAATGGCCCCCTGGCTGACCGCC
201 CAACGACCCCCGCCATTGACGTCAATAATGACGTATGTTCCCATAGTAACGCCAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTACGGTAA
301 ACTGCCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCCCTGGCATTATGCCAGTACA
401 TGACCTTATGGGACTTTCCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGTATGCGGTTTTGGCAGTACATCAATGGGCGTGGATA
501 GCGGTTTGACTCACGGGGATTCCAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTGTTGGCACCAAATCAACGGGACTTTCCAAAATGTCGTAAC
601 AACTCCGCCCCATTGACGCAAATGGGCGGTAGGCGGTACGGTGGGAGTCTATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCGCTGGAGACGCC
701 ATCCACGCTGTTTGGACTCCATAGAAGACACCGGGACCGATCCAGCTCCGGTCGACCGATCCTGAGAACTTCAGGgtgagtttggggacccttgattg
801 ttctttcttttgcgtattgtaaaattcatgttatatggagggggcaaagttttcaggggtgtgtttagaatgggaagatgtcccttgatcaccatgga
901 ccctcatgataatgtttctttcactttctactctgttgacaaccattgtctcctcttattttcttttcattttctgtaacttttctgtaaaccttta
1001 gcttgcatgttaacgaattttaaaattcacttttgtttatttgtcagattgtaagtactttctcctaactcttttttcaaggcaatcaggggatatt
1101 atattgtacttcagcacagttttagagaacaattgttataattaaatgataaggtagaatattttctgcatataaattctggctggcgtggaatattctt
1201 attggtagaacaactacaccctggatcatcctgcctttctctttatggttacaatgatatacactgtttgagatgaggataaaataactctgagtcca
1301 aaccgggcccctctgctaaccatgttcatgcctttctctttctctacagCTCCTGGCAACGTGCTGGTTGTTGTGCTGTCTCATATTTGGCAAAGA

Agel (1416)

T19I (1480)

**A27S
Δ L24P25P26 (1495)**

1401 ATTCTCGACGGATCCACCGTCAACATGTTTGTGTTCTTGGTGTGCTTCCACTGGTCAGTTCCTCAATGCGTAAATCTCATCACCGAACTCAATCCCA
1501 TACAAATTCCTTACCAGAGGAGTACTATCCTGACAAAGTGTTCGCGTCAAGTGTCTCCACTCTACTCAGGACCTTTCTGCTTTCTTTTCTAAC
1601 GTTACATGGTTTCATGCAATCCATGTGTCTGGGACAAACGGCACAAACGCTTCGACAACCTGTATTGCCATTCAATGATGGGGTGTACTTTGCCCTCA
1701 CAGAGAAATCCAACATCATTGAGGATGGATTTTCGGGACTACTCTGGACTCAAAGACACAGAGCCTGCTGATCGTTAAACAACGCCACAAACGTTGTCAT
1801 CAAAGTGTGCGAATTCAGTTTTGCAATGATCCCTTCTGACGTGTACTATCACAAGAATAACAAGTCTGGATGGAGAGCGAATTCGGGTCTACAGC

G142D (1840)

1801 K V 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
1901 AGCGAAACAACCTGCACCTTCGAGTACGTGAGTCAACCTTTCTGATGGACCTGGAAGGAAACAGGGAACTTCAAGAACCTGAGAGAGTTTGTCTTTA
199▶ S A 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

V213G (2053)

2001 AGAACATCGACGGCTATTTAAGATCTATAGTAAGCATACGCCTATCAACCTGGGAGGGATCTTCCCAGGGCTTTTCAGCCTGGAACCTTTGGTTGA
2101 CTTGCCTATTGGTATCAATATCACCAGATTTTCCAGACCTTCTGGCATTGCATCGGTCTTACTTCCAGGTGATTCCTCTCCGGGTGGACTGCCGGC
2201 GCCGCTGCCTACTATGTCGGCTATCTGCAACCAAGAAGCTTCTGCTCAAGTACAACGAAACGGCACTATTACGGATGCTGTTGATTGTGCCTGGACC
2301 CTCTGTCTGAGACTAAATGCACCCTCAAGAGCTTTACCGTTGAGAAGGGGATTTACCAAACAGTAATTTCCGGGTCCAACCCACCGAAAGCATTGTGCG
239▶ P L 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

G339D (2431)

2401 GTTCCCAAATATCACCAATCTGTGTCCTTTGATGAAGTGTCAATGTCTACAAGTTTGTCTCTGTGACGCATGGAATAGGAAACGCATCTCCAATTGT
249▶ F P 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

T376A (2542)

S373P (2533)

S371F (2527) S375F (2539)

2501 GTCGCTGATTACTCCGTGCTGTACAATTTTGGCCCAATTCCTGCTTCAAGTGTATGGCGTTTCCACTACCAAATTAACGACCTGTGCTTCACTAATG
259▶ V A 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

R408S (2638)

D405N (2629)

K417N (2665)

2601 TGTATGCCGACTTTTTGTGATACGAGGCATTAAGTGTAGGCAGATTGCACCAGGGCAGACCGGCATTAACGACTTCACTAAGCTTCCAGATGA
269▶ V Y 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

N440K (2734)

2701 CTTTACCGGATGTGTTATTGCATGGAACCTCAAACAAAGCTGGATTCCAAGGTGGTGGCAACTATAACTACCTGTATAGACTGTTCCAGGAAATCCAACCTG
425▶ F T G C V I A W N S N K L D S K V G G N Y N Y L Y R L F R K S N L

S477N, T478K (2845)

E484A (2866)

Q493R (2893)

2801 AAACATTTCGAGCGAGATATAAGCACAGAAATCTACCAGGCTGGAACAAAACCTGCAACGGCGTGGCTGGGTTCAACTGCTACTTCCCATTGCGCAGTT
459▶ K P F E R D I S T E I Y Q A G N K P C N G V A G F N C Y F P L R S

N501Y (2917)

Q498R (2908)

Y505H (2929)

2901 ACGGATTCAGACTACATACGGGGTGGGTCAACCAACCTATCGTGTCTAGTCTGAGTTTTGAGCTCCTCCATGCCCCAGCCACAGTCTGTGGCCCCAA
492▶ Y G F R P T Y G V G H Q P Y R V V V L S F E L L H A P A T V C G P K

3001 GAAAAGCACCAATCTGGTGAAGAACAAATGCGTGAACCTTAACTTTAACGGACTCACAGGAACCGGCGTATTGACGGAGAGTAACAAGAAGTTCCTGCCA
525▶ K S T N L V K N K C V N F N F N G L T G T G V L T E S N K K F L P

3101 TTCCAGCAGTTCGGTCGCGATATTGCCGACACTACCGACGCTGTCCGAGATCCCCAGACATTGGAGATTCTTGATATCACACCTGTAGTTTCGGCGGAG
559▶ F Q Q F G R D I A D T T D A V R D P Q T L E I L D I T P C S F G G

D614G (3256)

3201 TGAGCGTGATTACGCCCGGAACCAATACCAGCAATCAGGTTGCCGCTCTGTATCAGGGCGTGAATTGCACCGAGGTACCTGTCCATCCACGCTGACCA
592▶ V S V I T P G T N T S N Q V A V L Y Q G V N C T E V P V A I H A D Q

H655Y (3379)

3301 ACTTACACCCACATGGCGAGTATATTCCACCGGCTCCAACGCTTTTCAGACACGCTGGATGTCTGATCGGTGCAGAAATATGTTAATAATAGCTACGAG
625▶ L T P T W R V Y S T G S N V F Q T R A G C L I G A E Y V N N S Y E

N679K (3451)

Furin cleavage site

3401 TGTGATATCCCATCGGTGCTGGAATATGCGCCTCTATCAAACCTCAAGCGGGCACTAGTGTAGCATCCCAAAGTATCATTGCCT
659▶ C D I P I G A G I C A S Y Q T Q T K S H R R A R R S V A S Q S I A

3501 ACACAATGAGCCTCGGTGCTGAGAATCTGTGCGCTACAGCAACAATCCATTGCTATCCCTACTAATTTCAATCAGTGTGACAACTGAAATTCGCC
692▶ Y T M S L G A E N S V A Y S N N S I A I P T N F T I S V T T E I L P

3601 CGTATCTATGACCAAAACAAGCGTTGACTGCACCATGTACATCTGTGGCGATTCTACCGAATGTAGCAATCTCCTCCTGCAATACGGATCATTCTGCACT
725▶ V S M T K T S V D C T M Y I C G D S T E C S N L L L Q Y G S F C T

N764K (3706)

3701 CAGCTGAAGCGTGCCCTCACAGGATTGCAGTTGAGCAGGACAAGAATACGAGGAAGTGTGGCCAGGTGAAGCAAATCTACAAAACCTCACCCATAA
759▶ Q L K R A L T G I A V E Q D K N T Q E V F A Q V K Q I Y K T P P I

D796Y (3802)

3801 AATACCTTTGGCGGATCAATTTCTCACAGATCCTGCCGATCCCTCAAACCTCCAAGCGTAGCTTTATCGAGGATCTGCTCTTCAACAAGGTAACCT
792▶ K Y F G G F N F S Q I L P D P S K P S K R S F I E D L L F N K V T L

3901 CGCAGATGCCGTTTTCATCAAGCAGTATGGCGATTGTCTGGGAGACATCGCCGCTCGGGACCTGATCTGTGCACAGAAGTTCAATGGACTGACCGTCTG
825▶ A D A G F I K Q Y G D C L G D I A A R D L I C A Q K F N G L T V L

4001 CCTCCCTTGTGACCGACGAGATGATGCCAATACTAGCCCTGCTGGCCGGCACCATCACTTCTGGTGGACATTCGGAGCTGGCGCTGCCCTTC
859▶ P P L L T D E M I A Q Y T S A L L A G T I T S G W T F G A G A A L

4101 AGATTCCTTTGCTATGCAGATGGCCCTACCGCTTTAACGGCATCGGTGTGACACAAAACGTTCTGTATGAAAACAGAAACTCATCGCCAACCAGTTCAA
892▶ Q I P F A M Q M A Y R F N G I G V T Q N V L Y E N Q K L I A N Q F N

Q954H (4276)

4201 CAGTGTATCGGTAAGATACAGGATAGCCTGTCCACTGCCAGCGCATTGGGAAAGTTCAGGATGTAGTGAACCAATGCCAGGCACCTAACACC
925▶ S A I G K I Q D S L S S T A S A L G K L Q D V V N H N A Q A L N T

N969K (4321)

4301 CTGGTGAACAGCTCTCTTCAAGTTTGGTGCATTTCTAGCGTGTGAATGACATACTGAGCCGGTTGGACAAGGTGGAGGCTGAAGTGCAGATTGATA
959▶ L V K Q L S S K F G A I S S V L N D I L S R L D K V E A E V Q I D

4401 GGCTGATAACTGGGCGCTTCACTCTCTTACAGCCTATGTGACCCAGCAGCTCATCCGCGCTGCTGAAATTCGCGCATCCGTAACCTGGCAGCAACCAA
992▶ R L I T G R L Q S L Q T Y V T Q Q L I R A A E I R A S A N L A A T K

4501 AATGTCCGAGTGTGTCTGGTTCAGTCTAAGAGAGTGGACTTTTGGCGGAAGGGGTATCACCTGATGTCTTTTCTCAGTCTGCACCCCATGGTGTGGT
1025▶ M S E C V L G Q S K R V D F C G K G Y H L M S F P Q S A P H G V V

4601 TTTCTGACGTGACTTATGTCCAGCTCAGGAAAAGAACTTCACTACAGCCAGCCATCTGCCACGATGGGAAAGCCCACTTTCCAGGGAAGGCGTAT
1059▶ F L H V T Y V P A Q E K N F T T A P A I C H D G K A H F P R E G V

4701 TCGTGTCCAATGGTACTCATTGGTTCGTCCTCAGAGAAATTTCTACGAGCCCAGATTATAACCACTGACAATACATTTGTATCCGGCAATTGTGATGT
1092▶ F V S N G T H W F V T Q R N F Y E P Q I I T T D N T F V S G N C D V

4801 GGTATCGGATTGTGAATAACTGTTTACGATCCTTTGACGCCAGAGCTGGACTCCTTCAAGGAGGAGCTTGACAATATTTTAAAGATCACACATCA
1125▶ V I G I V N N T V Y D P L Q P E L D S F K E E L D K Y F K N H T S

4901 CCTGACGTGCACCTCGGAGATATTTCCAGGAATCAATGCTTCCGTGGTCAATATTCAGAAGGAGATAGACAGGCTGAATGAGGTTGCCAAGAACCTCAACG
1159▶ P D V D L G D I S G I N A S V V N I Q K E I D R L N E V A K N L N

5001 AGTCTCTGATCTGACGAGTTGGGCAAGTACGAACAGTATCAAATGGCCTTGGTACATTTGGCTTGGGTTCAATGCTGGGCTGATAGCTATCGT
1192▶ E S L I D L Q E L G K Y E Q Y I K W P W Y I W L G F I A G L I A I V

NheI (5183)

5101 CATGGTGACAATTATGTTGTGTTGCATGACATCCTGTGTAGTTGTCTGAAGGGCTGCTGCTCATGGCCAGCTGTTGCTAAAGCTAGCCTCAGGGGATC
1225▶ M V T I M L C C M T S C C S C L K G C C S C G S C C •

5201 CGTCGAGGAATCACTCCTCAGGTGACAGGCTGCTATCAGAAGTGGTGGTGGTGTGGCAATGCCTGGCTCACAAATACCACTGAGATCTTTTTCCC

5301 TCTGCCAAAAATATGGGGACATCATGAAGCCCTTGAGCATCTGACTTCTGGCTAATAAAGGAAATTTATTTTCATTGCAATAGTGTGTTGGAATTTT
5401 TGTGTCTCTCACTCGGAAGGACATATGGGAGGCAAATCATTTAAAACATCAGAATGAGTATTTGGTTTAGAGTTTGGCAACATATGCCATATGCTGGC
5501 TGCCATGAACAAAGGTTGGCTATAAAGAGGTCATCAGTATATGAAACAGCCCCTGCTGTCCATTCTTATTCCATAGAAAAAGCCTTGACTTGAGGTTAG
5601 ATTTTTTTTATATTTTGTGGTTATTTTTTTCTTTAACATCCCTAAAATTTTCTTACATGTTTTACTAGCCAGATTTTTCTCTCTCTGACTAC
5701 TCCCAGTCATAGCTGTCCCTCTTCTTATGGAGATCCCTCGACGGATCGGCCGAATTCGTAATCATGTCATAGCTGTTTCTGTGTGAAATTGTTATC
5801 CGCTCACAATTCACACAACATACGAGCCGGAAGCATAAAGTGTAAAGCCTGGGGTGCCTAATGAGTGAGCTAACTCACATTAATTGCGTTGCGCTCACT
5901 GCCCCGTTTCCAGTCGGGAAACCTGTCGTGCCAGTGCATTAATGAATCGGCCAACGCGCGGGGAGAGGCGGTTTGCATTTGGGCGCTCTCCGCTTCC
6001 TCGCTCACTGACTCGTGCCTCGGTCGTTCCGCTGCGGCGAGCGGTATCAGCTCAAAAGGCGTAATACGGTTATCCACAGAATCAGGGGATAACG
6101 CAGGAAGAACATGTGAGCAAAGGCCAGCAAAGGCCAGGAACCGTAAAAAGGCCGCGTTTCCATAGGCTCCGCCCCCTGACGAGCA
6201 TCACAAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGGACTATAAAGATACCAGGCGTTTCCCTGGAAGCTCCCTCGTGCCTCTCTGTT
6301 CCGACCCTGCCGCTTACCGGATACCTGTCCGCTTTCTCCCTCGGGAAGCGTGGCGCTTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGG
6401 TCGTTGCTCCAAGCTGGGCTGTGTGCACGAACCCCGTTAGCCCGACCGCTGCGCTTATCCGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACA
6501 CGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGGCCTAACTACGGC
6601 TACACTAGAAGAACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAACAACCACCGCTG
6701 GTAGCGGTGTTTTTTTGTGTTGCAAGCAGCAGATTACGCGCAGAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGTCTGACGCTCAGTG
6801 GAACGAAAACCTCAGTTAAGGATTTTGGTATGAGATTATCAAAAAGGATCTTACCTAGATCCTTTAAATTAATAAAGTTTTAAATCAATCTAA
6901 AGTATATATGAGTAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTTGTTTCATCCATAGTTGCCTGAC
7001 TCCCGCTGTGTAGATAACTACGATACGGGAGGCTTACCATCTGGCCCGAGTGTGCAATGATACCGGAGACCCAGCTCACCAGGCTCCAGATTTATC
263 G T 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
7101 AGCAATAAACAGCCAGCCGGAAGGGCCGAGCGCAGAAGTGGTCTGCAACTTTATCCGCTCCATCCAGTCTATTAATTGTTGCCGGGAAGCTAGAGTA
230 A I 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
7201 AGTAGTTCGCCAGTTAATAGTTTGCACAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTACGCTCGTCTGTTGGTATGGCTTATTGAGCTCCGCTG
196 L L 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
7301 CCAACGATCAAGGCGAGTTACATGATCCCCATGTTGTGCAAAAAAGCGGTTAGCTCCTTCGGTCTCCGATCGTTGTGAGAAGTAAAGTTGGCCGAGT
163 W R 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
7401 GTTATCACTCATGGTTATGCCAGCACTGCATAATTCTTACTGTATGCCATCCGTAAGATGCTTTTCTGTGACTGGTACTCAACCAAGTCATTC
130 N D 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
7501 TGAGAATAGTGTATGCGGCGACCGAGTTGCTCTTGGCCGGCGTCAATACGGGATAATACCGGCCACATAGCAGAAGTAAAAAGTCTCATATTGGAA
96 Q S 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
7601 AACGTTCTTCGGGGCGAAAACCTCAAGGATCTTACCCTGTTGAGATCCAGTTCGATGTAACCCACTCGTGCACCAACTGATCTTCAAGCATCTTTTAC
63 R E 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
7701 TTTACCAGCGTTTCTGGGTGAGCAAAAACAGGAAGGCAAAATGCCGCAAAAAGGGAATAAGGGCGACACGGAAATGTTGAATACTCATACTTCTCCT
30 K V 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 TTTCAATATTATTGAAGCATTTATCAGGGTTATTGTCTCATGAGCGGATACATATTTGAATGATTTAGAAAAATAACAAATAGGGGTTCCGCGCACAT
7901 TTCCCGGAAAAGTGCCACCTAAATTGTAAGCGTTAATATTTTGTAAATTCGCGTTAAATTTTGTAAATCAGCTCATTTTTTAAACCAATAGGCCGAA
8001 ATCGGCAAAATCCCTTATAAATCAAAAGAATAGACCGAGATAGGGTTGAGTGTGTTCCAGTTTGAACAAGAGTCCACTATTAAGAACGTGGACTCCA
8101 ACGTCAAAGGGCGAAAAACCGTCTATCAGGGCGATGGCCACTACGTGAACCATCACCTAATCAAGTTTTTGGGGTGCAGGTGCCGTAAAGCACTAAA
8201 TCGGAACCTAAAGGGAGCCCCGATTTAGAGCTTGACGGGGAAAGCCGGCGAACGTGGCGAGAAAGGAAGGAAGAAAGCGAAAGGAGCGGGCGTAGG
8301 GCGCTGGCAAGTGTAGCGGTACGCTGCGCGTAACCAACACACCCGCGGCTTAATGCGCCGCTACAGGGCGGTCCTTCCGCTTCCAGGCTGCGCA
8401 ACTGTTGGGAAGGGCGATCGGTGCGGGCTCTTCGCTATTACGCCAGCTGGCGAAAGGGGATGTGCTGCAAGGCGATTAAGTTGGTAAACGCCAGGGTT
8501 TTCCAGTCACGACGTTGTAACACGACGGCCAGTGAGCGCGTAATACGACTCACTATAGGGCGAATTGGAGCTCCACCGCGTGGCGGCCGCTTAGA