**A**

ATGGATTCATACCTGCTGATGTGGGGACTGCTCACGTTCATCATGGTGCCTGGCTGCCAGGCAGAGCTCTGTGACGATGACCCGCCAGAGATCCCACACGCCACATTCAAAGCCATGGCCTACAAGGAAGGAACCATGTTGAACTGTGAATGCAAGAGAGGTTTCCGCAGAATAAAAAGCGGGTCACTCTATATGCTCTGTACAGGAAACTCTAGCCACTCGTCCTGGGACAACCAATGTCAATGCACAAGCTCTGCCACTCGGAACACAACGAAACAAGTGACACCTCAACCTGAAGAACAGAAAGAAAGGAAAACCACAGAAATGCAAAGTCCAATGCAGCCAGTGGACCAAGCGAGCCTTCCAGGTCACTGCAGGGAACCTCCACCATGGGAAAATGAAGCCACAGAGAGAATTTATCATTTCGTGGTGGGGCAGATGGTTTATTATCAGTGCGTCCAGGGATACAGGGCTCTACACAGAGGTCCTGCTGAGAGCGTCTGCAAAATGACCCACGGGAAGACAAGGTGGACCCAGCCCCAGCTCATATGCACAGGTGAAATGGAGACCAGTCAGTTTCCAGGTGAAGAGAAGCCTCAGGCAAGCCCCGAAGGCCGTCCTGAGAGTGAGACTTCCTGCCTCGTCACAACAACAGATTTTCAAATACAGACAGAAATGGCTGCAACCATGGAGACGTCCATATTTACAACAGATCTCCAGGTAGCAGTGGCCGGCTGTGTTTTCCTGCTGATCAGCGTCCTCCTCCTGAGTGGGCTCACCTGGCAGCGGAGACAGAGGAAGTCTAGAATTCCC**CACGCCTTGCGTGGCGAGCTCTACCGCCCAGCATGGGAACCCCAGGACTATGAGATGGTGGAGCTTTTCCTGCGTAGGCTTCGGCTCTGGATGGGCTTCAGCAAGGTCAAGGAGTTCCGCCACAAAGTCCGCTTTGAAGGAATGGATCCACTGCCTTCCCGCTCATCCAGGGGCTCCAAGTCATCCCCAGTTGTGCTCCCACCTAGCTCAGGCTCAGAAGCTTCACACCCATCCACCTCGTCCAGCCAACCAGACGGGCCAAGCGCCAGCTTAAGCCGCTCGACGCTGAAGCTGGAACCAGAGCCCTCTCGCCTCCATGCTGTGTTTGAAAGTCTGCTTGTCCAGTTTGACCGACTCAACCAGGCCACAGAGGACGTCTACCAGCTGGAGCAACAACTCCAGAGCCTTCGAGGCCATGGGCACAATGGACCTCCTTCCTCTCCCTCCCCTGGCTGCTTCCCAGGCTCTCAGCCAGCTTTGCCCAGCCGCCTTTCTCGGGCCAGTCAGGGGCTGGATCAGACTGTAGGCCCCAACAGGGTGTCCCTGTGGCCTAATAACAAGGTCCACCCCAGCAGCACT**TAGGCCCTAGGGGTCTTGGCCATTCCCTTCCCTGGGAATGCCTGAGCTTCACACTGGCCTCTCAGAGCCAGGGTGGACACCACTCAGTATTACCTTCTGCTGCCCTCTAGGTTGGGCCAGGCAGAACGGCTGCATGCCAGTTCTTTTGGGTACAGGTATTGCTGCCTTCCTTACCTGTCCACATATGGGGCTTCTGCACTTTAAAAAGGCTGTGTGGCCAGCCAGGACCCAGGGTCCCCTCCCCACAGGAGGACACAGCAGTATTGGACCAAGTGAGTACCCAGCCTCCAAGACGCTAATTTATTCGCCCCCCCTCCCCCCAAGTCCTCAGGTTCAGCGGGCTGCGCCCAGCTCTACCCCTAGGTGGCCATCTCCTCTTGCTAAAAATCTAAGCTGGAGGGAGGGCTAAGCTACACTTCTCCTTTATCCGTCCCCTAAGTTATTACCTCTCTTGTTTCTGCAGCATACTTGCCCTCTAGCTACCATCTGCTTTCTATGTCCACCATCAATAATTTATATGGGGTTAAAATGTATATATTTTTGTATGTCAGTATTTTCTACTTGGGCTGAAAATGGGTCCATTGTTACCCAGGGCAGGGGTACAGGGGAAGCTGCAGCTATTACTGGATCCGAGTCTGGCCTCAGGCAGGTGCTGGACAGCAATTGGGGCCACTGTGGCCTTGTTTTCCTCCCTTGTCTGGGGCCAGGCAGCACGCAGATCTGCTGGTTTCAGATCTGAGCAAGGGCAGGACTACTGTGGGATGAAAGATGCCAAGAAGTTACTGGACAAGCCCACCAATGGGGCTTGCCCCCATGGCGGGTGGGGGAAAGAGAATGTATGTGATGGCACCTGCCTGCTTCTGTGGGCTCATCTGCAGCTCTAGCCTGGATTCTGCCCCAACCCCAAACAGACAAGACAAAGTCAAATAAAGAAGCTGTCTGACaaaaaaaagcttgggggatccgtcgactcgagcggccgc

**B**

HA-forward 5’ GAGGACCGCGAATTCCCCACG 3’

HA-reverse 5’ GATGCGGCCGCTAAGCTTCTGAGCCTGAGCTAG 3’

AT-forward 5’ GATGAATTCCAGCTTCACACCCATCCACCTC 3’

AT-reverse\* 5’ GATGCGGCCGCCTAAGTGCTGCTGGGGTGGAC 3’

hHT-forward\*\* 5’ GATGAATTCCA**T**GCCTTGCGTGGAGAGCTGTAC 3’

**C**

Y4117D GAC**G**ATGAG

WT GACTATGAG

L4122A GAG**GCC**TTC

L4122Δ GAG\_\_\_TTC

WT GAGCTTTTC

R4125L CTGC**T**TAGGCTTCGGCTC

R4126G CTGCGT**G**GGCTTCGGCTC

R4126T CTGCGTACGCTTCGGCTC

R4128L CTGCGTAGGCTTTGGCTC

WT CTGCGTAGGCTTCGGCTC

V4136A AAGG**C**CAAG

WT AAGGTCAAG

R4140A TTC**GC**CCACAAAGTCCGCTTTGAA

H4141A TTCCGC**GC**CAAAGTCCGCTTTGAA

K4142A TTCCGCCAC**GC**AGTCCGCTTTGAA

V4143A TTCCGCCACAAAG**CG**CGCTTTGAA

R4144C TTCCGCCACAAAGTC**T**GCTTTGAA

F4145A TTCCGCCACAAAGT**G**CGC**GC**TGAA

F4145V TTCCGCCACAAAGTCCGC**GT**TGAA

V4143A/F4145A TTCCGCCACAAAG**CG**CGC**GC**TGAA

WT TTCCGCCACAAAGTCCGCTTTGAA

Q4215P GTCC**C**GTTT

WT GTCCAGTTT

hS4168A GGC**G**CCAAG

hWT GGCTCCAAG