



175

1 GAGCTTGGCCATTGCATACGTTGTATCCATATCATAATATGTACATTTATATTGGCTCATGTCCAACATTACGCCATGTTGACATTGATTATTGACTA
101 GTTATTAATAGTAATCAATTACGGGGTCATTAGTTCATAGCCCATATATGGAGTTCGCGTTACATAACTTACGGTAAATGGCCCGCTGGCTGACCGCC
201 CAACGACCCCGCCATTGACGTCAATAATGACGTATGTTCCCATAGTAACGCCAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTTACGGTAA
301 ACTGCCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCTATTGACGTCAATGACGGTAAATGGCCCGCTGGCATTATGCCAGTACA
401 TGACCTTATGGGACTTTCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGATGCGGTTTTGGCAGTACATCAATGGGCGTGGATA
501 GCGGTTTGACTCACGGGGATTCCAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTGGTGGACCAAATCAACGGGACTTTCCAAAATGTCGTAAC
601 AACTCCGCCCCATTGACGCAAATGGGCGGTAGCGGTGTACGGTGGGAGTCTATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCGCCTGGAGACGCC
701 ATCCACGCTGTTTTGACCTCCATAGAAGACACCGGGACCGATCCAGCTCCGGTGCACCGATCCTGAGAACTCAGGgtgagtttggggacccttgattg
801 ttctttcttttctgctattgtaaaattcatgttatatggaggggcaaagtttccagggtgttgttagaatgggaagatgtcccttgatcacctatgga
901 ccctcatgataatgttttctttcactttctactctgttgacaaccattgtctcctcttattttcttttcattttctgtaacttttctgtaaaccttta
1001 gcttgcatgtgtaacgaatgttttaattcacttttgtttatgttcagattgtaagtactttctctaatcactttttttcaaggcaatcagggtatatt
1101 atattgtacttcagcacagtttagagaacaattgttataattaatgataaggtagaatatttctgcatataaattctggctggcgtggaatattctt
1201 attggtagaacaactacaccctggtcatcatcctgcctttctctttatggttacaatgatatacactgtttgagatgaggataaaaactctgagtcca
1301 aaccgggcccctctgtaaccatggtcatgcctttctctttctctacagCTCCTGGCAACGTGCTGGTTGTGTGCTGTCTCATATTTGGCAAAGA

Agel (1416)

1401 ATTCTCGACGGATCCACGGTCAACATGTTTGTGTTCTTGGTGTGCTTCCACTGGTCAGTCCCAATGCGTTAATCTCACACCCGAACCTCAACTCCC
1501 ACCCGCATATACAAATTCCTTACCAGAGGAGTACTATCCTGACAAAGTGTTCGGTCAAGTGTCTCCACTCTACTCAGGACCTCTTTCTGCCTTTC
25▶ P A Y T N S F T R G V Y Y P D K V F R S S V L H S T Q D L F L P F
1601 TTTCTAACGTTACATGGTTTCATGCAATCCATGTGTCTGGGACAAACGTGATCAAAACGCTTCGACAACCCTGTATTGCCATTCAATGATGGGGTGTACT
59▶ F S N V T W F H A I H V S G T N V I K R F D N P V L P F N D G V Y
1701 TTGCTCCACAGAGAAATCCAACATCATTGAGGATGGATTTTCGGGACTACTCTGGACTCAAAGACACAGAGCCTGCTGATCGTTAAACAACGCCACAAA
92▶ F A S T E 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
1801 CGTTGTCATCAAAGTGTGCGAGTTCAGTTCGCAATGATCCCTTCCGGAGTGTACTATACAAGAATAACAAGTCTGGATGGAGAGCGAATTTCCGG
125▶ V V I K V C E F Q F C N D P F L G V Y Y H K N N K S W M E S E F R
1901 GTCTACAGCAGCGCAAACAACCTGACCTTCGAGTACGTGAGTCAACCTTTCTGATGGACCTGGAAGGAAACAGGAAACTCAAGAACCTGAGAGAGT
159▶ V Y S 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
2001 TTGCTTTAAGAACATGACGGCTATTTAAGATCTATAGTAAGCATACGCCATCAACCTGGTAAGGGATCTCCCCAGGGCTTTTCAGCCCTGGAACC
192▶ F V F K N I D G Y F K I Y S K H T P I N L V R D L P Q G F S A L E P

G75V+T76I (1648)

D253N (2164)

Δ [R246,G252]

2101 TTTGGTTGACTTGCTATTGGTATCAATATCACCAGATTTAGACCCTTCTGGCATTGCATAACTCTCTCCGGGTGGACTGCCGGCGCTGCTCCTAC
225▶ L V D L P I G I N I T R F Q T L L A L H N S S S G W T A G A A A Y
2201 TATGTCGGCTATCTGCAACCAAGAACGTTCTGCTCAAGTACAACGAAACGGCACTATTACGGATGCTGTTGATTGTGCCCTGGACCTCTGCTGAGA
259▶ 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 S E
2301 CTAATGCACCCTCAAGAGCTTTACCGTTGAGAAGGGATTACCAAACAGTAATTTCCGGTCCAACCCACGAAAGCATTGTGCGGTTCCCAAATAT
292▶ 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 N I

2401 CACCAATCTGTGCCCTTTGGCGAAGTGTCAATGCTACAAGTTTGTCTTGTGTACGCATGGAATAGGAAACGCATCTCCAATTGTGTCGCTGATTAC
325▶ T N L C P F G E V F N A T R F A S V Y A W N R K R I S N C V A D Y

2501 TCCGTGCTGTACAATCCGCCTCTTTCTCAACCTTCAAGTGTATGGCGTTTACCTACCAAACCTAACGACCTGTGCTTCACTAATGTGTATGCCGACT
359▶ S V L Y N S A S F S T F K C Y G V S P T K L N D L C F T N V Y A D

2601 CTTTTGTGATACGAGGCGATGAAGTGAACAGATTGCACCAGGGCAGACCGGCAAAATGGCCGACTACAACCTACAAGCTTCCAGATGACTTTACCGGATG
392▶ S F V I R G D E V R Q I A P G Q T G K I A D Y N Y K L P D D F T G C

L452Q (2758)

2701 TGTTATTGCATGGAACCTCAAACAATCTGGATTCCAAGTGGGTGGCAACTATAACTACAGATATAGACTGTTGAGAAATCAAACCTGAAACCTGAG
425▶ V I A W N S N N L D S K V G G N Y N Y Q Y R L F R K S N L K P F E

F490S (2872)

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

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

3001 TCTGGTGAAGAACAATGCGTGAACCTTAACTTAAACGGACTCACAGGAACCGGCGTATTGACGGAGAGTAACAAGAAGTTCTCGCCATTCCAGCAGTTCC
525▶ 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 F Q Q F

3101 GGTGCGATATTGCCGACACTACCGACGCTGTCCGAGATCCCCAGACATTGGAGATTCTTGATATCACACCCTGTAGTTTCGGCGGAGTGAGCGTGATTA
559▶ 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 V S V I

D614G (3244)

3201 CGCCCGGAACCAATACCAGCAATCAGGTTGCCGTCCTGTATCAGGGCGTTGAATTGCACCGAGGTACCTGTGCGCATCCACGCTGACCAACTTACACCCAC
592▶ 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 L T P T

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

Furin cleavage site (3457)

3401 ATCGGTGCTGGAATATGCGCCTCTTATCAAACCTCAAACCAACTCTCTAGCGGGGACCGTAGTGTAGCATCCCAAAGTATCATTGCCTACACAATGAGCC
659▶ I G A G I C A S Y Q T Q T N S P R R A R S V A S Q S I I A Y T M S

3501 TCGGTGCTGAGAATTCTGTGCGCTACAGCAACAACCTCATTGCTATCCTACTAATTCACAATCAGTGTGACAACTGAAATCTGCCGATCTATGAC
692▶ 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 V S M T

3601 CAAAACAAGCGTTGACTGCACCATGTACATCTGTGGCATTCTACCGAATGTAGCAATCTCCTGCAATACGGATCATTCTGCACTCAGCTGAATCGT
725▶ 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 Q L N R

3701 GCCCTCACAGGTATTGAGTGGAGCAGACAAGAATACGCAGGAAGTGTGGCCAGGTGAAGCAAATCTACAAAACCTCACCCATAAAAGACTTTGGCG
759▶ 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 K D F G

3801 GATTCAATTTCTACAGATCTGCCGATCCCTCAAACCTCAAGCGTAGCTTTATCGAGGATCTGCTCTTCAACAAGGTAACCCCTCGCAGATGCCGG
792▶ 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 A D A G

T859N (3979)

3901 TTTTCATCAAGCAGTATGGCGATTGTCTGGGAGACATCGCCGCTCGGGACCTGATCTGTGCACAGAAGTTCAATGGACTGAACGTGCTGCCTCCCTTGCTG
825▶ 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 N V L P P L L

4001 ACCGACGAGATGATAGCCCAATACACTAGCGCCTGTGGCCGGCACCATCACTTCTGGGTGGACATTCGGAGCTGGCGCTGCCCTTCAGATTCCTTTTG
859▶ 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 Q I P F

4101 CTATGCAGATGGCCTACCGCTTAAACGGCATCGGTGTGACACAAAACGTTCTGTATGAAAACAGAAACTCATGCCAACAGTTCAACAGTGTATCGG
892▶ 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 S A I G

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

4301 CTCTCTCAAATTTGGTGGCATTCTAGCGTCTGAATGACATACTGAGCCGGTTGGACAAGGTGGAGGCTGAAGTGCAGATTGATAGGTGATAACTG
959▶ L S S N 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 R L I T

4401 GCGCCTTCAGTCTTTCAGACCTATGTGACCCAGCAGCTCATCCGCGCTGTGAAATTCGCGCATCCGCTAACCTGGCAGCAACCAAAATGTCCGAGTG
992▶ 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 M S E C

4501 TGTGCTGGGTGAGTCTAAGAGAGTGGACTTTTTCGGGGAAGGGGTATCACTGATGTCTTTTCTCAGTCTGCACCCCATGGTGTGGTCTTTCTGCACGTG
1025▶ 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 F L H V

4601 ACTTATGTCAGCTCAGGAAAAGAACTTCACTACAGCCCCAGCCATCTGCCACGATGGGAAAGCCCACTTTCCAGGGAAGGCGTATTTCGTGTCATG
1059▶ 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 F V S N

4701 GTACTATTGGTTCGTCACTCAGAGAAATTTCTACGACCCCAAGATTATAACCACTGACAATACATTTGATCCGGCAATTGTGATGTGTTATCGGGAT
1092▶ 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 V I G I

4801 TGTGAATAACTGTTTACGATCCTTTGCAGCCAGAGCTGGACTCCTCAAGGAGGAGCTTGACAAATATTTAAGAATCACACATCACCTGACGTGCAC
1125▶ 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 P D V D

4901 CTCGGAGATATTTAGGAATCAATGCTTCCGTTGGTCAATATTCAGAAGGAGATAGACAGGCTGAATGAGGTTGCCAAGAACCCTCAACGAGTCTCTGATCG
1159▶ 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 E S L I

5001 ATCTGCAGGAGTTGGGCAAGTACGAACAGTATATCAAATGGCCTGGTACATTTGGCTTGGGTTTCATTGCTGGGCTGATAGCTATCGTCATGGTGACAAT
1192▶ 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 M V T I

Nhel (5171)

5101 TATGTTGTGTTGCATGACATCCTGCTGTAGTTGTCTGAAGGGCTGCTGCTCATGCGGCAGCTGTTGCTAAAGCTAGCCTCGAGGGATCCGTCGAGGAATT
1225▶ M L C C M T S C C S C L K G C C S C G S C C •

5201 CACTCCTCAGGTGCAGGCTGCCTATCAGAAGTGGTGGCTGGTGGCCAATGCCCTGGCTACAAATACCACTGAGATCTTTTTCCCTCGCCAAAAAT

5301 TATGGGGACATCATGAAGCCCTTGAGCATCTGACTTCTGGCTAATAAAGGAAATTTATTTTCATTGCAATAGTGTGTTGGAATTTTTTGTGTCTCTCAC

5401 TCGGAAGGACATATGGGAGGGCAAATCATTTAAAACATCAGAATGAGTATTTGGTTTAGAGTTTGGCAACATATGCCATATGCTGGCTGCCATGAACAA

5501 AGTTGGCTATAAAGAGGTCATCAGTATATGAAACAGCCCCCTGCTGTCCATTCTTATTCCATAGAAAAGCCTTGACTTGAGGTTAGATTTTTTTTATA

5601 TTTTGTTTTGTTATTTTTTTCTTTAACATCCCTAAAATTTCTTACATGTTTTACTAGCCAGATTTTTCTCTCTCTGACTACTCCAGTCATAG

5701 CTGTCCCTTCTCTTATGGAGATCCCTCGACGGATCGGCCGCAATTCGAATCATGTATAGCTGTTTCTGTGTGAAATTTGTTATCCGCTACAATTC

5801 CACACAACATACGAGCCGGAAGCATAAAGTGTAAAGCCTGGGTGCCTAATGAGTGAAGTCACTACATTAATTGCGTTGCGCTCACTGCCCGCTTCCA

5901 GTCGGGAAACCTGTCGTGCCAGTGCATTAATGAATCGGCCAACGCGCGGGGAGAGGCGGTTTGCATTGGGCGCTCTTCCGCTTCCCTCGCTCACTGAC
6001 TCGCTGCGCTCGTTCGTTCCGCTGCGGCAGCGGTATCAGTCACTCAAAGGCGGTAATACGGTTATCCACAGAATCAGGGGATAACGCAGGAAGAACA
6101 TGTGAGCAAAGGCCAGCAAAGGCCAGGAACCGTAAAAAGGCCGCTTGTGGCGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAATCG
6201 ACGCTCAAGTCAGAGGTGGCGAAACCCGACAGGACTATAAAGATACCAGGCGTTTCCCCTGGAAGCTCCCTCGTGGCTCTCTGTCCGACCTGCCG
6301 CTTACCGGATACCTGTCCGCTTTCTCCCTTCGGAAGCGTGGCGTTTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCCGTTGAGGTGTTGCTCCA
6401 AGCTGGGTGTGTGCACGAACCCCGTTACGCCGACCGCTGCGCCTTATCCGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCC
6501 ACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGGCCTAACTACGGCTACACTAGAAGA
6601 ACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCGGTGGTT
6701 TTTTTGTTTGAAGCAGCAGATTACGCGCAGAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTACGGGGTCTGACGCTCAGTGAACGAAAACTC
6801 ACGTTAAGGGATTTTGGTCATGAGATTACAAAAAGGATCTTACCTAGATCCTTTTAAATAAAAATGAAGTTTTAAATCAATCTAAAGTATATATGAG
6901 TAAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTTTGGTTCATCCATAGTTGCTGACTCCCGTCTGTG
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 T Y
7001 AGATAACTACGATACGGGAGGGCTTACCATCTGGCCCCAGTGTGCAATGATACCGCGAGACCCACGCTCACCAGGCTCCAGATTTATCAGCAATAAACCA
259 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 F W
7101 GCCAGCCGGAAGGGCCGAGCGCAGAAGTGGTCTGCAACTTTATCCGCTCCATCCAGTCTATTAATTGTTGCCGGGAAGCTAGAGTAAGTAGTTCCGCA
226 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 E G
7201 GTTAATAGTTTGCACAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTACGCTCGTCTTGGTATGGCTTCATTAGCTCCGGTCCCAACGATCAA
192 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 D L
7301 GGCAGTTACATGATCCCCATGTTGTGCAAAAAAGCGTTAGCTCCTTCGGTCTCCGATCGTTGTCAGAAGTAAGTTGGCCGAGTGTATCACTCAT
159 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 S M
7401 GGTATGGCAGCACTGCATAATTCTTACTGTGTCATGCCATCCGTAAGATGCTTTTCTGTGACTGGTGAAGTACTCAACCAAGTCATTCTGAGAATAGTGT
126 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 Y H
7501 ATGCGGCGACCGAGTTGCTCTTCCCGGCGTCAATACGGGATAATACCGGCCACATAGCAGAAGTTAAAAGTGTGCTCATTGAAAAACGTTCTTCGG
92 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 E P
7601 GGCAAAACTCTCAAGGATCTTACCGCTGTTGAGATCCAGTTCGATGTAACCCACTCGTGACCCCACTGATCTTACGATCTTTTACTTTTACCAGCGT
59 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 L T
7701 TTCTGGGTGAGCAAAAACAGGAAGGCAAAATGCCGAAAAAGGGAATAAGGGCGACCGAAATGTTGAATACTCATACTCTTCTTTTCAATATTAT
26 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 TGAAGCATTTATCAGGGTATTGTCTCATGAGCGGATACATATTTGAATGATTTAGAAAAATAAACAAATAGGGGTTCCGCGCACATTTCCCGAAAAAG
7901 TGCCACCTAAATTGTAAGCGTTAATATTTTGTAAATTCGCGTTAAATTTTGTAAATCAGCTCATTTTTTAAACCAATAGGCCGAAATCGGCAAAATC
8001 CCTATAAATCAAAGAATAGACCGAGATAGGGTTGAGTGTGTTCCAGTTTGAACAAGAGTCCACTATTAAGAAGCTGGACTCCAACGTCAAAGGGC
8101 GAAAAACCGTCTATCAGGGCGATGGCCACTACGTGAACCATACCCTAATCAAGTTTTTGGGGTCCGAGGTGCCGTAAGGACTAAATCGGAACCTAA
8201 AGGAGCCCCGATTTAGAGCTTACGCGGAAAGCCGCGAACGTGGCGAGAAAGGAAGGAAAGGAAAGGAGCGGGCGTAGGGCGCTGGCAAGT
8301 GTAGCGGTACGCTGCGCGTAACCAACACCCGCGCTTAAATGCGCCGCTACAGGCGCGTCCCATTCGCCATTACGGCTGCGCAACTGTTGGGAAG
8401 GCGATCGGTGCGGGCCTCTTCGCTATTACGCCAGCTGGCGAAAGGGGATGTGCTGCAAGGCGATTAAGTTGGGTAACGCCAGGGTTTTCCAGTACG
8501 ACGTTGTAACGACGGCCAGTGAGCGCGTAATACGACTACTATAGGGCAATTGGAGCTCCACCGCGTGGCGGCGCTCTAGA