SEQ ID NO: 1 - fljB/STF2 amino acid sequence (hinge region underlined)

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTA
NIKGLTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSI
QAEITQRLNEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTL
GLDSLNVQKAYDVKDTAVTTKAYANNGTTLDVSGLDDAAIKAATGGTNGTASVTGG
AVKFDADNNKYFVTIGGFTGADAAKNGDYEVNVATDGTVTLAAGATKTTMPAGATT
KTEVQELKDTPAVVSADAKNALIAGGVDATDANGAELVKMSYTDKNGKTIEGGYAL
KAGDKYYAADYDEATGAIKAKTTSYTAADGTTKTAANQLGGVDGKTEVVTIDGKTY
NASKAAGHDFKAQPELAEAAAKTTENPLQKIDAALAQVDALRSDLGAVQNRFNSAI
TNLGNTVNNLSEARSRIEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSL
LR

Figure 1

SEQ ID NO: 2 - fljB/STF2 nucleic acid sequence (hinge region underlined)

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAA
CAAATCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTA
TCAACAGCGCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCG
AACATCAAAGGTCTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGC
GCAGACCACTGAAGGCGCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTG
AACTGGCGGTTCAGTCTGCTAACAGCACCAACTCCCAGTCTGACCTCGACTCCATC
CAGGCTGAAATCACCCAGCGCCTGAACGAAATCGACCGTGTATCCGGCCAGACTCA
GTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACACCCTGACCATCCAGGTTGGCG
CCAACGACGGTGAAACTATCGATATCGATCTGAAGCAGATCAACTCTCAGACCCTG
GGTCTGGACTCACTGAACGTGCAGAAAGCGTATGATGTGAAAGATACAGCAGTAAC
AACGAAAGCTTATGCCAATAATGGTACTACACTGGATGTATCGGGTCTTGATGATG
CAGCTATTAAAGCGGCTACGGGTGGTACGAATGGTACGGCTTCTGTAACCGGTGGT
GCGGTTAAATTTGACGCAGATAATAACAAGTACTTTGTTACTATTGGTGGCTTTAC
TGGTGCTGATGCCGCCAAAAATGGCGATTATGAAGTTAACGTTGCTACTGACGGTA
CAGTAACCCTTGCGGCTGGCGCAACTAAAACCACAATGCCTGCTGGTGCGACAACT
AAAACAGAAGTACAGGAGTTAAAAGATACACCGGCAGTTGTTTCAGCAGATGCTAA
AAATGCCTTAATTGCTGGCGGCGTTGACGCTACCGATGCTAATGGCGCTGAGTTGG
TCAAAATGTCTTATACCGATAAAAATGGTAAGACAATTGAAGGCGGTTATGCGCTT
AAAGCTGGCGATAAGTATTACGCCGCAGATTACGATGAAGCGACAGGAGCAATTAA
AGCTAAAACTACAAGTTATACTGCTGCTGACGGCACTACCAAAACAGCGGCTAACC
AACTGGGTGGCGTAGACGGTAAAACCGAAGTCGTTACTATCGACGGTAAAACCTAC
AATGCCAGCAAAGCCGCTGGTCATGATTTCAAAGCACAACCAGAGCTGGCGGAAGC
AGCCGCTAAAACCACCGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGCAGG
TGGATGCGCTGCGCTCTGATCTGGGTGCGGTACAAAACCGTTTCAACTCTGCTATC
ACCAACCTGGGCAATACCGTAAACAATCTGTCTGAAGCGCGTAGCCGTATCGAAGA
TTCCGACTACGCGACCGAAGTTTCCAACATGTCTCGCGCGCAGATTCTGCAGCAGG
CCGGTACTTCCGTTCTGGCGCAGGCTAACCAGGTCCCGCAGAACGTGCTGTCTCTG
TTACGT

Figure 2

SEQ ID NO: 3 - fljB/STF2Δ amino acid sequence

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTA
NIKGLTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSI
QAEITQRLNEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTL
GLDSLNVHGAPVDPASPWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGN
TVNNLSEARSRIEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLLR

Figure 3

SEQ ID NO: 4 - fljB/STF2Δ nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAA
CAAATCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTA
TCAACAGCGCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCG
AACATCAAAGGTCTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGC
GCAGACCACTGAAGGCGCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTG
AACTGGCGGTTCAGTCTGCTAACAGCACCAACTCCCAGTCTGACCTCGACTCCATC
CAGGCTGAAATCACCCAGCGCCTGAACGAAATCGACCGTGTATCCGGCCAGACTCA
GTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACACCCTGACCATCCAGGTTGGCG
CCAACGACGGTGAAACTATCGATATCGATCTGAAGCAGATCAACTCTCAGACCCTG
GGTCTGGACTCACTGAACGTGCATGGAGCGCCGGTGGATCCTGCTAGCCCATGGAC
CGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGCTGCGCT
CTGATCTGGGTGCGGTACAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAAT
ACCGTAAACAATCTGTCTGAAGCGCGTAGCCGTATCGAAGATTCCGACTACGCGAC
CGAAGTTTCCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCCGTTC
TGGCGCAGGCTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTACGTG

Figure 4

SEQ ID NO: 5 - pET/STF2Δ.JEIII+ nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAA
CAAATCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTA
TCAACAGCGCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCG
AACATCAAAGGTCTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGC
GCAGACCACTGAAGGCGCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTG
AACTGGCGGTTCAGTCTGCTAACAGCACCAACTCCCAGTCTGACCTCGACTCCATC
CAGGCTGAAATCACCCAGCGCCTGAACGAAATCGACCGTGTATCCGGCCAGACTCA
GTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACACCCTGACCATCCAGGTTGGCG
CCAACGACGGTGAAACTATCGATATCGATCTGAAGCAGATCAACTCTCAGACCCTG
GGTCTGGACTCACTGAACGTGCATGGAGCGCCGGTGGATCCTGCTAGCCCATGGAC
CGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGCTGCGCT
CTGATCTGGGTGCGGTACAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAAT
ACCGTAAACAATCTGTCTGAAGCGCGTAGCCGTATCGAAGATTCCGACTACGCGAC
CGAAGTTTCCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCCGTTC
TGGCGCAGGCTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTACGTGAATTCTGC
AGATATCCAGCACAGTGGCGGCCGCTC***ATGGACAAACTGGCTCTGA***AAGGCACAAC
CTATGGCATGTGTACAGAAAAATTCTCGTTCGCGAAAAATCCGGTGGACACTGGTC
ACGGAACAGTTGTCATTGAACTCTCCTACTCTGGGAGTGATGGCCCCTGCAAAATT
CCGATTGTTTCCGTTGCGAGCCTCAATGACATGACCCCCGTTGGGCGGCTGGTGAC
AGTGAACCCCTTCGTCGCGACTTCCAGTGCCAACTCAAAGGTGCTGGTCGAGATGG
AACCCCCCTTCGGAGACTCCTACATCGTAGTTGGAAGGGGAGACAAGCAGATCAAC
CACCATTGGCACAAAGCTGGAAGCACGCTGGGCAAGGCC

Figure 5

SEQ ID NO: 6 - pET/STF2 .JEIII+ amino acid sequence

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTANIKG
LTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSIQAEITQRL
NEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPV
DPASPWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSRIEDSD
YATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLLREFCRYPAQWRPL***MDKLALK*****GTTY**
GMCTEKFSFAKNPVDTGHGTVVIELSYSGSDGPCKIPIVSVASLNDMTPVGRLVTVNPFV
ATSSANSKVLVEMEPPFGDSYIVVGRGDKQINHHWHKAGSTLGKA

Figure 6

SEQ ID NO: 29 - STF2.EIII+ nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAA
TCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGC
GCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGT
CTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGC
GCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCT
AACAGCACCAACTCCCAGTCTGACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTG
AACGAAATCGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTGGCGCAG
GACAACACCCTGACCATCCAGGTTGGCGCCAACGACGGTGAAACTATCGATATCGATCTG
AAGCAGATCAACTCTCAGACCCTGGGTCTGGACTCACTGAACGTGCAGAAAGCGTATGAT
GTGAAAGATACAGCAGTAACAACGAAAGCTTATGCCAATAATGGTACTACACTGGATGTA
TCGGGTCTTGATGATGCAGCTATTAAAGCGGCTACGGGTGGTACGAATGGTACGGCTTCT
GTAACCGGTGGTGCGGTTAAATTTGACGCAGATAATAACAAGTACTTTGTTACTATTGGT
GGCTTTACTGGTGCTGATGCCGCCAAAAATGGCGATTATGAAGTTAACGTTGCTACTGAC
GGTACAGTAACCCTTGCGGCTGGCGCAACTAAAACCACAATGCCTGCTGGTGCGACAACT
AAAACAGAAGTACAGGAGTTAAAAGATACACCGGCAGTTGTTTCAGCAGATGCTAAAAAT
GCCTTAATTGCTGGCGGCGTTGACGCTACCGATGCTAATGGCGCTGAGTTGGTCAAAATG
TCTTATACCGATAAAAATGGTAAGACAATTGAAGGCGGTTATGCGCTTAAAGCTGGCGAT
AAGTATTACGCCGCAGATTACGATGAAGCGACAGGAGCAATTAAAGCTAAAACTACAAGT
TATACTGCTGCTGACGGCACTACCAAAACAGCGGCTAACCAACTGGGTGGCGTAGACGGT
AAAACCGAAGTCGTTACTATCGACGGTAAAACCTACAATGCCAGCAAAGCCGCTGGTCAT
GATTTCAAAGCACAACCAGAGCTGGCGGAAGCAGCCGCTAAAACCACCGAAAACCCGCTG
CAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTA
CAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCTGAA
GCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAAGTTTCCAACATGTCTCGCGCG
CAGATTCTGCAGCAGGCCGGTACTTCCGTTCTGGCGCAGGCTAACCAGGTCCCGCAGAAC
GTGCTGTCTCTGTTACGTATGGAAAAATTGCAGTTGAAGGGAACAACCTATGGCGTCTGT

TCAAAGGCTTTCAAGTTTCTTGGGACTCCCGCAGACACAGGTCACGGCACTGTGGTGTTG

GAATTGCAGTACACTGGCACGGATGGACCTTGCAAAGTTCCTATCTCGTCAGTGGCTTCA

TTGAACGACCTAACGCCAGTGGGCAGATTGGTCACTGTCAACCCTTTTGTTTCAGTGGCC

ACGGCCAACGCTAAGGTCCTGATTGAATTGGAACCACCCTTTGGAGACTCATACATAGTG

GTGGGCAGAGGAGAACAACAGATCAATCACCATTGGCACAAGTCTGGAAGCAGCATTGGC

AAA

Figure 7

SEQ ID NO: 30 - fljB/STF2.EIII+ amino acid sequence of SEQ ID NO: 29

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTA
NIKGLTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSI
QAEITQRLNEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTL
GLDSLNVQKAYDVKDTAVTTKAYANNGTTLDVSGLDDAAIKAATGGTNGTASVTGG
AVKFDADNNKYFVTIGGFTGADAAKNGDYEVNVATDGTVTLAAGATKTTMPAGATT
KTEVQELKDTPAVVSADAKNALIAGGVDATDANGAELVKMSYTDKNGKTIEGGYAL
KAGDKYYAADYDEATGAIKAKTTSYTAADGTTKTAANQLGGVDGKTEVVTIDGKTY
NASKAAGHDFKAQPELAEAAAKTTENPLQKIDAALAQVDALRSDLGAVQNRFNSAI
TNLGNTVNNLSEARSRIEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSL
LRMEKLQLKGTTYGVCSKAFKFLGTPADTGHGTVVLELQYTGTDGPCKVPISSVAS
LNDLTPVGRLVTVNPFVSVATANAKVLIELEPPFGDSYIVVGRGEQQINHHWHKSG
SSIGK

Figure 8

SEQ ID NO: 31 - STF2Δ .EIII+ nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAA
CAAATCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTA
TCAACAGCGCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCG
AACATCAAAGGTCTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGC
GCAGACCACTGAAGGCGCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTG
AACTGGCGGTTCAGTCTGCTAACAGCACCAACTCCCAGTCTGACCTCGACTCCATC
CAGGCTGAAATCACCCAGCGCCTGAACGAAATCGACCGTGTATCCGGCCAGACTCA
GTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACACCCTGACCATCCAGGTTGGCG
CCAACGACGGTGAAACTATCGATATCGATCTGAAGCAGATCAACTCTCAGACCCTG
GGTCTGGACTCACTGAACGTGCATGGAGCGCCGGTGGATCCTGCTAGCCCATGGAC
CGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGCTGCGCT
CTGATCTGGGTGCGGTACAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAAT
ACCGTAAACAATCTGTCTGAAGCGCGTAGCCGTATCGAAGATTCCGACTACGCGAC
CGAAGTTTCCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCCGTTC
TGGCGCAGGCTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTACGT***ATGGAAAAA***
TTGCAG**TTGAAGGGAACAACCTATGGCGTCTGTTCAAAGGCTTTCAAGTTTCTTGG**
GACTCCCGCAGACACAGGTCACGGCACTGTGGTGTTGGAATTGCAGTACACTGGCA
CGGATGGACCTTGCAAAGTTCCTATCTCGTCAGTGGCTTCATTGAACGACCTAACG
CCAGTGGGCAGATTGGTCACTGTCAACCCTTTTGTTTCAGTGGCCACGGCCAACGC
TAAGGTCCTGATTGAATTGGAACCACCCTTTGGAGACTCATACATAGTGGTGGGCA
GAGGAGAACAACAGATCAATCACCATTGGCACAAGTCTGGAAGCAGCATTGGCAAA

Figure 9

SEQ ID NO: 32 - fljB/STF2Δ.EIII^{+} amino acid sequence of SEQ ID NO: 31

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAA
GQAIANRFTANIKGLTQASRNANDGISIAQTTEGALNEINNNLQRV
RELAVQSANSTNSQSDLDSIQAEITQRLNEIDRVSGQTQFNGVKVL
AQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPVDPAS
PWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLS
EARSRIEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLL
R***MEKLQ***LKGTTYGVCSKAFKFLGTPADTGHGTVVLELQYTGTDGPC
KVPISSVASLNDLTPVGRLVTVNPFVSVATANAKVLIELEPPFGDS
YIVVGRGEQQINHHWHKSGSSIGK

Figure 10

SEQ ID NO: 33 - STF2Δ.EIII+ nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGA
ATAACCTGAACAAATCCCAGTCCGCACTGGGCACCGCTATCGAGCG
TCTGTCTTCTGGTCTGCGTATCAACAGCGCGAAAGACGATGCGGCA
GGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGTCTGA
CTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGAC
CACTGAAGGCGCGCTGAACGAAATCAACAACAACCTGCAGCGTGTG
CGTGAACTGGCGGTTCAGTCTGCTAACAGCACCAACTCCCAGTCTG
ACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTGAACGAAAT
CGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTG
GCGCAGGACAACACCCTGACCATCCAGGTTGGCGCCAACGACGGTG
AAACTATCGATATCGATCTGAAGCAGATCAACTCTCAGACCCTGGG
TCTGGACTCACTGAACGTGCATGGAGCGCCGGTGGATCCTGCTAGC
CCATGGACCGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGC
AGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTACAAAACCGTTT
CAACTCTGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCT
GAAGCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAAGTTT
CCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCCGT
TCTGGCGCAGGCTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTA
CGTGAATTCTGCAGATATCCAGCACAGTGGCGGCCGCT***CATGGAAA***
AATTGCAGTTGAAGGGAACAACCTATGGCGTCTGTTCAAAGGCTTT
CAAGTTTCTTGGGACTCCCGCAGACACAGGTCACGGCACTGTGGTG
TTGGAATTGCAGTACACTGGCACGGATGGACCTTGCAAAGTTCCTA
TCTCGTCAGTGGCTTCATTGAACGACCTAACGCCAGTGGGCAGATT
GGTCACTGTCAACCCTTTTGTTTCAGTGGCCACGGCCAACGCTAAG
GTCCTGATTGAATTGGAACCACCCTTTGGAGACTCATACATAGTGG
TGGGCAGAGGAGAACAACAGATCAATCACCATTGGCACAAGTCTGG
AAGCAGCATTGGCAAACCCTTAATAAGC

Figure 11

SEQ ID NO: 34 - fljB/STF2Δ.EIII+ amino acid sequence of SEQ ID NO: 33

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAA
GQAIANRFTANIKGLTQASRNANDGISIAQTTEGALNEINNNLQRV
RELAVQSANSTNSQSDLDSIQAEITQRLNEIDRVSGQTQFNGVKVL
AQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPVDPAS
PWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLS
EARSRIEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLL
REFCRYPAQWRPL***MEKLQ*****LKGTTYGVCSKAFKFLGTPADTGHGTVV**
LELQYTGTDGPCKVPISSVASLNDLTPVGRLVTVNPFVSVATANAK
VLIELEPPFGDSYIVVGRGEQQINHHWHKSGSSIGKPLIS

Figure 12

SEQ ID NO: 35 - STF2.EIII+- STF2 nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAA
TCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGC
GCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGT
CTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGC
GCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCT
AACAGCACCAACTCCCAGTCTGACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTG
AACGAAATCGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTGGCGCAG
GACAACACCCTGACCATCCAGGTTGGCGCCAACGACGGTGAAACTATCGATATCGATCTG
AAGCAGATCAACTCTCAGACCCTGGGTCTGGACTCACTGAACGTGCAGAAAGCGTATGAT
GTGAAAGATACAGCAGTAACAACGAAAGCTTATGCCAATAATGGTACTACACTGGATGTA
TCGGGTCTTGATGATGCAGCTATTAAAGCGGCTACGGGTGGTACGAATGGTACGGCTTCT
GTAACCGGTGGTGCGGTTAAATTTGACGCAGATAATAACAAGTACTTTGTTACTATTGGT
GGCTTTACTGGTGCTGATGCCGCCAAAAATGGCGATTATGAAGTTAACGTTGCTACTGAC
GGTACAGTAACCCTTGCGGCTGGCGCAACTAAAACCACAATGCCTGCTGGTGCGACAACT
AAAACAGAAGTACAGGAGTTAAAAGATACACCGGCAGTTGTTTCAGCAGATGCTAAAAAT
GCCTTAATTGCTGGCGGCGTTGACGCTACCGATGCTAATGGCGCTGAGTTGGTCAAAATG
TCTTATACCGATAAAAATGGTAAGACAATTGAAGGCGGTTATGCGCTTAAAGCTGGCGAT
AAGTATTACGCCGCAGATTACGATGAAGCGACAGGAGCAATTAAAGCTAAAACTACAAGT
TATACTGCTGCTGACGGCACTACCAAAACAGCGGCTAACCAACTGGGTGGCGTAGACGGT
AAAACCGAAGTCGTTACTATCGACGGTAAAACCTACAATGCCAGCAAAGCCGCTGGTCAT
GATTTCAAAGCACAACCAGAGCTGGCGGAAGCAGCCGCTAAAACCACCGAAAACCCGCTG
CAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTA
CAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCTGAA
GCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAAGTTTCCAACATGTCTCGCGCG
CAGATTCTGCAGCAGGCCGGTACTTCCGTTCTGGCGCAGGCTAACCAGGTCCCGCAGAAC
GTGCTGTCTCTGTTACGT**GAATTCTGCAGATATCCAGCACAGTGGCGGCCGCTCATGG**
AAAAATTGCAGTTGAAGGGAACAACCTATGGCGTCTGTTCAAAGGCTTTCAAGTTTCT
TGGGACTCCCGCAGACACAGGTCACGGCACTGTGGTGTTGGAATTGCAGTACACTGGC
ACGGATGGACCTTGCAAAGTTCCTATCTCGTCAGTGGCTTCATTGAACGACCTAACGC
CAGTGGGCAGATTGGTCACTGTCAACCCTTTTGTTTCAGTGGCCACGGCCAACGCTAA
GGTCCTGATTGAATTGGAACCACCCTTTGGAGACTCATACATAGTGGTGGGCAGAGGA
GAACAACAGATCAATCACCATTGGCACAAGTCTGGAAGCAGCATTGGCAAA

Figure 13

SEQ ID NO: 36 - fljB/STF2.EIII+ amino acid sequence of SEQ ID NO: 35

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIA
NRFTANIKGLTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANS
TNSQSDLDSIQAEITQRLNEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDG
ETIDIDLKQINSQTLGLDSLNVQKAYDVKDTAVTTKAYANNGTTLDVSGLD
DAAIKAATGGTNGTASVTGGAVKFDADNNKYFVTIGGFTGADAAKNGDYEV
NVATDGTVTLAAGATKTTMPAGATTKTEVQELKDTPAVVSADAKNALIAGG
VDATDANGAELVKMSYTDKNGKTIEGGYALKAGDKYYAADYDEATGAIKAK
TTSYTAADGTTKTAANQLGGVDGKTEVVTIDGKTYNASKAAGHDFKAQPEL
AEAAAKTTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLS
EARSRIEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLLR**EFCR**
YPAQWRPL*MEKLQ*LKGTTYGVCSKAFKFLGTPADTGHGTVVLELQYTGTDG
PCKVPISSVASLNDLTPVGRLVTVNPFVSVATANAKVLIELEPPFGDSYIV
VGRGEQQINHHWHKSGSSIGK

Figure 14

SEQ ID NO: 37 - fljB/STF2Δ.EIII+ nucleic acid sequence of SEQ ID NO: 38

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAA
CAAATCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTA
TCAACAGCGCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCG
AACATCAAAGGTCTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGC
GCAGACCACTGAAGGCGCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTG
AACTGGCGGTTCAGTCTGCTAACAGCACCAACTCCCAGTCTGACCTCGACTCCATC
CAGGCTGAAATCACCCAGCGCCTGAACGAAATCGACCGTGTATCCGGCCAGACTCA
GTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACACCCTGACCATCCAGGTTGGCG
CCAACGACGGTGAAACTATCGATATCGATCTGAAGCAGATCAACTCTCAGACCCTG
GGTCTGGACTCACTGAACGTGACCGAAAACCCGCTGCAGAAAATTGATGCCGCGCT
GGCGCAGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTACAAAACCGTTTCAACT
CTGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCTGAAGCGCGTAGCCGT
ATCGAAGATTCCGACTACGCGACCGAAGTTTCCAACATGTCTCGCGCGCAGATTCT
GCAGCAGGCCGGTACTTCCGTTCTGGCGCAGGCTAACCAGGTCCCGCAGAACGTGC
TGTCTCTGTTACGT**ATGGAAAAATTGCAGTTGAAGGGAACAACCTATGGCGTCTGT**
TCAAAGGCTTTCAAGTTTCTTGGGACTCCCGCAGACACAGGTCACGGCACTGTGGT
GTTGGAATTGCAGTACACTGGCACGGATGGACCTTGCAAAGTTCCTATCTCGTCAG
TGGCTTCATTGAACGACCTAACGCCAGTGGGCAGATTGGTCACTGTCAACCCTTTT
GTTTCAGTGGCCACGGCCAACGCTAAGGTCCTGATTGAATTGGAACCACCCTTTGG
AGACTCATACATAGTGGTGGGCAGAGGAGAACAACAGATCAATCACCATTGGCACA
AGTCTGGAAGCAGCATTGGCAAA

Figure 15

SEQ ID NO: 38 - fljB/STF2Δ.EIII+ amino acid sequence of SEQ ID NO: 37

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTA
NIKGLTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSI
QAEITQRLNEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTL
GLDSLNVTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSR
IEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLLR***MEKLQ*****LKGTTYGVC**
SKAFKFLGTPADTGHGTVVLELQYTGTDGPCKVPISSVASLNDLTPVGRLVTVNPF
VSVATANAKVLIELEPPFGDSYIVVGRGEQQINHHWHKSGSSIGK

Figure 16

SEQ ID NO: 54 - fljB/STF2.EIII+ nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAA
TCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGC
GCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGT
CTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGC
GCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCT
AACAGCACCAACTCCCAGTCTGACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTG
AACGAAATCGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTGGCGCAG
GACAACACCCTGACCATCCAGGTTGGCGCCAACGACGGTGAAACTATCGATATCGATCTG
AAGCAGATCAACTCTCAGACCCTGGGTCTGGACTCACTGAACGTGCAGAAAGCGTATGAT
GTGAAAGATACAGCAGTAACAACGAAAGCTTATGCCAATAATGGTACTACACTGGATGTA
TCGGGTCTTGATGATGCAGCTATTAAAGCGGCTACGGGTGGTACGAATGGTACGGCTTCT
GTAACCGGTGGTGCGGTTAAATTTGACGCAGATAATAACAAGTACTTTGTTACTATTGGT
GGCTTTACTGGTGCTGATGCCGCCAAAAATGGCGATTATGAAGTTAACGTTGCTACTGAC
GGTACAGTAACCCTTGCGGCTGGCGCAACTAAAACCACAATGCCTGCTGGTGCGACAACT
AAAACAGAAGTACAGGAGTTAAAAGATACACCGGCAGTTGTTTCAGCAGATGCTAAAAAT
GCCTTAATTGCTGGCGGCGTTGACGCTACCGATGCTAATGGCGCTGAGTTGGTCAAAATG
TCTTATACCGATAAAAATGGTAAGACAATTGAAGGCGGTTATGCGCTTAAAGCTGGCGAT
AAGTATTACGCCGCAGATTACGATGAAGCGACAGGAGCAATTAAAGCTAAAACTACAAGT
TATACTGCTGCTGACGGCACTACCAAAACAGCGGCTAACCAACTGGGTGGCGTAGACGGT
AAAACCGAAGTCGTTACTATCGACGGTAAAACCTACAATGCCAGCAAAGCCGCTGGTCAT
GATTTCAAAGCACAACCAGAGCTGGCGGAAGCAGCCGCTAAAACCACCGAAAACCCGCTG
CAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTA
CAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCTGAA
GCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAAGTTTCCAACATGTCTCGCGCG
CAGATTCTGCAGCAGGCCGGTACTTCCGTTCTGGCGCAGGCTAACCAGGTCCCGCAGAAC
GTGCTGTCTCTGTTACGT**AAGGGCAATTCGAAGCTTGAAGGTCAATTGGAATTCCCTAGG**
ACTAGTATGGAAAAATTGCAGTTGAAGGGAACAACCTATGGCGTCTGTTCAAAGGCTTTC
AAGTTTCTTGGGACTCCCGCAGACACAGGTCACGGCACTGTGGTGTTGGAATTGCAGTAC
ACTGGCACGGATGGACCTTGCAAAGTTCCTATCTCGTCAGTGGCTTCATTGAACGACCTA
ACGCCAGTGGGCAGATTGGTCACTGTCAACCCTTTTGTTTCAGTGGCCACGGCCAACGCT
AAGGTCCTGATTGAATTGGAACCACCCTTTGGAGACTCATACATAGTGGTGGGCAGAGGA
G**AACAACAGATCAATCACCATTGGCACAAGTCTGGAAGCAGCATTGGCAAA**

Figure 17

SEQ ID NO: 55 - fljB/STF2.EIII+ amino acid sequence

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTANIKG
LTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSIQAEITQRL
NEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVQKAYD
VKDTAVTTKAYANNGTTLDVSGLDDAAIKAATGGTNGTASVTGGAVKFDADNNKYFVTIG
GFTGADAAKNGDYEVNVATDGTVTLAAGATKTTMPAGATTKTEVQELKDTPAVVSADAKN
ALIAGGVDATDANGAELVKMSYTDKNGKTIEGGYALKAGDKYYAADYDEATGAIKAKTTS
YTAADGTTKTAANQLGGVDGKTEVVTIDGKTYNASKAAGHDFKAQPELAEAAAKTTENPL
QKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSRIEDSDYATEVSNMSRA
QILQQAGTSVLAQANQVPQNVLSLLR**KGNSKLEGQLEFPRTS*MEKLQ*LKGTTYGVCSKAF**
KFLGTPADTGHGTVVLELQYTGTDGPCKVPISSVASLNDLTPVGRLVTVNPFVSVATANA
KVLIELEPPFGDSYIVVGRGEQQINHHWHKSGSSIGK

Figure 18

SEQ ID NO: 58 - *Salmonella muenchen* flagellin fliC amino acid sequence (hinge underlined)

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTA
NIKGLTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANGTNSQSDLDSI
QAEITQRLNEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKEISSKTL
GLDKLNVQDAYTPKETAVTVDKTTYKNGTDTITAQSNTDIQTAIGGGATGVTGADI
KFKDGQYYLDVKGGASAGVYKATYDETTKKVNIDTTDKTPLATAEATAIRGTATIT
HNQIAEVTKEGVDTTTVAAQLAAAGVTGADKDNTSLVKLSFEDKNGKVIDGGYAVK
MGDDFYAATYDEKTGTITAKTTTYTDGAGVAQTGAVKFGGANGKSEVVTATDGKTY
LASDLDKHNFRTGGELKEVNTDKTENPLQKIDAALAQVDTLRSDLGAVQNRFNSAI
TNLGNTVNNLSSARSRIEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSL
LR

Figure 19

SEQ ID NO: 59 - *Salmonella muenchen* flagellin fliC nucleic acid sequence (hinge underlined)

ATGGCACAAGTCATTAATACAAACAGCCTGTCGCTGTTGACCCAGAATAACCTGAA
CAAATCCCAGTCCGCTCTGGGCACCGCTATCGAGCGTCTGTCTTCCGGTCTGCGTA
TCAACAGCGCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCG
AACATCAAAGGTCTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGC
GCAGACCACTGAAGGCGCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTG
AACTGGCGGTTCAGTCTGCTAACGGTACTAACTCCCAGTCTGACCTTGACTCTATC
CAGGCTGAAATCACCCAGCGTCTGAACGAAATCGACCGTGTATCCGGTCAGACTCA
GTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACACCCTGACCATCCAGGTTGGTG
CCAACGACGGTGAAACTATTGATATTGATTTAAAAGAAATTAGCTCTAAAACACTG
GGACTTGATAAGCTTAATGTCCAGGATGCCTACACCCCGAAAGAAACTGCTGTAAC
CGTTGATAAAACTACCTATAAAAATGGTACAGATACTATTACAGCCCAGAGCAATA
CTGATATCCAAACTGCAATTGGCGGTGGTGCAACGGGGGTTACTGGGGCTGATATC
AAATTTAAAGATGGTCAATACTATTTAGATGTTAAAGGCGGTGCTTCTGCTGGTGT
TTATAAAGCCACTTATGATGAAACTACAAAGAAAGTTAATATTGATACGACTGATA
AAACTCCGTTAGCAACTGCGGAAGCTACAGCTATTCGGGGAACGGCCACTATAACC
CACAACCAAATTGCTGAAGTAACAAAAGAGGGTGTTGATACGACCACAGTTGCGGC
TCAACTTGCTGCTGCAGGGGTTACTGGTGCCGATAAGGACAATACTAGCCTTGTAA
AACTATCGTTTGAGGATAAAAACGGTAAGGTTATTGATGGTGGCTATGCAGTGAAA
ATGGGCGACGATTTCTATGCCGCTACATATGATGAGAAAACAGGTACAATTACTGC
TAAAACAACCACTTATACAGATGGTGCTGGCGTTGCTCAAACTGGAGCTGTGAAAT
TTGGTGGCGCAAATGGTAAATCTGAAGTTGTTACTGCTACCGATGGTAAAACTTAC
TTAGCAAGCGACCTTGACAAACATAACTTCAGAACAGGCGGTGAGCTTAAAGAGGT
TAATACAGATAAGACTGAAAACCCACTGCAGAAAATTGATGCTGCCTTGGCACAGG
TTGATACACTTCGTTCTGACCTGGGTGCGGTACAGAACCGTTTCAACTCCGCTATC
ACCAACCTGGGCAATACCGTAAATAACCTGTCTTCTGCCCGTAGCCGTATCGAAGA
TTCCGACTACGCGACCGAAGTCTCCAACATGTCTCGCGCGCAGATTCTGCAGCAGG
CCGGTACCTCCGTTCTGGCGCAGGCTAACCAGGTTCCGCAAAACGTCCTCTCTTTA
CTGCGTTAA

Figure 20

SEQ ID NO: 63 - linker nucleic acid sequence

AAGGGCAATTCGAAGCTTGAAGGTCAATTGGAATTCCCTAGGACTAGTC
CAGTGTGGTGGAATTCTGCAGATATCCAGCACAGTGGCGGCCGCCAGTG
TGATGGATATCTGCAGAATTCGCCCTTGCGGCCGCTC

Figure 21

SEQ ID NO: 64 - Hepatitis C E1 amino acid sequence

YQVRNSTGLYHVTNDCPNSSIVYEAADAILHTPGCVPCVREGNASRCWVA
MTPTVATRDGKLPATQLRRHIDLLVGSATLCSALYVGDLCGSVFLVGQLFT
FSPRRHWTTQGCNCSIYPGHITGHRMAWDMMMNWSPTTALVMAQLLRIPQ
AILDMIAGAHWGVLAGIAYFSMVGNWAKVLVVLLLFAGVDA

Figure 22

SEQ ID NO: 65 - Hepatitis C E2 amino acid sequence

ETHVTGGSAGHTVSGFVSLLAPGAKQNVQLINTNGSWHLNSTALNCNDSLN
TGWLAGLFYHHKFNSSGCPERLASCRPLTDFDQGWGPISYANGSGPDQRPY
CWHYPPKPCGIVPAKSVCGPVYCFTPSPVVVGTTDRSGAPTYSWGENDTDV
FVLNNTRPPLGNWFGCTWMNSTGFTKVCGAPPCVIGGAGNNTLHCPTDCFR
KHPDATYSRCGSGPWITPRCLVDYPYRLWHYPCTINYTIFKIRMYVGGVEH
RLEAACNWTRGERCDLEDRDRSELSPLLLTTTQWQVLPCSFTTLPALSTGLI
HLHQNIVDVQYLYGVGSSIASWAIKWEYVVLLFLLLADARVCSCLWMMLL
ISQAEA

Figure 23

SEQ ID NO: 66 - Hepatitis C E1 nucleic acid sequence

TACCAAGTGCGCAACTCCACGGGGCTCTACCACGTCACCAATGATTGCC
CTAACTCGAGTATTGTGTACGAGGCGGCCGATGCCATCCTGCACACTCCG
GGGTGCGTCCCTTGCGTTCGCGAGGGCAACGCCTCGAGGTGTTGGGTGG
CGATGACCCCTACGGTGGCCACCAGGGATGGCAAACTCCCCGCGACGCA
GCTTCGACGTCACATCGATCTGCTTGTCGGGAGCGCCACCCTCTGTTCGG
CCCTCTACGTGGGGGACCTGTGCGGGTCTGTCTTTCTTGTCGGCCAACTG
TTTACCTTCTCTCCCAGGCGCCACTGGACGACGCAAGGTTGCAATTGCTC
TATCTATCCCGGCCATATAACGGGTCACCGCATGGCATGGGATATGATG
ATGAACTGGTCCCCTACGACGGCGTTGGTAATGGCTCAGCTGCTCCGGAT
CCCACAAGCCATCTTGGACATGATCGCTGGTGCTCACTGGGGAGTCCTG
GCGGGCATAGCGTATTTCTCCATGGTGGGGAACTGGGCGAAGGTCCTGG
TAGTGCTGCTGCTATTTGCCGGCGTCGACGCG

Figure 24

SEQ ID NO: 67 - Hepatitis C E2 nucleic acid sequence

GAAACCCACGTCACCGGGGGAAGTGCCGGCCACACTGTGTCTGGATTTG
TTAGCCTCCTCGCACCAGGCGCCAAGCAGAACGTCCAGCTGATCAACAC
CAACGGCAGTTGGCACCTCAATAGCACGGCCCTGAACTGCAATGATAGC
CTCAACACCGGCTGGTTGGCAGGGCTTTTCTATCACCACAAGTTCAACTC
TTCAGGCTGTCCTGAGAGGCTAGCCAGCTGCCGACCCCTTACCGATTTTG
ACCAGGGCTGGGGCCCTATCAGTTATGCCAACGGAAGCGGCCCCGACCA
GCGCCCCTACTGCTGGCACTACCCCCCAAAACCTTGCGGTATTGTGCCCG
CGAAGAGTGTGTGTGGTCCGGTATATTGCTTCACTCCCAGCCCCGTGGTG
GTGGGAACGACCGACAGGTCGGGCGCGCCCACCTACAGCTGGGGTGAA
AATGATACGGACGTCTTCGTCCTTAACAATACCAGGCCACCGCTGGGCA
ATTGGTTCGGTTGTACCTGGATGAACTCAACTGGATTCACCAAAGTGTGC
GGAGCGCCTCCTTGTGTCATCGGAGGGGCGGGCAACAACACCCTGCACT
GCCCCACTGATTGCTTCCGCAAGCATCCGGACGCCACATACTCTCGGTGC
GGCTCCGGTCCCTGGATCACACCCAGGTGCCTGGTCGACTACCCGTATAG
GCTTTGGCATTATCCTTGTACCATCAACTACACTATATTTAAAATCAGGA
TGTACGTGGGAGGGGTCGAGCACAGGCTGGAAGCTGCCTGCAACTGGAC
GCGGGGCGAACGTTGCGATCTGGAAGATAGGGACAGGTCCGAGCTCAGC
CCGTTACTGCTGACCACTACACAGTGGCAGGTCCTCCCGTGTTCCTTCAC
AACCCTGCCAGCCTTGTCCACCGGCCTCATCCACCTCCACCAGAACATTG
TGGACGTGCAGTACTTGTACGGGGTGGGGTCAAGCATCGCGTCCTGGGC
CATTAAGTGGGAGTACGTCGTCCTCCTGTTCCTTCTGCTTGCAGACGCGC
GCGTCTGCTCCTGCTTGTGGATGATGCTACTCATATCCCAAGCGGAAGCG

Figure 25

SEQ ID NO: 68 - *E. coli* fliC amino acid sequence (hinge region underlined)

MAQVINTNSLSLITQNNINKNQSALSSSIERLSSGLRINSAKDDAAGQAIANRFTS
NIKGLTQAARNANDGISVAQTTEGALSEINNNLQRIRELTVQASTGTNSDSDLDSI
QDEIKSRLDEIDRVSGQTQFNGVNVLAKDGSMKIQVGANDGQTITIDLKKIDSDTL
GLNGFNVNGSGTIANKAATISDLTAAKMDAATNTITTTNNALTASKALDQLKDGDT
VTIKADAAQTATVYTYNASAGNFSFSNVSNNTSAKAGDVAASLLPPAGQTASGVYK
AASGEVNFDVDANGKITIGGQKAYLTSDGNLTTNDAGGATAATLDGLFKKAGDGQS
IGFKKTASVTMGGTTYNFKTGADADAATANAGVSFTDTASKETVLNKVATAKQGKA
VAADGDTSATITYKSGVQTYQAVFAAGDGTASAKYADKADVSNATATYTDADGEMT
TIGSYTTKYSIDANNGKVTVDSGTGTGKYAPKVGAEVYVSANGTLTTDATSEGTVT
KDPLKALDEAISSIDKFRSSLGAIQNRLDSAVTNLNNTTTNLSEAQSRIQDADYAT
EVSNMSKAQIIQQAGNSVLAKANQVPQQVLSLLQG

Figure 26

SEQ ID NO: 69 - *E. coli* fliC nucleic acid sequence (hinge region underlined)

ATGGCACAAGTCATTAATACCAACAGCCTCTCGCTGATCACTCAAAATAATATCAA
CAAGAACCAGTCTGCGCTGTCGAGTTCTATCGAGCGTCTGTCTTCTGGCTTGCGTA
TTAACAGCGCGAAGGATGACGCAGCGGGTCAGGCGATTGCTAACCGTTTCACCTCT
AACATTAAAGGCCTGACTCAGGCGGCCCGTAACGCCAACGACGGTATCTCCGTTGC
GCAGACCACCGAAGGCGCGCTGTCCGAAATCAACAACAACTTACAGCGTATCCGTG
AACTGACGGTTCAGGCTTCTACCGGGACTAACTCCGATTCGGATCTGGACTCCATT
CAGGACGAAATCAAATCCCGTCTGGACGAAATTGACCGCGTATCTGGCCAGACCCA
GTTCAACGGCGTGAACGTACTGGCGAAAGACGGTTCAATGAAAATTCAGGTTGGTG
CGAATGACGGCCAGACTATCACGATTGATCTGAAGAAAATTGACTCAGATACGCTG
GGGCTGAATGGTTTTAACGTGAATGGTTCCGGTACGATAGCCAATAAAGCGGCGAC
CATTAGCGACCTGACAGCAGCGAAAATGGATGCTGCAACTAATACTATAACTACAA
CAAATAATGCGCTGACTGCATCAAAGGCGCTTGATCAACTGAAAGATGGTGACACT
GTTACTATCAAAGCAGATGCTGCTCAAACTGCCACGGTTTATACATACAATGCATC
AGCTGGTAACTTCTCATTCAGTAATGTATCGAATAATACTTCAGCAAAAGCAGGTG
ATGTAGCAGCTAGCCTTCTCCCGCCGGCTGGGCAAACTGCTAGTGGTGTTTATAAA
GCAGCAAGCGGTGAAGTGAACTTTGATGTTGATGCGAATGGTAAAATCACAATCGG
AGGACAGAAAGCATATTTAACTAGTGATGGTAACTTAACTACAAACGATGCTGGTG
GTGCGACTGCGGCTACGCTTGATGGTTTATTCAAGAAAGCTGGTGATGGTCAATCA
ATCGGGTTTAAGAAGACTGCATCAGTCACGATGGGGGGAACAACTTATAACTTTAA
AACGGGTGCTGATGCTGATGCTGCAACTGCTAACGCAGGGGTATCGTTCACTGATA
CAGCTAGCAAAGAAACCGTTTTAAATAAAGTGGCTACAGCTAAACAAGGCAAAGCA
GTTGCAGCTGACGGTGATACATCCGCAACAATTACCTATAAATCTGGCGTTCAGAC
GTATCAGGCTGTATTTGCCGCAGGTGACGGTACTGCTAGCGCAAAATATGCCGATA
AAGCTGACGTTTCTAATGCAACAGCAACATACACTGATGCTGATGGTGAAATGACT
ACAATTGGTTCATACACCACGAAGTATTCAATCGATGCTAACAACGGCAAGGTAAC
TGTTGATTCTGGAACTGGTACGGGTAAATATGCGCCGAAAGTAGGGGCTGAAGTAT
ATGTTAGTGCTAATGGTACTTTAACAACAGATGCAACTAGCGAAGGCACAGTAACA
AAAGATCCACTGAAAGCTCTGGATGAAGCTATCAGCTCCATCGACAAATTCCGTTC
TTCCCTGGGTGCTATCCAGAACCGTCTGGATTCCGCAGTCACCAACCTGAACAACA
CCACTACCAACCTGTCCGAAGCGCAGTCCCGTATTCAGGACGCCGACTATGCGACC
GAAGTGTCCAACATGTCGAAAGCGCAGATCATTCAGCAGGCCGGTAACTCCGTGCT
GGCAAAAGCCAACCAGGTACCGCAGCAGGTTCTGTCTCTGCTGCAGGGTTAA

Figure 27

SEQ ID NO: 70 - STF2Δ.EIII+ nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGA
ATAACCTGAACAAATCCCAGTCCGCACTGGGCACCGCTATCGAGCG
TCTGTCTTCTGGTCTGCGTATCAACAGCGCGAAAGACGATGCGGCA
GGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGTCTGA
CTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGAC
CACTGAAGGCGCGCTGAACGAAATCAACAACAACCTGCAGCGTGTG
CGTGAACTGGCGGTTCAGTCTGCTAACAGCACCAACTCCCAGTCTG
ACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTGAACGAAAT
CGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTG
GCGCAGGACAACACCCTGACCATCCAGGTTGGCGCCAACGACGGTG
AAACTATCGATATCGATCTGAAGCAGATCAACTCTCAGACCCTGGG
TCTGGACTCACTGAACGTGCATGGAGCGCCGGTGGATCCTGCTAGC
CCATGGACCGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGC
AGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTACAAAACCGTTT
CAACTCTGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCT
GAAGCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAAGTTT
CCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCCGT
TCTGGCGCAGGCTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTA
CGTGAATTCTGCAGATATCCAGCACAGTGGCGGCCGCTC**ATGGAAA**
AATTGCAGTTGAAGGGAACAACCTATGGCGTCTGTTCAAAGGCTTT
CAAGTTTCTTGGGACTCCCGCAGACACAGGTCACGGCACTGTGGTG
TTGGAATTGCAGTACACTGGCACGGATGGACCTTGCAAAGTTCCTA
TCTCGTCAGTGGCTTCATTGAACGACCTAACGCCAGTGGGCAGATT
GGTCACTGTCAACCCTTTTGTTTCAGTGGCCACGGCCAACGCTAAG
GTCCTGATTGAATTGGAACCACCCTTTGGAGACTCATACATAGTGG
TGGGCAGAGGAGAACAACAGATCAATCACCATTGGCACAAGTCTGG
AAGCAGCATTGGCAAACCCTTAATAAGC

Figure 28

SEQ ID NO: 71 - STF2Δ.EIII+ amino acid sequence of SEQ ID NO: 70

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAA
GQAIANRFTANIKGLTQASRNANDGISIAQTTEGALNEINNNLQRV
RELAVQSANSTNSQSDLDSIQAEITQRLNEIDRVSGQTQFNGVKVL
AQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPVDPAS
PWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLS
EARSRIEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLL
REFCRYPAQWRPL***MEKLQLKGTTYGVCSKAFKFLGTPADTGHGTVV***
LELQYTGTDGPCKVPISSVASLNDLTPVGRLVTVNPFVSVATANAK
VLIELEPPFGDSYIVVGRGEQQINHHWHKSGSSIGKPLIS

Figure 29

SEQ ID NO: 72 - STF2Δ.EIIIs+ (Cys-Ser mutation) amino acid sequence (linker underlined)

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAA
GQAIANRFTANIKGLTQASRNANDGISIAQTTEGALNEINNNLQRV
RELAVQSANSTNSQSDLDSIQAEITQRLNEIDRVSGQTQFNGVKVL
AQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPVDPAS
PWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLS
EARSRIEDSDYATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLL
REFSRYPAQWRPL***MEKLQ*****LKGTTYGVCSKAFKFLGTPADTGHGTVV**
LELQYTGTDGPCKVPISSVASLNDLTPVGRLVTVNPFVSVATANAK
VLIELEPPFGDSYIVVGRGEQQINHHWHKSGSSIGKPLIS

Figure 30

SEQ ID NO: 73 - STF2Δ.EIIIs+ (Cys-Ser mutation) nucleic acid sequence of SEQ ID NO: 72 (linker underlined)

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGA
ATAACCTGAACAAATCCCAGTCCGCACTGGGCACCGCTATCGAGCG
TCTGTCTTCTGGTCTGCGTATCAACAGCGCGAAAGACGATGCGGCA
GGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGTCTGA
CTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGAC
CACTGAAGGCGCGCTGAACGAAATCAACAACAACCTGCAGCGTGTG
CGTGAACTGGCGGTTCAGTCTGCTAACAGCACCAACTCCCAGTCTG
ACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTGAACGAAAT
CGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTG
GCGCAGGACAACACCCTGACCATCCAGGTTGGCGCCAACGACGGTG
AAACTATCGATATCGATCTGAAGCAGATCAACTCTCAGACCCTGGG
TCTGGACTCACTGAACGTGCATGGAGCGCCGGTGGATCCTGCTAGC
CCATGGACCGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGC
AGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTACAAAACCGTTT
CAACTCTGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCT
GAAGCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAAGTTT
CCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCCGT
TCTGGCGCAGGCTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTA
CGTGAATTCTCTAGATATCCAGCACAGTGGCGGCCGCTC**ATGGAAA**
AATTGCAGTTGAAGGGAACAACCTATGGCGTCTGTTCAAAGGCTTT
CAAGTTTCTTGGGACTCCCGCAGACACAGGTCACGGCACTGTGGTG
TTGGAATTGCAGTACACTGGCACGGATGGACCTTGCAAAGTTCCTA
TCTCGTCAGTGGCTTCATTGAACGACCTAACGCCAGTGGGCAGATT
GGTCACTGTCAACCCTTTTGTTTCAGTGGCCACGGCCAACGCTAAG
GTCCTGATTGAATTGGAACCACCCTTTGGAGACTCATACATAGTGG
TGGGCAGAGGAGAACAACAGATCAATCACCATTGGCACAAGTCTGG
AAGCAGCATTGGCAAACCCTTAATAAGCTGA

Figure 31

SEQ ID NO: 76 - pET/STF2Δ.JEIIIs+ amino acid sequence (Cys-ser mutation in linker region)

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTANIKG
LTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSIQAEITQRL
NEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPV
DPASPWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSRIEDSD
YATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLLREFSRYPAQWRPL***MDKLALKGTTY***
GMCTEKFSFAKNPVDTGHGTVVIELSYSGSDGPCKIPIVSVASLNDMTPVGRLVTVNPFV
ATSSANSKVLVEMEPPFGDSYIVVGRGDKQINHHWHKAGSTLGKA

Figure 32

SEQ ID NO: 77 - pET/STF2 Δ.JEIIIs+ nucleic acid sequence(Cys-ser mutation in linker region)

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAA
TCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGC
GCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGT
CTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGC
GCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCT
AACAGCACCAACTCCCAGTCTGACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTG
AACGAAATCGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTGGCGCAG
GACAACACCCTGACCATCCAGGTTGGCGCCAACGACGGTGAAACTATCGATATCGATCTG
AAGCAGATCAACTCTCAGACCCTGGGTCTGGACTCACTGAACGTGCATGGAGCGCCGGTG
GATCCTGCTAGCCCATGGACCGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGCAG
GTGGATGCGCTGCGCTCTGATCTGGGTGCGGTACAAAACCGTTTCAACTCTGCTATCACC
AACCTGGGCAATACCGTAAACAATCTGTCTGAAGCGCGTAGCCGTATCGAAGATTCCGAC
TACGCGACCGAAGTTTCCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCC
GTTCTGGCGCAGGCTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTACGTGAATTCAGC
AGATATCCAGCACAGTGGCGGCCGCTC***ATGGACAAACTGGCTCTG***AAAGGCACAACCTAT
GGCATGTGTACAGAAAAATTCTCGTTCGCGAAAAATCCGGTGGACACTGGTCACGGAACA
GTTGTCATTGAACTCTCCTACTCTGGGAGTGATGGCCCCTGCAAAATTCCGATTGTTTCC
GTTGCGAGCCTCAATGACATGACCCCCGTTGGGCGGCTGGTGACAGTGAACCCCTTCGTC
GCGACTTCCAGTGCCAACTCAAAGGTGCTGGTCGAGATGGAACCCCCCTTCGGAGACTCC
TACATCGTAGTTGGAAGGGGAGACAAGCAGATCAACCACCATTGGCACAAAGCTGGAAGC
ACGCTGGGCAAGGCC

Figure 33

SEQ ID NO: 78 - JEIII+ nucleic acid sequence

ATGGACAAACTGGCTCTGAAAGGCACAACCTATGGCATGTGTACAGAAAAATTCTCGTTCGC
GAAAAATCCGGTGGACACTGGTCACGGAACAGTTGTCATTGAACTCTCCTACTCTGGGAGTG
ATGGCCCCTGCAAAATTCCGATTGTTTCCGTTGCGAGCCTCAATGACATGACCCCCGTTGGG
CGGCTGGTGACAGTGAACCCCTTCGTCGCGACTTCCAGTGCCAACTCAAAGGTGCTGGTCGA
GATGGAACCCCCCTTCGGAGACTCCTACATCGTAGTTGGAAGGGGAGACAAGCAGATCAACC
ACCATTGGCACAAAGCTGGAAGCACGCTGGGCAAGGCC

Figure 34

SEQ ID NO: 79 - JEIII+ amino acid sequence

MDKLALKGTTYGMCTEKFSFAKNPVDTGHGTVVIELSYSGSDGPCKIPIVSVASLND
MTPVGRLVTVNPFVATSSANSKVLVEMEPPFGDSYIVVGRGDKQINHHWHKAGSTL
GKA

Figure 35

SEQ ID NO: 80 - pET/STF2Δ.Den1 EIII amino acid sequence

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTANIKG
LTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSIQAEITQRL
NEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPV
DPASPWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSRIEDSD
YATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLLREFSRYPAQWRPLKGMSYVMCTGS
FKLEKEVAETQHGTVLVQVKYEGTDAPCKIPFSTQDEKGVTQNGRLITANPIVTDKEKPV
NIEAEPPFGENYIVVGAGEKALKLSWFKK

Figure 36

SEQ ID NO: 81 - pET/STF2Δ.Den1 EIII nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAATCCCA
GTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGCGCGAAAGACG
ATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGTCTGACTCAGGCTTCC
CGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGCGCGCTGAACGAAATCAACAA
CAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCTAACAGCACCAACTCCCAGTCTGACC
TCGACTCCATCCAGGCTGAAATCACCCAGCGCCTGAACGAAATCGACCGTGTATCCGGCCAGACT
CAGTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACACCCTGACCATCCAGGTTGGCGCCAACGA
CGGTGAAACTATCGATATCGATCTGAAGCAGATCAACTCTCAGACCCTGGGTCTGGACTCACTGA
ACGTGCATGGAGCGCCGGTGGATCCTGCTAGCCCATGGACCGAAAACCCGCTGCAGAAAATTGAT
GCCGCGCTGGCGCAGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTACAAAACCGTTTCAACTC
TGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCTGAAGCGCGTAGCCGTATCGAAGATT
CCGACTACGCGACCGAAGTTTCCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCC
GTTCTGGCGCAGGCTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTACGTGAATTCAGCAGATA
TCCAGCACAGTGGCGGCCGCTCAAAGGAATGTCTTACGTAATGTGCACAGGCAGTTTCAAGCTGG
AAAAAGAAGTTGCCGAAACACAGCATGGCACGGTACTAGTCCAAGTGAAATATGAGGGAACAGAC
GCGCCATGTAAGATACCATTTTCCACTCAAGATGAGAAAGGGGCGACTCAGAACGGAAGATTGAT
AACCGCAAATCCTATCGTAACCGACAAGGAAAAGCCCGTGAATATTGAGGCAGAGCCTCCGTTTG
GGGAGTCGTATATCGTCGTTGGTGCTGGTGAAAAGGCTTTAAAGCTCAGTTGGTTCAAAAAGGGG
TCAAGCATTGGTAAA

Figure 37

SEQ ID NO: 82 - pET/STF2Δ.Den2 EIII amino acid sequence

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTANIKG
LTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSIQAEITQRL
NEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPV
DPASPWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSRIEDSD
YATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLLREFSRYPAQWRPLKGMSYSMCTGK
FKVVKEIAETQHGTIVIRVQYEGDGSPCKTPFEIMDLEKRHVLGRLTTVNPIVTEKDSPV
NIEAEPPFGDSYIIIGVEPGQLKLDWFKK

Figure 38

SEQ ID NO: 83 - pET/STF2Δ.Den2 EIII nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAAT
CCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGCGC
GAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGTCTG
ACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGCGCGC
TGAACGAAATCAACAACAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCTAACAG
CACCAACTCCCAGTCTGACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTGAACGAA
ATCGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACA
CCCTGACCATCCAGGTTGGCGCCAACGACGGTGAAACTATCGATATCGATCTGAAGCAGAT
CAACTCTCAGACCCTGGGTCTGGACTCACTGAACGTGCATGGAGCGCCGGTGGATCCTGCT
AGCCCATGGACCGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGC
TGCGCTCTGATCTGGGTGCGGTACAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAA
TACCGTAAACAATCTGTCTGAAGCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAA
GTTTCCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCCGTTCTGGCGCAGG
CTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTACGTGAATTCAGCAGATATCCAGCACA
GTGGCGGCCGCTCAAAGGTATGAGCTATAGCATGTGTACCGGTAAATTTAAAGTTGTTAAA
GAAATTGCGGAAACCCAGCATGGTACCATTGTTATTCGTGTTCAGTATGAAGGTGATGGTA
GCCCGTGTAAAATTCCGTTTGAAATTATGGATCTGGAAAAACGTCATGTTCTGGGTCGTCT
GATTACCGTTAATCCGATTGTTACCGAAAAAGATAGCCCGGTTAATATTGAAGCGGAACCG
CCGTTTGGTGATAGCTATATTATTATTGGTGTTGAACCGGGTCAGCTGAAACTGAATTGGT
TTAAAAAAGGTAGCAGCATTGGTCAG

Figure 39

SEQ ID NO: 84 - pET/STF2Δ.Den3 EIII amino acid sequence

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTANIKG
LTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSIQAEITQRL
NEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPV
DPASPWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSRIEDSD
YATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLLREFSRYPAQWRPLKGMSYAMCLNT
FVLKKEVSETQHGTILIKVEYKGEDAPCKIPFSTEDGQGKAHNGRLITANPVVTKKEEPV
NIEAEPPFGESNIVIGIGDKALKINWYRK

Figure 40

SEQ ID NO: 85 - pET/STF2Δ.Den3 EIII nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAAT
CCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGCGC
GAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGTCTG
ACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGCGCGC
TGAACGAAATCAACAACAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCTAACAG
CACCAACTCCCAGTCTGACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTGAACGAA
ATCGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACA
CCCTGACCATCCAGGTTGGCGCCAACGACGGTGAAACTATCGATATCGATCTGAAGCAGAT
CAACTCTCAGACCCTGGGTCTGGACTCACTGAACGTGCATGGAGCGCCGGTGGATCCTGCT
AGCCCATGGACCGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGC
TGCGCTCTGATCTGGGTGCGGTACAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAA
TACCGTAAACAATCTGTCTGAAGCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAA
GTTTCCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCCGTTCTGGCGCAGG
CTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTACGTGAATTCAGCAGATATCCAGCACA
GTGGCGGCCGCTCAAAGGAATGAGTTATGCAATGTGTTTAAATACATTTGTATTAAAAAAA
GAAGTAAGTGAAACACAACATGGAACAATATTAATAAAAGTAGAATATAAAGGAGAAGATG
CACCATGTAAAATACCATTTAGTACAGAAGATGGACAAGGAAAAGCACATAATGGAAGATT
AATAACAGCAAATCCAGTAGTAACAAAAAAAGAAGAACCAGTAAATATAGAAGCAG
AACCACCATTTGGAGAAAGTAATATAGTAATAGGAATAGGAGATAAAGCATTAAAA
ATAAATTGGTATAGAAAAGGAAGTAGTATAGGAAAA

Figure 41

SEQ ID NO: 86 - pET/STF2Δ.Den4 EIII amino acid sequence

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTANIKG
LTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSIQAEITQRL
NEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVHGAPV
DPASPWTENPLQKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSRIEDSD
YATEVSNMSRAQILQQAGTSVLAQANQVPQNVLSLLREFSRYPAQWRPLKGMSYTMCSGK
FSIDKEMAETQHGTTVVKVKYEGAGAPCKVPIEIRDVNKEKVVGRIISPTPFAENTNSVT
NIELERPLDSYIVIGVGDSALTLHWFRK

Figure 42

SEQ ID NO: 87 - pET/STF2Δ.Den4 EIII nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAAT
CCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGCGC
GAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGTCTG
ACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGCGCGC
TGAACGAAATCAACAACAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCTAACAG
CACCAACTCCCAGTCTGACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTGAACGAA
ATCGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTGGCGCAGGACAACA
CCCTGACCATCCAGGTTGGCGCCAACGACGGTGAAACTATCGATATCGATCTGAAGCAGAT
CAACTCTCAGACCCTGGGTCTGGACTCACTGAACGTGCATGGAGCGCCGGTGGATCCTGCT
AGCCCATGGACCGAAAACCCGCTGCAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGC
TGCGCTCTGATCTGGGTGCGGTACAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAA
TACCGTAAACAATCTGTCTGAAGCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAA
GTTTCCAACATGTCTCGCGCGCAGATTTTGCAGCAGGCCGGTACTTCCGTTCTGGCGCAGG
CTAACCAGGTCCCGCAGAACGTGCTGTCTCTGTTACGTGAATTCAGCAGATATCCAGCACA
GTGGCGGCCGCTCAAGGGAATGTCATACACGATGTGTAGTGGTAAATTCTCTATAGACAAA
GAGATGGCAGAGACACAACACGGGACAACCGTCGTGAAGGTTAAGTATGAAGGAGCTGGCG
CACCGTGCAAAGTACCCATCGAAATTAGGGATGTAAACAAAGAGAAGGTCGTTGGGCGTAT
CATTAGCTCAACCCCACTTGCGGAAAATACTAATTCTGTAACGAACATAGAGTTGGAACCA
CCTTTTGGTGATAGCTATATAGTTATTGGTGTGGGCAATAGTGCCTTAACTCTACATTGGT
TTAGAAAAGGATCCTCGATCGGGAAA

Figure 43

SEQ ID NO: 174: - Tick-borne encephalitis envelope protein amino acid sequence

SRCTHLENRDFVTGTQGTTRVTLVLELGGCVTITAEGKPSMDVWLDSIYQENPAKTREY
CLHAKLSDTKVAARCPTMGPATLTEEHQSGTVCKRDQSDRGWGNHCGLFGKGSIVTCVK
VACEAKKKAIGHVYDANKIVYTVKVEPHTGDYVAANETHSGRKTASFTVSSEKTILTMG
DYGDVPLLCRVASGVDLAQTVILELDKTLEHLPTAWQVHRDWFNDLALPWKHEGAQQWN
NAERLVEFGAPHAVKMDVYNLGDQTGVLLKSLAGVPVAHIDGTKYHLKSGHVTCEVGLE
KLKMKGLTYTMCDKTKFAWKRTPTDSGHDTVVMEVTFSGTKPCRIPVRAVAHGSPDVNV
AMLITPNPTIENNGGGFIEMQLPPGDNIIYVGELSHQWFQKGSSIGRVFQKTRKGIERL
TVIGEHAWDFGSTGGFLTSVGKALHTVLGGAFNSIFGGVGFLPKLLLGVALAWLGLNMR
NPTMSMSFLLAGGLVLAMTLGVGA

Figure 44

SEQ ID NO: 39 – West Nile virus envelope protein amino acid sequence

```
FNCLGMSNRDFLEGVSGATWVDLVLEGDSCVTIMSKDKPTIDVKMMNMEAANLAEVRSYC   60
YLATVSDLSTKAACPTMGEAHNDKRADPAFVCRQGVVDRGWGNGCGLFGKGSIDTCAKFA  120
CSTKAIGRTILKENIKYEVAIFVHGPTTVESHGNYSTQVGATQAGRFSITPAAPSYTLKL  180
GEYGEVTVDCEPRSGIDTNAYYVMTVGTKTFLVHREWFMDLNLPWSSAGSTVWRNRETLM  240
EFEEPHATKQSVIALGSQEGALHQALAGAIPVEFSSNTVKLTSGHLKCRVKMEKLQLKGT  300
TYGVCSKAFKFLGTPADTGHGTVVLELQYTGTDGPCKVPISSVASLNDLTPVGRLVTVNP  360
FVSVATANAKVLIELEPPFGDSYIVVGRGEQQINHHWHKSGSSIGK                406
```

Figure 45

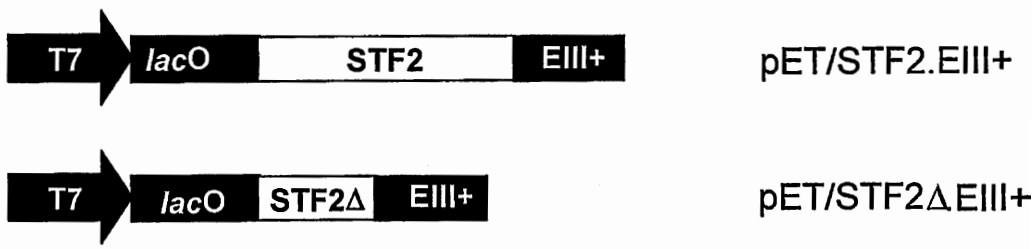

T7
lacO
STF2
EIII+
pET/STF2.EIII+
T7
lacO
STF2Δ
EIII+
pET/STF2ΔEIII+

Figure 46

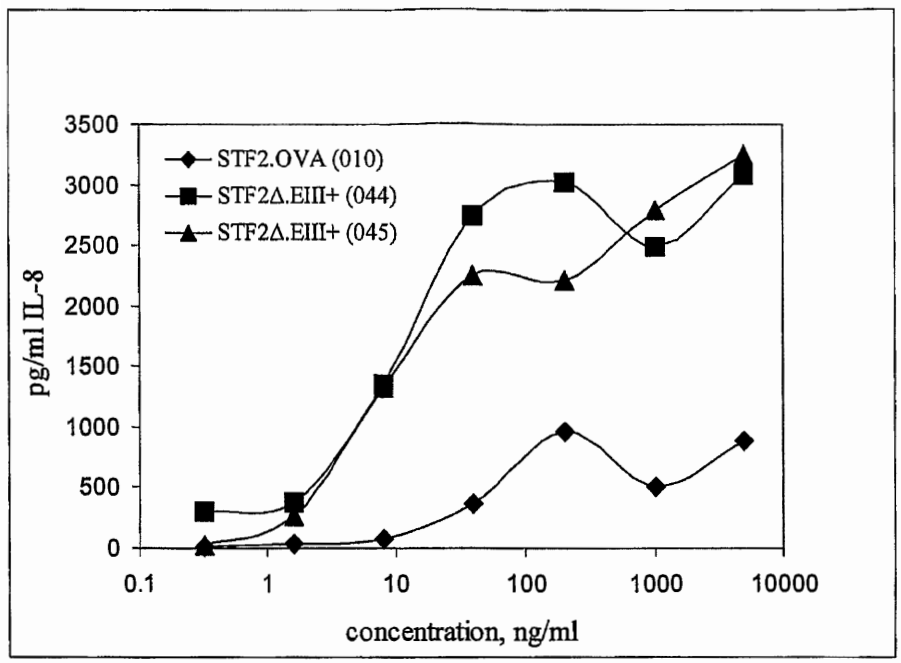

3500
3000
2500
2000
1500
1000
500
0
pg/ml IL-8
STF2.OVA (010)
STF2Δ.EIII+ (044)
STF2Δ.EIII+ (045)
0.1
1
10
100
1000
10000
concentration, ng/ml

Figure 47A

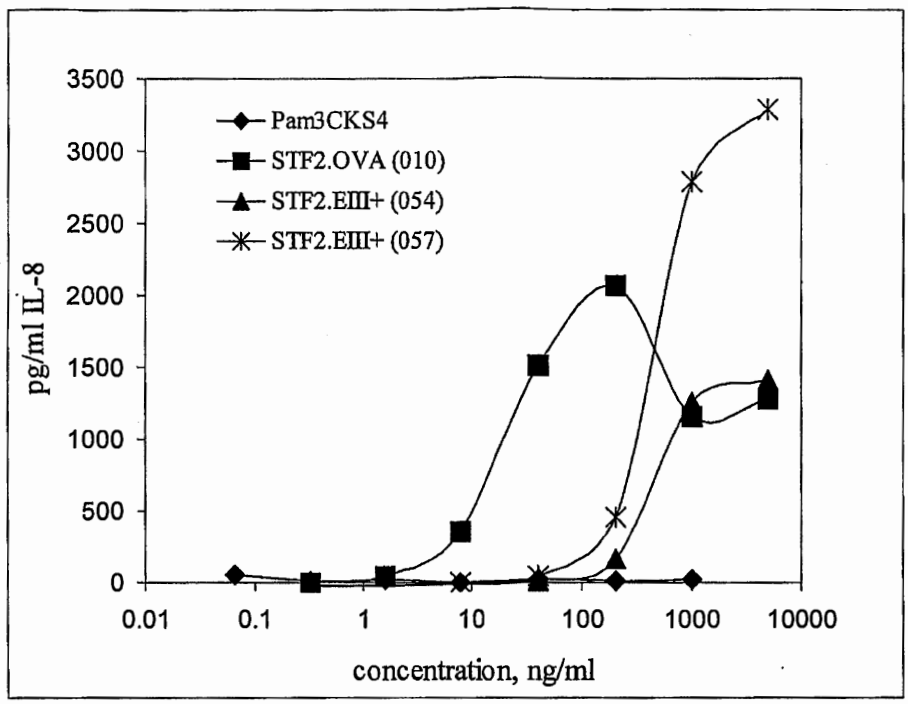

3500
3000
2500
2000
1500
1000
500
0
pg/ml IL-8
Pam3CKS4
STF2.OVA (010)
STF2.EIII+ (054)
STF2.EIII+ (057)
0.01
0.1
1
10
100
1000
10000
concentration, ng/ml

Figure 47B

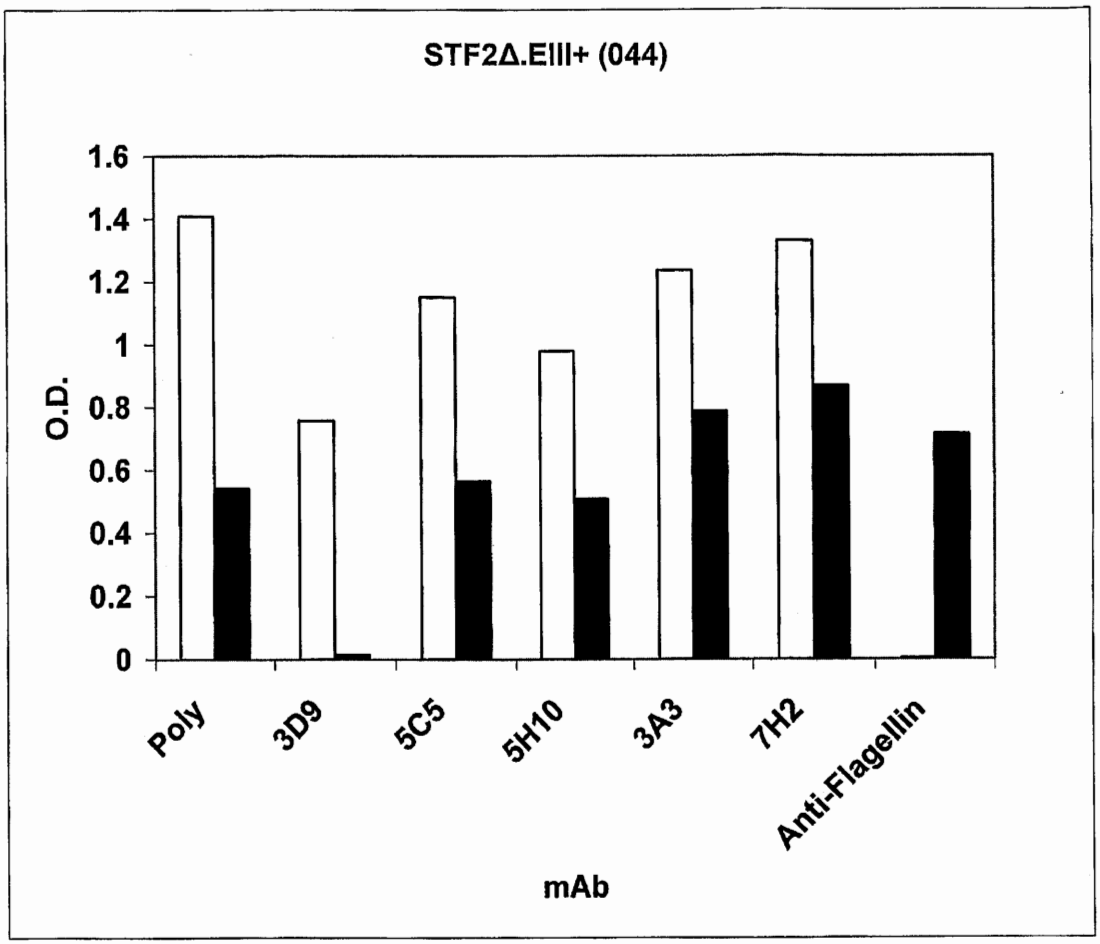

STF2Δ.EIII+ (044)
O.D.
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Poly
3D9
5C5
5H10
3A3
7H2
Anti-Flagellin
mAb

Figure 48

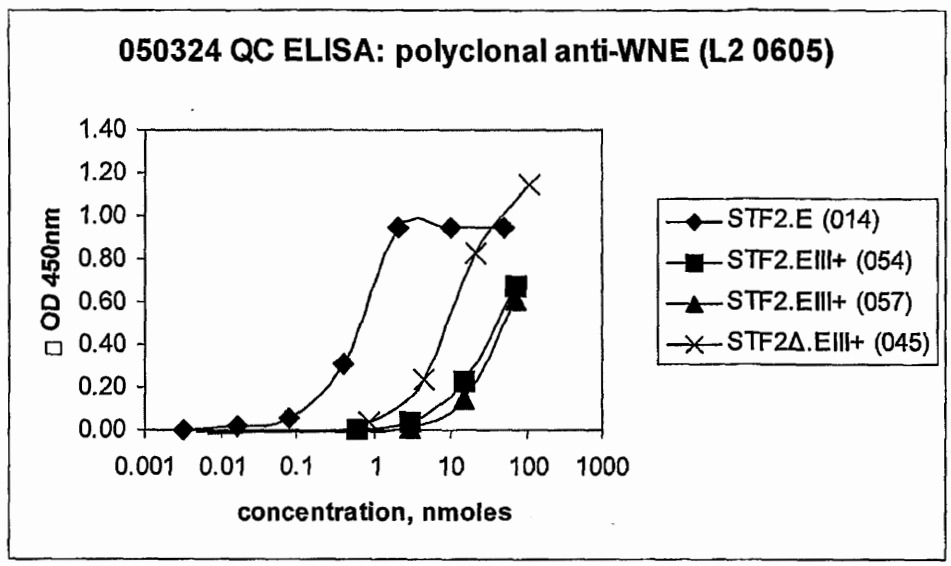

050324 QC ELISA: polyclonal anti-WNE (L2 0605)
OD 450nm
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.001
0.01
0.1
1
10
100
1000
concentration, nmoles
STF2.E (014)
STF2.EIII+ (054)
STF2.EIII+ (057)
STF2Δ.EIII+ (045)

Figure 49A

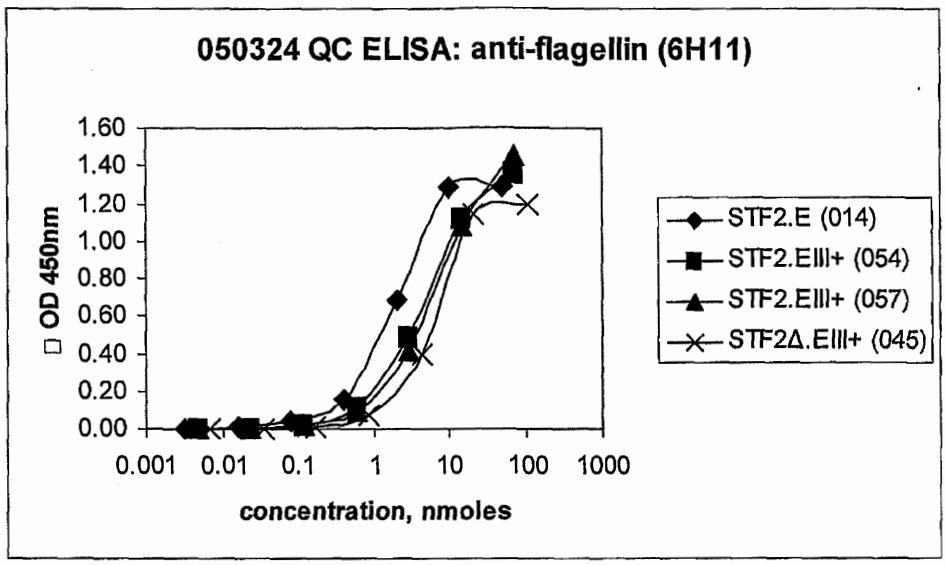

050324 QC ELISA: anti-flagellin (6H11)
OD 450nm
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.001
0.01
0.1
1
10
100
1000
concentration, nmoles
STF2.E (014)
STF2.EIII+ (054)
STF2.EIII+ (057)
STF2Δ.EIII+ (045)

Figure 49B

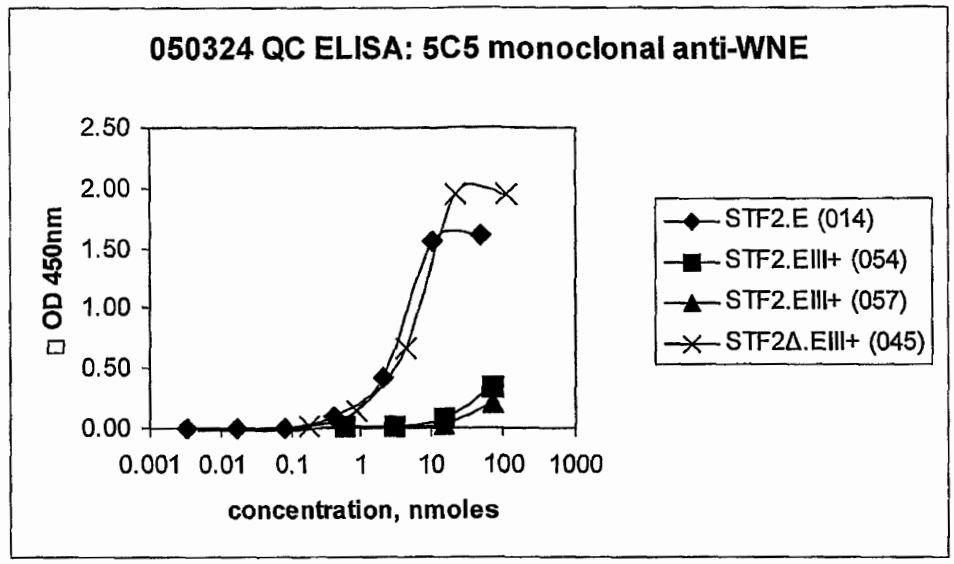

050324 QC ELISA: 5C5 monoclonal anti-WNE
□ OD 450nm
2.50
2.00
1.50
1.00
0.50
0.00
0.001
0.01
0.1
1
10
100
1000
concentration, nmoles
STF2.E (014)
STF2.EIII+ (054)
STF2.EIII+ (057)
STF2Δ.EIII+ (045)

Figure 49C

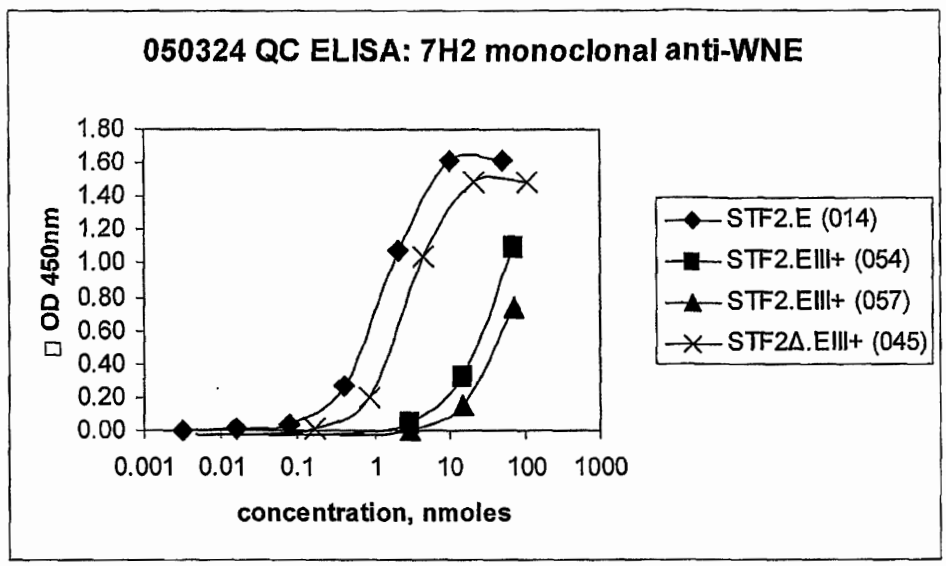

050324 QC ELISA: 7H2 monoclonal anti-WNE
OD 450nm
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.001
0.01
0.1
1
10
100
1000
concentration, nmoles
STF2.E (014)
STF2.EIII+ (054)
STF2.EIII+ (057)
STF2Δ.EIII+ (045)

Figure 49D

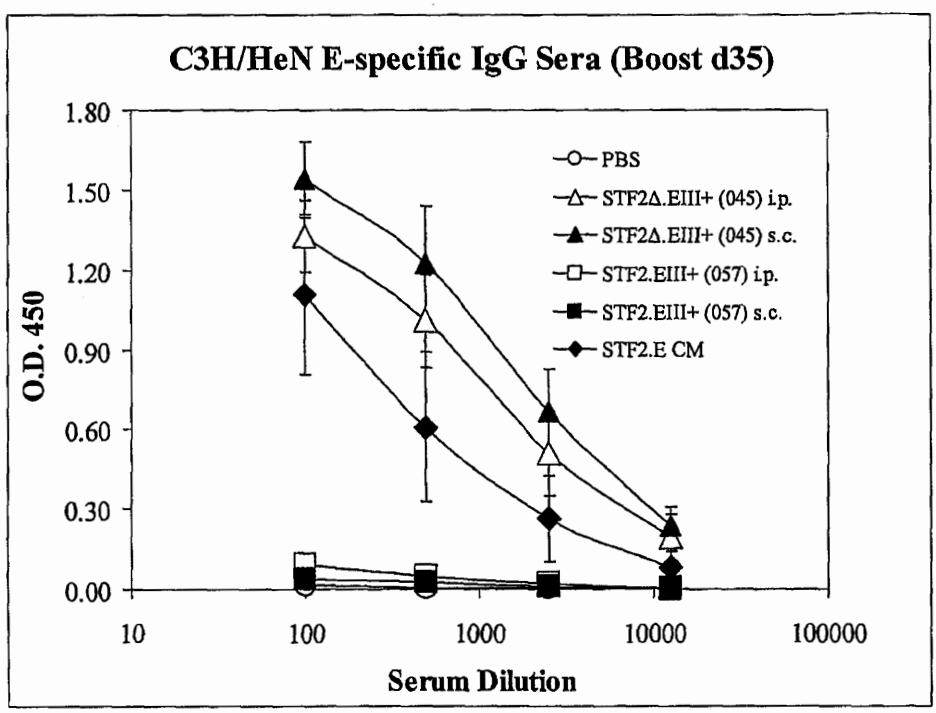

C3H/HeN E-specific IgG Sera (Boost d35)
1.80
1.50
1.20
0.90
0.60
0.30
0.00
O.D. 450
10
100
1000
10000
100000
Serum Dilution
PBS
STF2Δ.EIII+ (045) i.p.
STF2Δ.EIII+ (045) s.c.
STF2.EIII+ (057) i.p.
STF2.EIII+ (057) s.c.
STF2.E CM

Figure 50

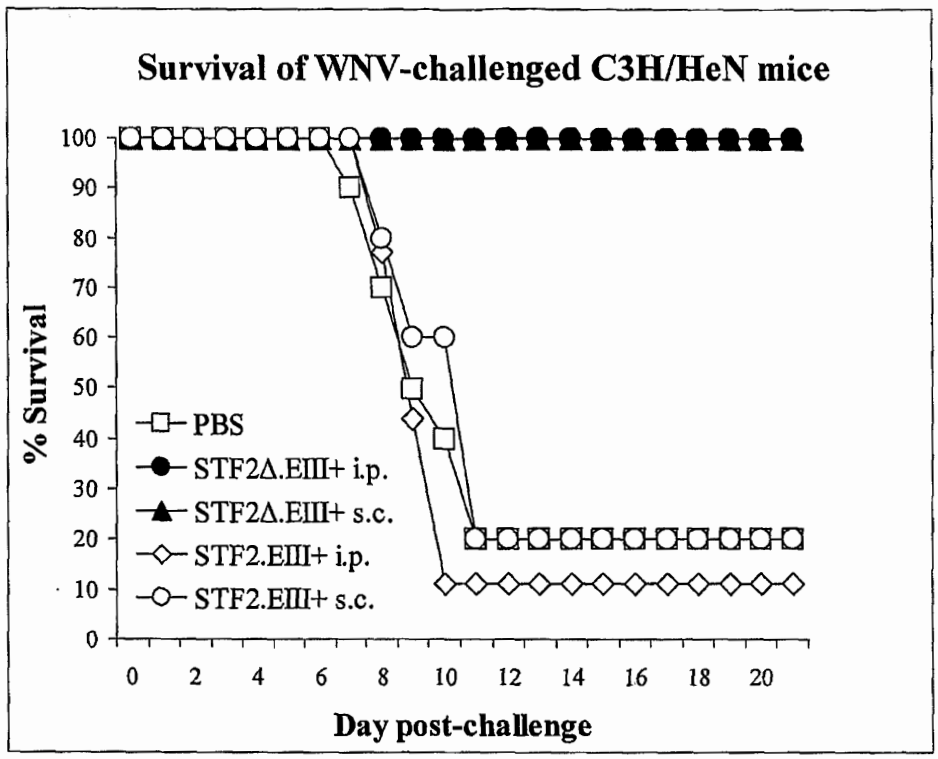

Survival of WNV-challenged C3H/HeN mice
% Survival
100
90
80
70
60
50
40
30
20
10
0
PBS
STF2Δ.EIII+ i.p.
STF2Δ.EIII+ s.c.
STF2.EIII+ i.p.
STF2.EIII+ s.c.
0
2
4
6
8
10
12
14
16
18
20
Day post-challenge

Figure 51

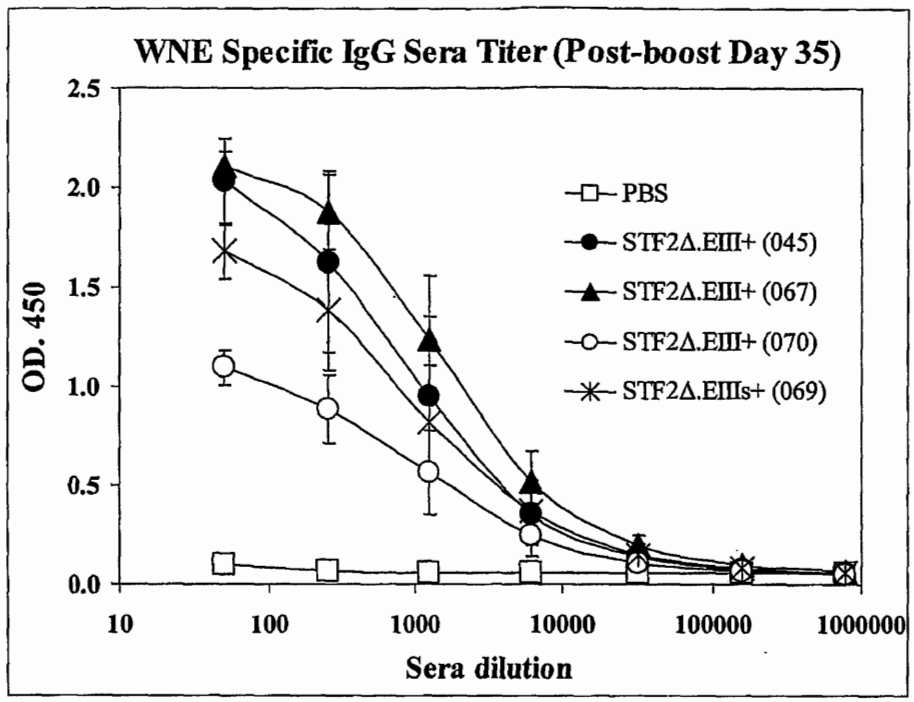

WNE Specific IgG Sera Titer (Post-boost Day 35)
OD. 450
2.5
2.0
1.5
1.0
0.5
0.0
10
100
1000
10000
100000
1000000
Sera dilution
PBS
STF2Δ.EIII+ (045)
STF2Δ.EIII+ (067)
STF2Δ.EIII+ (070)
STF2Δ.EIIIs+ (069)

Figure 52

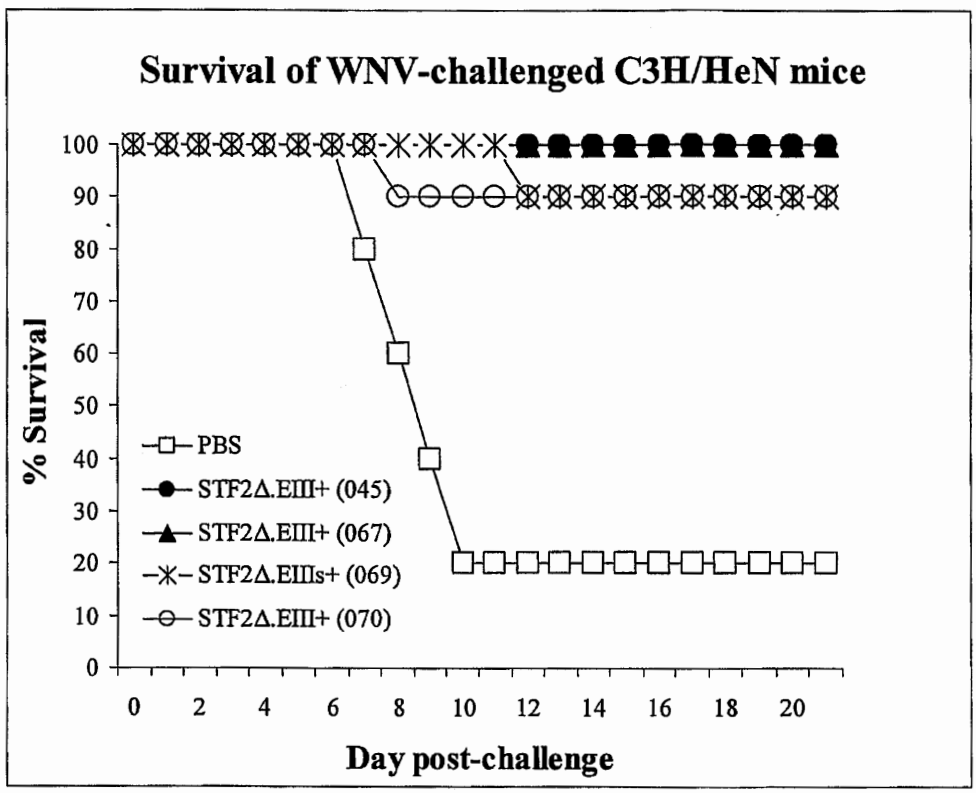

Survival of WNV-challenged C3H/HeN mice
% Survival
Day post-challenge
PBS
STF2Δ.EIII+ (045)
STF2Δ.EIII+ (067)
STF2Δ.EIIIs+ (069)
STF2Δ.EIII+ (070)
0
10
20
30
40
50
60
70
80
90
100
0
2
4
6
8
10
12
14
16
18
20

Figure 53

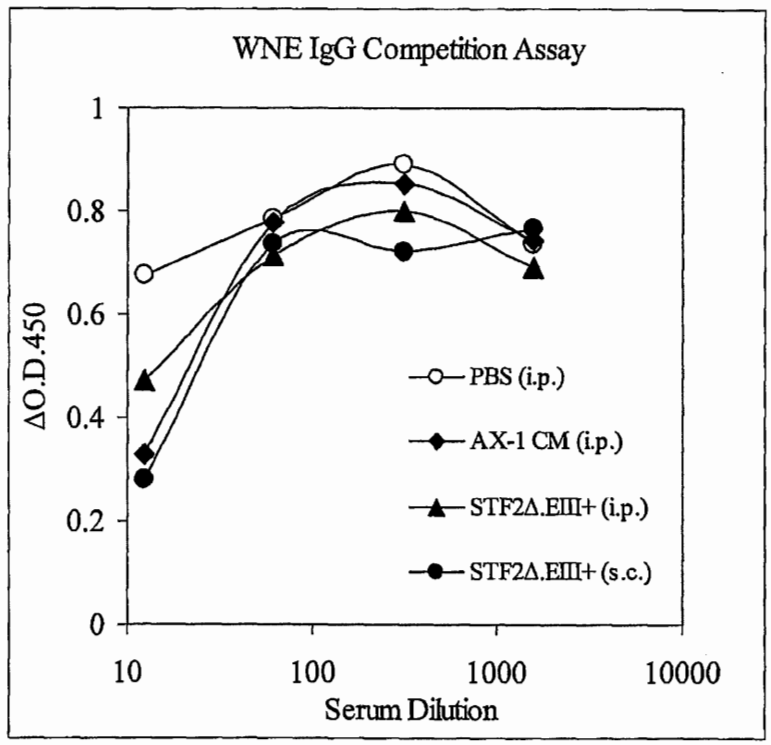

WNE IgG Competition Assay
ΔO.D.450
1
0.8
0.6
0.4
0.2
0
10
100
1000
10000
Serum Dilution
PBS (i.p.)
AX-1 CM (i.p.)
STF2Δ.EIII+ (i.p.)
STF2Δ.EIII+ (s.c.)

Figure 54

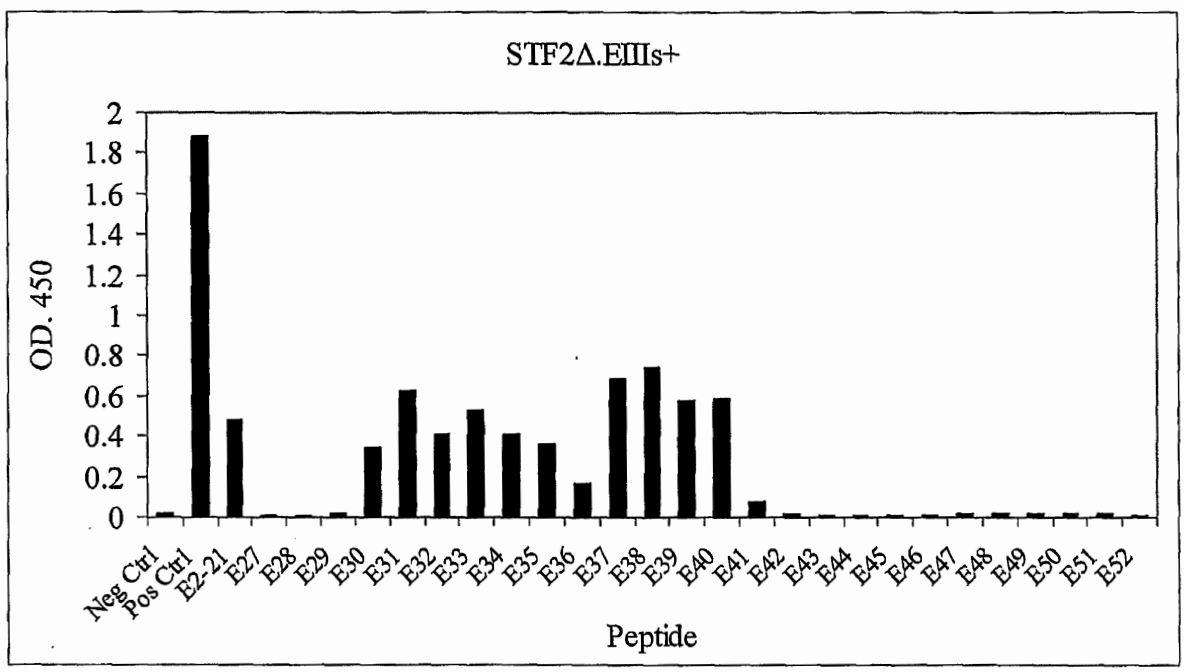

STF2Δ.EIIIs+
OD. 450
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Neg Ctrl
Pos Ctrl
E2-21
E27
E28
E29
E30
E31
E32
E33
E34
E35
E36
E37
E38
E39
E40
E41
E42
E43
E44
E45
E46
E47
E48
E49
E50
E51
E52
Peptide

Figure 55

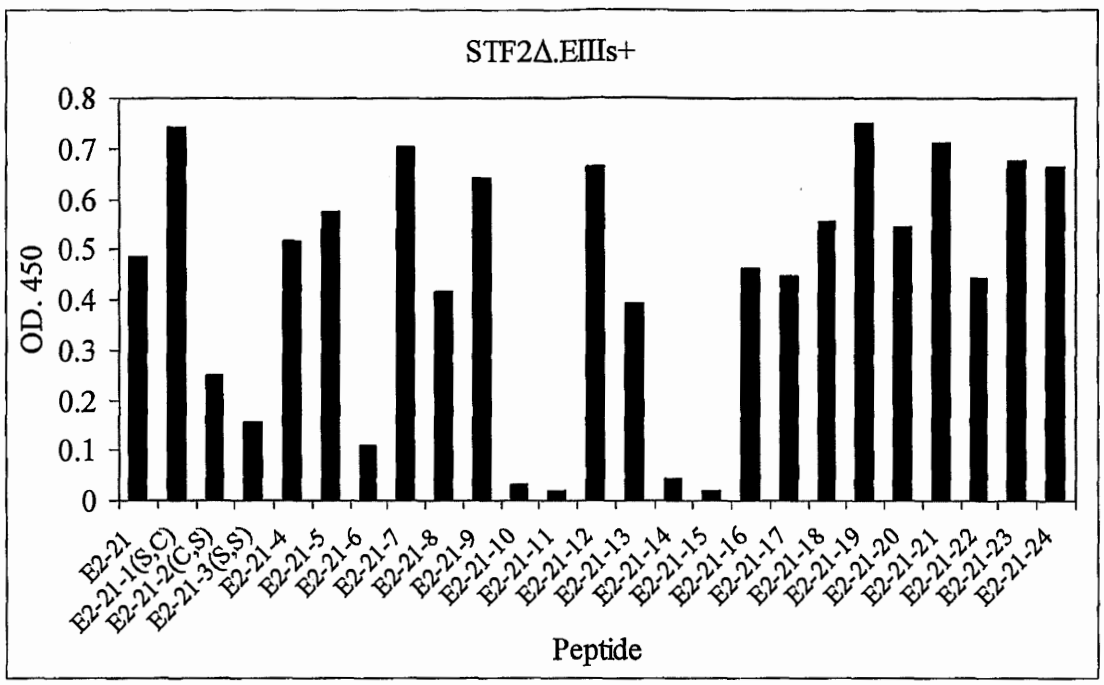

STF2Δ.EIIIs+
OD. 450
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
E2-21
E2-21-1(S,C)
E2-21-2(C,S)
E2-21-3(S,S)
E2-21-4
E2-21-5
E2-21-6
E2-21-7
E2-21-8
E2-21-9
E2-21-10
E2-21-11
E2-21-12
E2-21-13
E2-21-14
E2-21-15
E2-21-16
E2-21-17
E2-21-18
E2-21-19
E2-21-20
E2-21-21
E2-21-22
E2-21-23
E2-21-24
Peptide

Figure 56

E2-21	CRVKMEKLQLKGTTYGVCSK	SEQ ID NO: 100
E2-21-1	SRVKMEKLQLKGTTYGVCSK	SEQ ID NO: 101
E2-21-2	CRVKMEKLQLKGTTYGVSSK	SEQ ID NO: 102
E2-21-3	SRVKMEKLQLKGTTYGVSSK	SEQ ID NO: 103
E2-21-4	CRVKMEKLQLKGTTYGVCSK	SEQ ID NO: 104
E2-21-5	ARVKMEKLQLKGTTYGVCSK	SEQ ID NO: 105
E2-21-6	CAVKMEKLQLKGTTYGVCSK	SEQ ID NO: 106
E2-21-7	CRAKMEKLQLKGTTYGVCSK	SEQ ID NO: 107
E2-21-8	CRVAMEKLQLKGTTYGVCSK	SEQ ID NO: 108
E2-21-9	CRVKAEKLQLKGTTYGVCSK	SEQ ID NO: 109
E2-21-10	CRVKMAKLQLKGTTYGVCSK	SEQ ID NO: 110
E2-21-11	CRVKMEALQLKGTTYGVCSK	SEQ ID NO: 111
E2-21-12	CRVKMEKAQLKGTTYGVCSK	SEQ ID NO: 112
E2-21-13	CRVKMEKLALKGTTYGVCSK	SEQ ID NO: 113
E2-21-14	CRVKMEKLQAKGTTYGVCSK	SEQ ID NO: 114
E2-21-15	CRVKMEKLQLAGTTYGVCSK	SEQ ID NO: 115
E2-21-16	CRVKMEKLQLKATTYGVCSK	SEQ ID NO: 116
E2-21-17	CRVKMEKLQLKGATYGVCSK	SEQ ID NO: 117
E2-21-18	CRVKMEKLQLKGTAYGVCSK	SEQ ID NO: 118
E2-21-19	CRVKMEKLQLKGTTAGVCSK	SEQ ID NO: 119
E2-21-20	CRVKMEKLQLKGTTYAVCSK	SEQ ID NO: 120
E2-21-21	CRVKMEKLQLKGTTYGACSK	SEQ ID NO: 121
E2-21-22	CRVKMEKLQLKGTTYGVASK	SEQ ID NO: 122
E2-21-23	CRVKMEKLQLKGTTYGVCAK	SEQ ID NO: 123
E2-21-24	CRVKMEKLQLKGTTYGVCSA	SEQ ID NO: 124

Figure 57

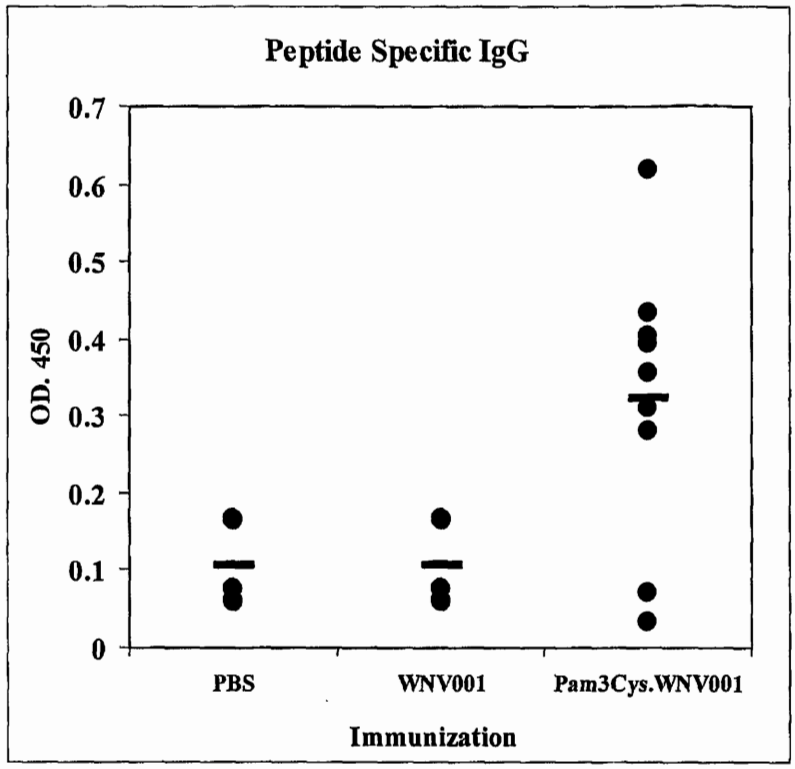

Peptide Specific IgG
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
OD. 450
PBS
WNV001
Pam3Cys.WNV001
Immunization

Figure 58

Flavivirus Envelope Protein Domain I/III junction
(domain I 280-297, domain III 298-406)

WN aa 281-307

WN	LTSGHLKCRVKMEKLQLKGTTYGVCSK	(SEQ ID NO: 88)
JE	LTSGHLKCRLKMDKLALKGTTYGMCTE	(SEQ ID NO: 89)
D1	IFAGHLKCRLKMDKLTLKGMSYVMCTG	(SEQ ID NO: 90)
D2	LFTGHLKCRLRMDKLQLKGMSYSMCTG	(SEQ ID NO: 91)
D3	IFAGHLKCRLKMDKLKLKGMSYAMCLN	(SEQ ID NO: 92)
D4	MFAGHLKCKVRMEKLRIKGMSYTMCSG	(SEQ ID NO: 93)
	xxxGHLKCRxxMxKLxLKGxxYxxCxx	(SEQ ID NO: 94)
	GHLKCRMKLLKGYC	(SEQ ID NO: 95)

Figure 59

E2-21	CRVKMEKLQLKGTTYGVCSK	SEQ ID NO: 125
E27	SNTVKLTSGHLKCRVKMEKL	SEQ ID NO: 126
E28	NTVKLTSGHLKCRVKMEKLQ	SEQ ID NO: 127
E29	TVKLTSGHLKCRVKMEKLQL	SEQ ID NO: 128
E30	VKLTSGHLKCRVKMEKLQLK	SEQ ID NO: 129
E31	KLTSGHLKCRVKMEKLQLKG	SEQ ID NO: 130
E32	LTSGHLKCRVKMEKLQLKGT	SEQ ID NO: 131
E33	TSGHLKCRVKMEKLQLKGTT	SEQ ID NO: 132
E34	SGHLKCRVKMEKLQLKGTTY	SEQ ID NO: 133
E35	GHLKCRVKMEKLQLKGTTYG	SEQ ID NO: 134
E36	HLKCRVKMEKLQLKGTTYGV	SEQ ID NO: 135
E37	LKCRVKMEKLQLKGTTYGVC	SEQ ID NO: 136
E38	KCRVKMEKLQLKGTTYGVCS	SEQ ID NO: 137
E39	CRVKMEKLQLKGTTYGVCSK	SEQ ID NO: 138
E40	RVKMEKLQLKGTTYGVCSKA	SEQ ID NO: 139
E41	VKMEKLQLKGTTYGVCSKAF	SEQ ID NO: 140
E42	KMEKLQLKGTTYGVCSKAFK	SEQ ID NO: 141
E43	MEKLQLKGTTYGVCSKAFKF	SEQ ID NO: 142
E44	EKLQLKGTTYGVCSKAFKFL	SEQ ID NO: 143
E45	KLQLKGTTYGVCSKAFKFLG	SEQ ID NO: 144
E46	LQLKGTTYGVCSKAFKFLGT	SEQ ID NO: 145
E47	QLKGTTYGVCSKAFKFLGTP	SEQ ID NO: 146
E48	LKGTTYGVCSKAFKFLGTPA	SEQ ID NO: 147
E49	KGTTYGVCSKAFKFLGTPAD	SEQ ID NO: 148
E50	GTTYGVCSKAFKFLGTPADT	SEQ ID NO: 149
E51	TTYGVCSKAFKFLGTPADTG	SEQ ID NO: 150
E52	TYGVCSKAFKFLGTPADTGH	SEQ ID NO: 151

Figure 60

SEQ ID NO: 152 - STF2.OVA nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAA
TCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGC
GCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGT
CTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGC
GCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCT
AACAGCACCAACTCCCAGTCTGACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTG
AACGAAATCGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTGGCGCAG
GACAACACCCTGACCATCCAGGTTGGCGCCAACGACGGTGAAACTATCGATATCGATCTG
AAGCAGATCAACTCTCAGACCCTGGGTCTGGACTCACTGAACGTGCAGAAAGCGTATGAT
GTGAAAGATACAGCAGTAACAACGAAAGCTTATGCCAATAATGGTACTACACTGGATGTA
TCGGGTCTTGATGATGCAGCTATTAAAGCGGCTACGGGTGGTACGAATGGTACGGCTTCT
GTAACCGGTGGTGCGGTTAAATTTGACGCAGATAATAACAAGTACTTTGTTACTATTGGT
GGCTTTACTGGTGCTGATGCCGCCAAAAATGGCGATTATGAAGTTAACGTTGCTACTGAC
GGTACAGTAACCCTTGCGGCTGGCGCAACTAAAACCACAATGCCTGCTGGTGCGACAACT
AAAACAGAAGTACAGGAGTTAAAAGATACACCGGCAGTTGTTTCAGCAGATGCTAAAAAT
GCCTTAATTGCTGGCGGCGTTGACGCTACCGATGCTAATGGCGCTGAGTTGGTCAAAATG
TCTTATACCGATAAAAATGGTAAGACAATTGAAGGCGGTTATGCGCTTAAAGCTGGCGAT
AAGTATTACGCCGCAGATTACGATGAAGCGACAGGAGCAATTAAAGCTAAAACCACAAGT
TATACTGCTGCTGACGGCACTACCAAAACAGCGGCTAACCAACTGGGTGGCGTAGACGGT
AAAACCGAAGTCGTTACTATCGACGGTAAAACCTACAATGCCAGCAAAGCCGCTGGTCAT
GATTTCAAAGCACAACCAGAGCTGGCGGAAGCAGCCGCTAAAACCACCGAAAACCCGCTG
CAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTA
CAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCTGAA
GCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAAGTTTCCAACATGTCTCGCGCG
CAGATTTTGCAGCAGGCCGGTACTTCCGTTCTGGCGCAGGCTAACCAGGTCCCGCAGAAC
GTGCTGTCTCTGTTACGTCTCGAGGGCTCCATCGGCGCAGCAAGCATGGAATTTTGTTTT
GATGTATTCAAGGAGCTCAAAGTCCACCATGCCAATGAGAACATCTTCTACTGCCCCATT
GCCATCATGTCAGCTCTAGCCATGGTATACCTGGGTGCAAAAGACAGCACCAGGACACAA
ATAAATAAGGTTGTTCGCTTTGATAAACTTCCAGGATTCGGAGACAGTATTGAAGCTCAG
TGTGGCACATCTGTAAACGTTCACTCTTCACTTAGAGACATCCTCAACCAAATCACCAAA
CCAAATGATGTTTATTCGTTCAGCCTTGCCAGTAGACTTTATGCTGAAGAGAGATACCCA
ATCCTGCCAGAATACTTGCAGTGTGTGAAGGAACTGTATAGAGGAGGCTTGGAACCTATC
AACTTTCAAACAGCTGCAGATCAAGCCAGAGAGCTCATCAATTCCTGGGTAGAAAGTCAG
ACAAATGGAATTATCAGAAATGTCCTTCAGCCAAGCTCCGTGGATTCTCAAACTGCAATG
GTTCTGGTTAATGCCATTGTCTTCAAAGGACTGTGGGAGAAAGCATTTAAGGATGAAGAC
ACACAAGCAATGCCTTTCAGAGTGACTGAGCAAGAAAGCAAACCTGTGCAGATGATGTAC
CAGATTGGTTTATTTAGAGTGGCATCAATGGCTTCTGAGAAAATGAAGATCCTGGAGCTT
CCATTTGCCAGTGGGACAATGAGCATGTTGGTGCTGTTGCCTGATGAAGTCTCAGGCCTT
GAGCAGCTTGAGAGTATAATCAACTTTGAAAAACTGACTGAATGGACCAGTTCTAATGTT
ATGGAAGAGAGGAAGATCAAAGTGTACTTACCTCGCATGAAGATGGAGGAAAAATACAAC
CTCACATCTGTCTTAATGGCTATGGGCATTACTGACGTGTTTAGCTCTTCAGCCAATCTG
TCTGGCATCTCCTCAGCAGAGAGCCTGAAGATATCTCAAGCTGTCCATGCAGCACATGCA
GAAATCAATGAAGCAGGCAGAGAGGTGGTAGGGTCAGCAGAGGCTGGAGTGGATGCTGCA
AGCGTCTCTGAAGAATTTAGGGCTGACCATCCATTCCTCTTCTGTATCAAGCACATCGCA
ACCAACGCCGTTCTCTTCTTTGGCAGATGTGTTTCCCCT**TCGAAGCTTGAAGGTAAGCCT**
ATCCCTAACCCTCTCCTCGGTCTCGATTCTACGCGTACCGGTCATCATCACCATCACCAT

Figure 61

SEQ ID NO: 153 - STF2.OVA amino acid sequence

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTANIKG
LTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSIQAEITQRL
NEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVQKAYD
VKDTAVTTKAYANNGTTLDVSGLDDAAIKAATGGTNGTASVTGGAVKFDADNNKYFVTIG
GFTGADAAKNGDYEVNVATDGTVTLAAGATKTTMPAGATTKTEVQELKDTPAVVSADAKN
ALIAGGVDATDANGAELVKMSYTDKNGKTIEGGYALKAGDKYYAADYDEATGAIKAKTTS
YTAADGTTKTAANQLGGVDGKTEVVTIDGKTYNASKAAGHDFKAQPELAEAAAKTTENPL
QKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSRIEDSDYATEVSNMSRA
QILQQAGTSVLAQANQVPQNVLSLLRLEGSIGAASMEFCFDVFKELKVHHANENIFYCPI
AIMSALAMVYLGAKDSTRTQINKVVRFDKLPGFGDSIEAQCGTSVNVHSSLRDILNQITK
PNDVYSFSLASRLYAEERYPILPEYLQCVKELYRGGLEPINFQTAADQARELINSWVESQ
TNGIIRNVLQPSSVDSQTAMVLVNAIVFKGLWEKAFKDEDTQAMPFRVTEQESKPVQMMY
QIGLFRVASMASEKMKILELPFASGTMSMLVLLPDEVSGLEQLESIINFEKLTEWTSSNV
MEERKIKVYLPRMKMEEKYNLTSVLMAMGITDVFSSSANLSGISSAESLKISQAVHAAHA
EINEAGREVVGSAEAGVDAASVSEEFRADHPFLFCIKHIATNAVLFFGRCVSP**SKLEGKP**
IPNPLLGLDSTRTGHHHHHH

Figure 62

SEQ ID NO: 154 - Ovalbumin (OVA) amino acid sequence

GSIGAASMEFCFDVFKELKVHHANENIFYCPIAIMSALAMVYLGAKDSTRTQINKVVRFD
KLPGFGDSIEAQCGTSVNVHSSLRDILNQITKPNDVYSFSLASRLYAEERYPILPEYLQC
VKELYRGGLEPINFQTAADQARELINSWVESQTNGIIRNVLQPSSVDSQTAMVLVNAIVF
KGLWEKAFKDEDTQAMPFRVTEQESKPVQMMYQIGLFRVASMASEKMKILELPFASGTMS
MLVLLPDEVSGLEQLESIINFEKLTEWTSSNVMEERKIKVYLPRMKMEEKYNLTSVLMAM
GITDVFSSSANLSGISSAESLKISQAVHAAHAEINEAGREVVGSAEAGVDAASVSEEFRA
DHPFLFCIKHIATNAVLFFGRCVSP

Figure 63

SEQ ID NO: 155 - Ovalbumin (OVA) nucleic acid sequence

GGGCTCCATCGGCGCAGCAAGCATGGAATTTTGTTTTGATGTATTCAAGGAGCTCAAAGT
CCACCATGCCAATGAGAACATCTTCTACTGCCCCATTGCCATCATGTCAGCTCTAGCCAT
GGTATACCTGGGTGCAAAAGACAGCACCAGGACACAAATAAATAAGGTTGTTCGCTTTGA
TAAACTTCCAGGATTCGGAGACAGTATTGAAGCTCAGTGTGGCACATCTGTAAACGTTCA
CTCTTCACTTAGAGACATCCTCAACCAAATCACCAAACCAAATGATGTTTATTCGTTCAG
CCTTGCCAGTAGACTTTATGCTGAAGAGAGATACCCAATCCTGCCAGAATACTTGCAGTG
TGTGAAGGAACTGTATAGAGGAGGCTTGGAACCTATCAACTTTCAAACAGCTGCAGATCA
AGCCAGAGAGCTCATCAATTCCTGGGTAGAAAGTCAGACAAATGGAATTATCAGAAATGT
CCTTCAGCCAAGCTCCGTGGATTCTCAAACTGCAATGGTTCTGGTTAATGCCATTGTCTT
CAAAGGACTGTGGGAGAAAGCATTTAAGGATGAAGACACACAAGCAATGCCTTTCAGAGT
GACTGAGCAAGAAAGCAAACCTGTGCAGATGATGTACCAGATTGGTTTATTTAGAGTGGC
ATCAATGGCTTCTGAGAAAATGAAGATCCTGGAGCTTCCATTTGCCAGTGGGACAATGAG
CATGTTGGTGCTGTTGCCTGATGAAGTCTCAGGCCTTGAGCAGCTTGAGAGTATAATCAA
CTTTGAAAAACTGACTGAATGGACCAGTTCTAATGTTATGGAAGAGAGGAAGATCAAAGT
GTACTTACCTCGCATGAAGATGGAGGAAAAATACAACCTCACATCTGTCTTAATGGCTAT
GGGCATTACTGACGTGTTTAGCTCTTCAGCCAATCTGTCTGGCATCTCCTCAGCAGAGAG
CCTGAAGATATCTCAAGCTGTCCATGCAGCACATGCAGAAATCAATGAAGCAGGCAGAGA
GGTGGTAGGGTCAGCAGAGGCTGGAGTGGATGCTGCAAGCGTCTCTGAAGAATTTAGGGC
TGACCATCCATTCCTCTTCTGTATCAAGCACATCGCAACCAACGCCGTTCTCTTCTTTGG
CAGATGTGTTTCCCCT

Figure 64

SEQ ID NO: 158 - STF2.E nucleic acid sequence

ATGGCACAAGTAATCAACACTAACAGTCTGTCGCTGCTGACCCAGAATAACCTGAACAAA
TCCCAGTCCGCACTGGGCACCGCTATCGAGCGTCTGTCTTCTGGTCTGCGTATCAACAGC
GCGAAAGACGATGCGGCAGGTCAGGCGATTGCTAACCGTTTCACCGCGAACATCAAAGGT
CTGACTCAGGCTTCCCGTAACGCTAACGACGGTATCTCCATTGCGCAGACCACTGAAGGC
GCGCTGAACGAAATCAACAACAACCTGCAGCGTGTGCGTGAACTGGCGGTTCAGTCTGCT
AACAGCACCAACTCCCAGTCTGACCTCGACTCCATCCAGGCTGAAATCACCCAGCGCCTG
AACGAAATCGACCGTGTATCCGGCCAGACTCAGTTCAACGGCGTGAAAGTCCTGGCGCAG
GACAACACCCTGACCATCCAGGTTGGCGCCAACGACGGTGAAACTATCGATATCGATCTG
AAGCAGATCAACTCTCAGACCCTGGGTCTGGACTCACTGAACGTGCAGAAAGCGTATGAT
GTGAAAGATACAGCAGTAACAACGAAAGCTTATGCCAATAATGGTACTACACTGGATGTA
TCGGGTCTTGATGATGCAGCTATTAAAGCGGCTACGGGTGGTACGAATGGTACGGCTTCT
GTAACCGGTGGTGCGGTTAAATTTGACGCAGATAATAACAAGTACTTTGTTACTATTGGT
GGCTTTACTGGTGCTGATGCCGCCAAAAATGGCGATTATGAAGTTAACGTTGCTACTGAC
GGTACAGTAACCCTTGCGGCTGGCGCAACTAAAACCACAATGCCTGCTGGTGCGACAACT
AAAACAGAAGTACAGGAGTTAAAAGATACACCGGCAGTTGTTTCAGCAGATGCTAAAAAT
GCCTTAATTGCTGGCGGCGTTGACGCTACCGATGCTAATGGCGCTGAGTTGGTCAAAATG
TCTTATACCGATAAAAATGGTAAGACAATTGAAGGCGGTTATGCGCTTAAAGCTGGCGAT
AAGTATTACGCCGCAGATTACGATGAAGCGACAGGAGCAATTAAAGCTAAAACCACAAGT
TATACTGCTGCTGACGGCACTACCAAAACAGCGGCTAACCAACTGGGTGGCGTAGACGGT
AAAACCGAAGTCGTTACTATCGACGGTAAAACCTACAATGCCAGCAAAGCCGCTGGTCAT
GATTTCAAAGCACAACCAGAGCTGGCGGAAGCAGCCGCTAAAACCACCGAAAACCCGCTG
CAGAAAATTGATGCCGCGCTGGCGCAGGTGGATGCGCTGCGCTCTGATCTGGGTGCGGTA
CAAAACCGTTTCAACTCTGCTATCACCAACCTGGGCAATACCGTAAACAATCTGTCTGAA
GCGCGTAGCCGTATCGAAGATTCCGACTACGCGACCGAAGTTTCCAACATGTCTCGCGCG
CAGATTTTGCAGCAGGCCGGTACTTCCGTTCTGGCGCAGGCTAACCAGGTCCCGCAGAAC
GTGCTGTCTCTGTTACGTTTCAACTGCCTTGGAATGAGCAACAGAGACTTCTTGGAAGGA
GTGTCTGGAGCAACATGGGTGGATTTGGTTCTCGAAGGCGACAGCTGCGTGACTATCATG
TCTAAGGACAAGCCTACCATCGATGTGAAGATGATGAATATGGAGGCGGCCAACCTGGCA
GAGGTCCGCAGTTATTGCTATTTGGCTACCGTCAGCGATCTCTCCACCAAAGCTGCGTGC
CCGACCATGGGAGAAGCTCACAATGACAAACGTGCTGACCCAGCTTTTGTGTGCAGACAA
GGAGTGGTGGACAGGGGCTGGGGCAACGGCTGCGGACTATTTGGCAAAGGAAGCATTGAC
ACATGCGCCAAATTTGCCTGCTCTACCAAGGCAATAGGAAGAACCATCTTGAAAGAGAAT
ATCAAGTACGAAGTGGCCATTTTTGTCCATGGACCAACTACTGTGGAGTCGCACGGAAAC
TACTCCACACAGGTTGGAGCCACTCAGGCAGGGAGATTCAGCATCACTCCTGCAGCGCCT
TCATACACACTAAAGCTTGGAGAATATGGAGAGGTGACAGTGGACTGTGAACCACGGTCA
GGGATTGACACCAATGCATACTACGTGATGACTGTTGGAACAAAGACGTTCTTGGTCCAT
CGTGAGTGGTTCATGGACCTCAACCTCCCTTGGAGCAGTGCTGGAAGTACTGTGTGGAGG
AACAGAGAGACGTTAATGGAGTTTGAGGAACCACACGCCACGAAGCAGTCTGTGATAGCA
TTGGGCTCACAAGAGGGAGCTCTGCATCAAGCTTTGGCTGGAGCCATTCCTGTGGAATTT
TCAAGCAACACTGTCAAGTTGACGTCGGGTCATTTGAAGTGTAGAGTGAAGATGGAAAAA
TTGCAGTTGAAGGGAACAACCTATGGCGTCTGTTCAAAGGCTTTCAAGTTTCTTGGGACT
CCCGCAGACACAGGTCACGGCACTGTGGTGTTGGAATTGCAGTACACTGGCACGGATGGA
CCTTGCAAAGTTCCTATCTCGTCAGTGGCTTCATTGAACGACCTAACGCCAGTGGGCAGA
TTGGTCACTGTCAACCCTTTTGTTTCAGTGGCCACGGCCAACGCTAAGGTCCTGATTGAA
TTGGAACCACCCTTTGGAGACTCATACATAGTGGTGGGCAGAGGAGAACAACAGATCAAT
CACCATTGGCACAAGTCTGGAAGCAGCATTGGCAAA

Figure 65

SEQ ID NO: 159 - STF2.E amino acid sequence

MAQVINTNSLSLLTQNNLNKSQSALGTAIERLSSGLRINSAKDDAAGQAIANRFTANIKG
LTQASRNANDGISIAQTTEGALNEINNNLQRVRELAVQSANSTNSQSDLDSIQAEITQRL
NEIDRVSGQTQFNGVKVLAQDNTLTIQVGANDGETIDIDLKQINSQTLGLDSLNVQKAYD
VKDTAVTTKAYANNGTTLDVSGLDDAAIKAATGGTNGTASVTGGAVKFDADNNKYFVTIG
GFTGADAAKNGDYEVNVATDGTVTLAAGATKTTMPAGATTKTEVQELKDTPAVVSADAKN
ALIAGGVDATDANGAELVKMSYTDKNGKTIEGGYALKAGDKYYAADYDEATGAIKAKTTS
YTAADGTTKTAANQLGGVDGKTEVVTIDGKTYNASKAAGHDFKAQPELAEAAAKTTENPL
QKIDAALAQVDALRSDLGAVQNRFNSAITNLGNTVNNLSEARSRIEDSDYATEVSNMSRA
QILQQAGTSVLAQANQVPQNVLSLLRFNCLGMSNRDFLEGVSGATWVDLVLEGDSCVTIM
SKDKPTIDVKMMNMEAANLAEVRSYCYLATVSDLSTKAACPTMGEAHNDKRADPAFVCRQ
GVVDRGWGNGCGLFGKGSIDTCAKFACSTKAIGRTILKENIKYEVAIFVHGPTTVESHGN
YSTQVGATQAGRFSITPAAPSYTLKLGEYGEVTVDCEPRSGIDTNAYYVMTVGTKTFLVH
REWFMDLNLPWSSAGSTVWRNRETLMEFEEPHATKQSVIALGSQEGALHQALAGAIPVEF
SSNTVKLTSGHLKCRVKMEKLQLKGTTYGVCSKAFKFLGTPADTGHGTVVLELQYTGTDG
PCKVPISSVASLNDLTPVGRLVTVNPFVSVATANAKVLIELEPPFGDSYIVVGRGEQQIN
HHWHKSGSSIGK

Figure 66

SEQ ID NO: 57 - E protein nucleic acid sequence

TTCAACTGCCTTGGAATGAGCAACAGAGACTTCTTGGAAGGAGTGTCTGGAGCAACATGG
GTGGATTTGGTTCTCGAAGGCGACAGCTGCGTGACTATCATGTCTAAGGACAAGCCTACC
ATCGATGTGAAGATGATGAATATGGAGGCGGCCAACCTGGCAGAGGTCCGCAGTTATTGC
TATTTGGCTACCGTCAGCGATCTCTCCACCAAAGCTGCGTGCCCGACCATGGGAGAAGCT
CACAATGACAAACGTGCTGACCCAGCTTTTGTGTGCAGACAAGGAGTGGTGGACAGGGGC
TGGGGCAACGGCTGCGGACTATTTGGCAAAGGAAGCATTGACACATGCGCCAAATTTGCC
TGCTCTACCAAGGCAATAGGAAGAACCATCTTGAAAGAGAATATCAAGTACGAAGTGGCC
ATTTTTGTCCATGGACCAACTACTGTGGAGTCGCACGGAAACTACTCCACACAGGTTGGA
GCCACTCAGGCAGGGAGATTCAGCATCACTCCTGCAGCGCCTTCATACACACTAAAGCTT
GGAGAATATGGAGAGGTGACAGTGGACTGTGAACCACGGTCAGGGATTGACACCAATGCA
TACTACGTGATGACTGTTGGAACAAAGACGTTCTTGGTCCATCGTGAGTGGTTCATGGAC
CTCAACCTCCCTTGGAGCAGTGCTGGAAGTACTGTGTGGAGGAACAGAGAGACGTTAATG
GAGTTTGAGGAACCACACGCCACGAAGCAGTCTGTGATAGCATTGGGCTCACAAGAGGGA
GCTCTGCATCAAGCTTTGGCTGGAGCCATTCCTGTGGAATTTTCAAGCAACACTGTCAAG
TTGACGTCGGGTCATTTGAAGTGTAGAGTGAAGATGGAAAAATTGCAGTTGAAGGGAACA
ACCTATGGCGTCTGTTCAAAGGCTTTCAAGTTTCTTGGGACTCCCGCAGACACAGGTCAC
GGCACTGTGGTGTTGGAATTGCAGTACACTGGCACGGATGGACCTTGCAAAGTTCCTATC
TCGTCAGTGGCTTCATTGAACGACCTAACGCCAGTGGGCAGATTGGTCACTGTCAACCCT
TTTGTTTCAGTGGCCACGGCCAACGCTAAGGTCCTGATTGAATTGGAACCACCCTTTGGA
GACTCATACATAGTGGTGGGCAGAGGAGAACAACAGATCAATCACCATTGGCACAAGTCT
GGAAGCAGCATTGGCAAA

Figure 67

SEQ ID NO: 160 - Den-1 amino acid sequence

MRCVGIGNRDFVEGLSGATWVDVVLEHGSCVTTMAKNKPTLDIELLKTEVTNPAVLRKLCIEAKI
SNTTTDSRCPTQGEATLVEEQDANFVCRRTFVDRGWGNGCGLFGKGSLITCAKFKCVTKLEGKIA
QYENLKYSVIVTVHTGDQHQVGNETTEHGTTATITPQAPTSEIQLTDYGTLTLDCSPRTGLDFNE
MVLLTMKKKSWLVHKQWFLDLPLPWTSGALTSQETWNRQDLLVTFKTAHAKKQEVVVLGSQEGAM
HTALTGATEIQTSGTTTIFAGHLKCRLKMDKLTLKGMSYVMCTGSFKLEKEVAETQHGTVLVQVK
YEGTDAPCKIPFSTQDEKGATQNGRLITANPIVTDKEKPVNIEAEPPFGESYIVVGAGEKALKLS
WFKKGSSIGKMFEATARGARRMAILGDTAWDFGSIGGVFTSMGKLVHQVFGTAYGVLFSGVSWTM
KIGIGILLTWLGLNSRNTSLSVMCIAVGMVTLYLGVMVQA

Figure 68

SEQ ID NO: 161 - Den-1 nucleic acid sequence

ATGCGATGCGTGGGAATAGGCAACAGAGACTTCGTGGAAGGACTGTCAGGAGCAACATGGGTGGAT
GTGGTACTGGAGCATGGAAGTTGCGTCACCACCATGGCAAAAAACAAACCAACACTGGACATTGAA
CTCTTGAAGACGGAGGTCACAAACCCTGCAGTTCTGCGTAAATTGTGCATTGAAGCTAAAATATCA
AACACCACCACCGATTCGAGATGTCCAACACAAGGAGAAGCCACACTGGTGGAAGAACAAGACGCG
AACTTTGTGTGCCGACGAACGTTCGTGGACAGAGGCTGGGGCAATGGCTGTGGGCTATTCGGAAAA
GGTAGTCTAATAACGTGTGCCAAGTTTAAGTGTGTGACAAAACTAGAAGGAAAGATAGCTCAATAT
GAAAACCTAAAATATTCAGTGATAGTCACCGTCCACACTGGAGATCAGCACCAGGTGGGAAATGAG
ACTACAGAACATGGAACAACTGCAACCATAACACCTCAAGCTCCTACGTCGGAAATACAGCTGACC
GACTACGGAACCCTTACATTAGATTGTTCACCTAGGACAGGGCTAGATTTTAACGAGATGGTGTTG
CTGACAATGAAAAAGAAATCATGGCTTGTCCACAAACAGTGGTTTCTAGACTTACCACTGCCTTGG
ACCTCTGGGGCTTTAACATCCCAAGAGACTTGGAACAGACAAGATTTACTGGTCACATTTAAGACA
GCTCATGCAAAGAAGCAGGAAGTAGTCGTACTAGGATCACAAGAAGGAGCAATGCACACTGCGCTG
ACTGGAGCGACAGAAATCCAAACGTCAGGAACGACAACAATTTTCGCAGGACACCTAAAATGCAGA
CTAAAAATGGACAAACTAACTTTAAAAGGGATGTCATATGTGATGTGCACAGGCTCATTCAAGTTA
GAGAAAGAAGTGGCTGAGACCCAGCATGGAACTGTTCTGGTGCAGGTTAAATATGAAGGAACAGAC
GCACCATGCAAGATTCCCTTTTCGACCCAAGATGAGAAAGGAGCAACCCAGAATGGGAGATTAATA
ACAGCCAACCCCATAGTCACTGACAAAGAAAAACCAGTCAATATTGAGGCAGAACCACCCTTTGGT
GAGAGCTACATCGTGGTAGGAGCAGGTGAAAAAGCTTTGAAACTAAGCTGGTTCAAGAAAGGAAGC
AGCATAGGGAAAATGTTTGAAGCAACTGCCCGAGGAGCACGAAGGATGGCCATTCTGGGAGACACC
GCATGGGACTTCGGTTCTATAGGAGGAGTGTTCACGTCTATGGGAAAACTGGTACACCAGGTTTTT
GGAACTGCATATGGAGTTTTGTTTAGCGGAGTTTCTTGGACCATGAAAATAGGAATAGGGATTCTG
CTGACATGGCTAGGATTAAATTCAAGGAACACGTCCCTTTCGGTGATGTGCATCGCAGTTGGCATG
GTCACACTGTACCTAGGAGTCATGGTTCAGGCA

Figure 69

SEQ ID NO: 162 - Den-2 amino acid sequence

MRCIGMSNRDFVEGVSGGSWVDIVLEHGSCVTTMAKNKPTLDFELIKTEAKQPATLRKYC
IEAKLTNTTTESRCPTQGEPSLNEEQDKRFVCKHSMVDRGWGNGCGLFGKGGIVTCAMFR
CKKNMEGKVVQPENLEYTIVITPHSGEEHAVGNDTGKHGKEIKITPQSSTTEAELTGYGT
VTMECSPRTGLDFNEMVLLQMENKAWLVHRQWFLDLPLPWLPGADTQGSNWIQKETLVTF
KNPHAKKQDVVVLGSQEGAMHTALTGATEIQMSSGNLLFTGHLKCRLRMDKLQLKGMSYS
MCTGKFKVVKEIAETQHGTIVIRVQYEGDGSPCKIPFEIMDLEKRHVLGRLITVNPIVTE
KDSPVNIEAEPPFGDSYIIIGVEPGQLKLNWFKKGSSIGQMFETTMRGAKRMAILGDTAW
DFGSLGGVFTSIGKALHQVFGAIYGAAFSGVSWTMKILIGVIITWIGMNSRSTSLSVTLV
LVGIVTLYLGVMVQA

Figure 70

SEQ ID NO: 163 - Den-2 nucleic acid sequence

ATGCGTTGCATAGGAATGTCAAATAGAGACTTTGTGGAAGGGGTTTCAGGAGGAAGCTGGGTTGAC
ATAGTCTTAGAACATGGAAGCTGTGTGACGACGATGGCAAAAAACAAACCAACATTGGATTTTGAA
CTGATAAAAACAGAAGCCAAACAGCCTGCCACCCTAAGGAAGTACTGTATAGAGGCAAAGCTAACC
AACACAACAACAGAATCTCGCTGCCCAACACAAGGGGAACCCAGCCTAAATGAAGAGCAGGACAAA
AGGTTCGTCTGCAAACACTCCATGGTAGACAGAGGATGGGGAAATGGATGTGGACTATTTGGAAAG
GGAGGCATTGTGACCTGTGCTATGTTCAGATGCAAAAAGAACATGGAAGGAAAAGTTGTGCAACCA
GAAAACTTGGAATACACCATTGTGATAACACCTCACTCAGGGGAAGAGCATGCAGTCGGAAATGAC
ACAGGAAAACATGGCAAGGAAATCAAAATAACACCACAGAGTTCCACCACAGAAGCAGAATTGACA
GGTTATGGCACTGTCACAATGGAGTGCTCTCCAAGAACGGGCCTCGACTTCAATGAGATGGTGTTG
CTGCAGATGGAAAATAAAGCTTGGCTGGTGCACAGGCAATGGTTCCTAGACCTGCCGTTACCATGG
TTGCCCGGAGCGGACACACAAGGGTCAAATTGGATACAGAAAGAGACATTGGTCACTTTCAAAAAT
CCCCATGCGAAGAAACAGGATGTTGTTGTTTTAGGATCCCAAGAAGGGGCCATGCACACAGCACTT
ACAGGGGCCACAGAAATCCAAATGTCATCAGGAAACTTACTCTTCACAGGACATCTCAAGTGCAGG
CTGAGAATGGACAAGCTACAGCTCAAAGGAATGTCATACTCTATGTGCACAGGAAAGTTTAAAGTT
GTGAAGGAAATAGCAGAAACACAACATGGAACAATAGTTATCAGAGTGCAATATGAAGGGGACGGC
TCTCCATGCAAGATCCCTTTTGAGATAATGGATTTGGAAAAAAGACATGTCTTAGGTCGCCTGATT
ACAGTCAACCCAATTGTGACAGAAAAAGATAGCCCAGTCAACATAGAAGCAGAACCTCCATTCGGA
GACAGCTACATCATCATAGGAGTAGAGCCGGGACAACTGAAGCTCAACTGGTTTAAGAAAGGAAGT
TCTATCGGCCAAATGTTTGAGACAACAATGAGGGGGGCGAAGAGAATGGCCATTTTAGGTGACACA
GCCTGGGATTTTGGATCCTTGGGAGGAGTGTTTACATCTATAGGAAAGGCTCTCCACCAAGTCTTT
GGAGCAATCTATGGAGCTGCCTTCAGTGGGGTTTCATGGACTATGAAAATCCTCATAGGAGTCATT
ATCACATGGATAGGAATGAATTCACGCAGCACCTCACTGTCTGTGACACTAGTATTGGTGGGAATT
GTGACACTGTATTTGGGAGTCATGGTGCAGGCC

Figure 71

SEQ ID NO: 164 - Den-3 amino acid sequence

MRCVGVGNRDFVEGLSGATWVDVVLEHGGCVTTMAKNKPTLDIELQKTEATQLATLRKLCIEGKIT
NITTDSRCPTQGEAILPEEQDQNYVCKHTYVDRGWGNGCGLFGKGSLVTCAKFQCLEPIEGKVVQH
ENLKYTVIITVHTGDQHQVGNDTQGVTVEITPQASTVEAILPEYGTLGLECSPRTGLDFNEMILLT
MKNKAWMVHRQWFFDLPLPWTSGATTETPTWNRKELLVTFKNAHAKKQEVVVLGSQEGAMHTALTG
ATEIQNSGGTSIFAGHLKCRLKMDKLELKGMSYAMCLNTFVLKKEVSETQHGTILIKVEYKGEDAP
CKIPFSTEDGQGKAHNGRLITANPVVTKKEEPVNIEAEPPFGESNIVIGIGDKALKINWYKKGSSI
GKMFEATARGARRMAILGDTAWDFGSVGGVLNSLGKMVHQIFGSAYTALFSGVSWIMKIGIGVLLT
WIGLNSKNTSMSFSCIAIGIITLYLGAVVQA

Figure 72

SEQ ID NO: 165 - Den-3 nucleic acid sequence

ATGAGATGCGTGGGAGTAGGAAACAGAGATTTTGTGGAAGGTCTGTCGGGAGCTACGTGGGTTGAT
GTGGTGCTCGAGCACGGAGGGTGTGTGACCACCATGGCTAAGAACAAGCCTACGCTGGACATAGAG
CTCCAGAAGACCGAGGCCACCCAACTGGCGACCCTAAGAAAGTTATGCATTGAGGGAAAAATTACC
AACATAACAACTGACTCAAGGTGTCCTACCCAGGGGGAAGCGATTTTACCTGAGGAGCAGGACCAG
AACTACGTATGTAAGCACACATACGTGGATAGAGGTTGGGGAAACGGTTGTGGTTTGTTTGGAAAA
GGAAGCTTGGTGACATGCGCGAAATTTCAATGTCTAGAACCAATAGAGGGAAAAGTGGTGCAACAT
GAGAACCTCAAATACACTGTCATCATCACAGTGCACACAGGAGACCAACACCAGGTGGGAAATGAC
ACGCAGGGAGTCACGGTTGAGATAACACCCCAGGCATCAACCGTTGAAGCTATCTTGCCTGAATAT
GGAACCCTTGGGCTAGAATGTTCACCACGGACAGGTTTGGATTTCAACGAAATGATTTTATTGACA
ATGAAGAACAAAGCATGGATGGTACATAGGCAATGGTTCTTTGACCTACCCCTACCATGGACATCA
GGAGCTACAACAGAGACACCAACTTGGAACAGGAAAGAGCTCCTTGTGACATTCAAGAATGCACAT
GCAAAAAAGCAAGAAGTAGTTGTCCTTGGATCGCAAGAGGGAGCAATGCACACAGCGCTGACAGGA
GCTACAGAGATTCAAAACTCAGGAGGTACAAGCATTTTTGCGGGGCACTTGAAATGTAGACTTAAG
ATGGACAAATTGGAACTCAAGGGGATGAGCTATGCAATGTGCTTGAATACCTTTGTGTTGAAGAAA
GAAGTCTCTGAAACGCAGCATGGGACAATACTCATCAAGGTTGAGTACAAAGGGGAAGATGCACCT
TGCAAGATTCCTTTCTCCACAGAGGATGGACAAGGGAAAGCTCACAATGGTAGACTGATCACAGCC
AACCCAGTGGTGACCAAGAAGGAGGAGCCTGTCAACATTGAGGCTGAACCTCCTTTTGGGGAAAGT
AACATAGTGATTGGGATTGGAGACAAAGCCTTGAAAATTAACTGGTACAAGAAGGGAAGCTCGATT
GGAAAGATGTTCGAGGCTACTGCCAGAGGTGCAAGGCGCATGGCCATCTTGGGAGACACAGCCTGG
GATTTTGGTTCAGTGGGTGGTGTTCTGAATTCATTAGGGAAAATGGTACACCAAATATTCGGAAGT
GCTTACACAGCCCTGTTTAGTGGAGTCTCATGGATAATGAAAATTGGAATAGGTGTCCTCTTAACC
TGGATAGGGTTGAATTCAAAAAACACTTCCATGTCATTTTCATGCATTGCGATAGGAATTATTACA
CTCTATCTGGGAGCCGTGGTACAAGCT

Figure 73

SEQ ID NO: 166 - Den-4 amino acid sequence

MRCVGVGNRDFVEGVSGGAWVDLVLEHGGCVTTMAQGKPTLDFELTKTTAKEVALLRTYCIEASIS
NITTATRCPTQGEPYLKEEQDQQYICRRDVVDRGWGNGCGLFGKGGVVTCAKFSCSGKITGNLVRI
ENLEYTVVVTVHNGDTHAVGNDTSNHGVTAMITPRSPSVEVKLPDYGELTLDCEPRSGIDFNEMIL
MKMKKKTWLVHKQWFLDLPLPWTAGADTSEVHWNYKERMVTFKVPHAKRQDVTVLGSQEGAMHSAL
AGATEVDSGDGNHMFAGHLKCEVRMEKLRIKGMSYTMCSGKFSIDKEMAETQHGTTVVKVKYEGAG
APCKVPIEIRDVNKEKVVGRIISSTPLAENTNSVTNIELEPPFGDSYIVIGVGNSALTLHWFRKGS
SIGKMFESTYRGAKRMAILGETAWDFGSVGGLFTSLGKAVHQVFGSVYTTMFGGVSWMIRILIGF
LVLWIGTNSRNTSMAMTCIAVGGITLFLGF

Figure 74

SEQ ID NO: 167 - Den-4 nucleic acid sequence

ATGCGATGCGTAGGAGTAGGAAACAGAGACTTTGTGGAAGGAGTCTCAGGTGGAGCATGGGTCGACC
TGGTGCTAGAACATGGAGGATGCGTCACAACCATGGCCCAGGGAAAACCAACCTTGGATTTTGAACT
GACCAAGACAACAGCCAAGGAAGTGGCTCTGTTAAGAACCTATTGCATTGAAGCCTCAATATCAAAC
ATAACTACGGCAACAAGATGTCCAACGCAAGGAGAGCCTTATCTGAAAGAGGAACAGGACCAACAGT
ACATTTGCCGGAGAGATGTGGTAGACAGAGGGTGGGGCAATGGCTGTGGCTTGTTTGGAAAAGGAGG
AGTTGTGACATGTGCGAAGTTTTCATGTTCGGGGAAGATAACAGGCAATTTGGTCCGAATTGAGAAC
CTTGAATACACAGTGGTGGTAACAGTCCACAATGGAGACACCCATGCAGTAGGAAATGACACATCCA
ATCATGGAGTTACAGCCATGATAACCCCCAGGTCACCATCGGTGGAAGTCAAATTGCCGGACTATGG
AGAACTAACACTCGATTGTGAACCCAGGTCTGGAATTGACTTTAATGAGATGATTCTGATGAAAATG
AAAAAGAAAACATGGCTCGTGCATAAGCAATGGTTTTTGGATCTGCCTCTTCCATGGACAGCAGGAG
CAGACACATCAGAGGTTCACTGGAATTACAAAGAGAGAATGGTGACATTTAAGGTTCCTCATGCCAA
GAGACAGGATGTGACAGTGCTGGGATCTCAGGAAGGAGCCATGCATTCTGCCCTCGCTGGAGCCACA
GAAGTGGACTCCGGTGATGGAAATCACATGTTTGCAGGACATCTCAAGTGCGAAGTCCGTATGGAGA
AATTGAGAATCAAGGGAATGTCATACACGATGTGTTCAGGAAAGTTTTCAATTGACAAAGAGATGGC
AGAAACACAGCATGGGACAACAGTGGTGAAAGTCAAGTATGAAGGTGCTGGAGCTCCGTGTAAAGTC
CCCATAGAGATAAGAGATGTAAACAAGGAAAAAGTGGTTGGGCGTATCATCTCATCCACCCCTTTGG
CTGAGAATACCAACAGTGTAACCAACATAGAATTAGAACCCCCCTTTGGGGACAGCTACATAGTGAT
AGGTGTTGGAAACAGCGCATTAACACTCCATTGGTTCAGGAAAGGGAGTTCCATTGGCAAGATGTTT
GAGTCCACATACAGAGGTGCAAAACGAATGGCCATTCTAGGTGAAACAGCTTGGGATTTTGGTTCCG
TTGGTGGATTGTTCACATCATTGGGAAAGGCTGTGCACCAGGTTTTTGGAAGTGTGTATACAACCAT
GTTTGGAGGAGTCTCATGGATGATTAGAATCCTAATTGGGTTCTTAGTGTTGTGGATTGGCACGAAC
TCAAGGAACACTTCAATGGCTATGACGTGCATAGCTGTTGGAGGAATCACTCTGTTTCTGGGCTTC

Figure 75

SEQ ID NO: 170 - JE nucleic acid sequence

TTTAATTGTCTGGGAATGGGCAATCGTGACTTCATAGAAGGAGCCAGTGGAGCCGCTTGGGTGACTTGGTGCTA
GAAGGAGACAGCTGCTTGACAATCATGGCAAACGACAAACCAACATTGGACGTCCGCATGATTAACATCGAAGC
TAGCCAACTTGCTGAGGTCAGAAGTTACTGCTATCATGCTTCAGTCACTGACATCTCGACGGTGGCTCGGTGCC
CCACGACTGGAGAAGCCCACAACGAGAAGCGAGCTGATAGTAGCTATGTGTGCAAACAAGGCTTCACTGACCGT
GGGTGGGGCAACGGATGTGGATTTTTCGGGAAGGGAAGCATTGACACATGTGCAAAATTCTCCTGCACCAGTAA
AGCGATTGGGAGAACAATCCAGCCAGAAAACATCAAATACAAAGTTGGCATTTTTGTGCATGGAACCACCACTT
CGGAAAACCATGGGAATTATTCAGCGCAAGTTGGGGCGTCCCAGGCGGCAAAGTTTACAGTAACACCCAATGCT
CCTTCGGTAGCCCTCAAACTTGGTGACTACGGAGAAGTCACACTGGACTGTGAGCCAAGGAGTGGACTGAACAC
TGAAGCGTTTTACGTCATGACCGTGGGGTCAAAGTCATTTCTGGTCCATAGGGAGTGGTTTCATGACCTCGCTC
TCCCCTGGACGTCCCCTTCGAGCACAGCGTGGAGAAACAGAGAACTCCTCATGGAATTTGAAGGGGCGCACGCC
ACAAAACAGTCCGTTGTTGCTCTTGGGTCACAGGAAGGAGGCCTCCATCATGCGTTGGCAGGAGCCATCGTGGT
GGAGTACTCAAGCTCAGTGATGTTAACATCAGGCCACCTGAAATGTAGGCTGAAAATGGACAAACTGGCTCTGA
AAGGCACAACCTATGGCATGTGTACAGAAAAATTCTCGTTCGCGAAAAATCCGGTGGACACTGGTCACGGAACA
GTTGTCATTGAACTCTCCTACTCTGGGAGTGATGGCCCCTGCAAAATTCCGATTGTTTCCGTTGCGAGCCTCAA
TGACATGACCCCCGTTGGGCGGCTGGTGACAGTGAACCCCTTCGTCGCGACTTCCAGTGCCAACTCAAAGGTGC
TGGTCGAGATGGAACCCCCCTTCGGAGACTCCTACATCGTAGTTGGAAGGGGAGACAAGCAGATCAACCACCAT
TGGCACAAAGCTGGAAGCACGCTGGGCAAGGCC

Figure 76

SEQ ID NO: 171 - JE amino acid sequence

FNCLGMGNRDFIEGASGAAWVDLVLEGDSCLTIMANDKPTLDVRMINIEASQLAEVRSYCYHASVTDISTV
ARCPTTGEAHNEKRADSSYVCKQGFTDRGWGNGCGFFGKGSIDTCAKFSCTSKAIGRTIQPENIKYKVGIF
VHGTTTSENHGNYSAQVGASQAAKFTVTPNAPSVALKLGDYGEVTLDCEPRSGLNTEAFYVMTVGSKSFLV
HREWFHDLALPWTSPSSTAWRNRELLMEFEGAHATKQSVVALGSQEGGLHHALAGAIVVEYSSSVMLTSGH
LKCRLKMDKLALKGTTYGMCTEKFSFAKNPVDTGHGTVVIELSYSGSDGPCKIPIVSVASLNDMTPVGRLV
TVNPFVATSSANSKVLVEMEPPFGDSYIVVGRGDKQINHHWHKAGSTLGKA

Figure 77

SEQ ID NO: 175 - Tick-borne encephalitis envelope protein nucleic acid sequence

TCGCGGTGCACACATTTGGAGAACAGGGACTTTGTCACTGGTACTCAGGGAACCAC
GAGAGTGACTCTGGTGTTGGAGCTGGGGGGATGTGTCACGATCACTGCTGAGGGGA
AGCCCTCAATGGATGTGTGGCTCGATTCCATCTATCAGGAGAACCCTGCCAAGACA
CGCGAGTACTGTCTGCATGCCAAGCTGTCGGACACCAAAGTTGCGGCCAGATGCCC
AACAATGGGGCCTGCCACTCTGACTGAGGAGCATCAGAGTGGTACGGTGTGCAAGA
GAGACCAGAGTGACCGAGGCTGGGGCAATCACTGCGGATTGTTTGGAAAGGGCAGT
ATTGTGACCTGTGTCAAGGTGGCTTGTGAGGCAAAGAAGAAGGCCATTGGACATGT
GTATGATGCCAACAAGATCGTGTACACCGTTAAGGTTGAGCCACACACGGGGGACT
ATGTTGCCGCCAATGAAACCCACAGTGGGAGGAAGACGGCATCCTTCACGGTCTCC
TCAGAAAAGACCATCTTGACTATGGGGGACTATGGAGATGTGCCCTTGTTGTGCAG
AGTCGCCAGTGGCGTTGACTTGGCTCAGACTGTCATTCTTGAGCTTGACAAGACTC
TGGAACACCTTCCAACAGCCTGGCAGGTCCATCGTGACTGGTTCAATGATCTGGCT
CTACCGTGGAAACACGAAGGAGCGCAACAATGGAACAATGCTGAGCGACTGGTTGA
ATTTGGAGCTCCGCATGCCGTTAAAATGGACGTGTATAACCTTGGAGATCAAACTG
GGGTGTTGTTGAAGTCACTTGCTGGGGTTCCTGTGGCGCACATTGATGGAACAAAG
TACCACCTAAAAAGCGGCCATGTAACATGCGAGGTTGGACTAGAAAAGCTCAAAAT
GAAGGGTCTCACATACACAATGTGTGACAAAACGAAGTTCGCATGGAAGCGGACTC
CAACAGACAGCGGACATGACACAGTGGTCATGGAGGTCACGTTCTCTGGAACAAAA
CCTTGCAGGATCCCAGTGCGGGCAGTGGCACACGGCTCTCCAGATGTAAATGTGGC
CATGCTGATAACACCAAACCCCACCATTGAGAACAATGGAGGTGGCTTCATAGAGA
TGCAGCTACCCCCAGGGGATAACATCATCTATGTTGGGGAACTAAGCCATCAGTGG
TTCCAGAAGGGGAGCAGCATCGGAAGGGTGTTTCAAAAGACCAGGAAGGGCATCGA
GAGACTGACAGTGATAGGAGAACACGCCTGGGACTTCGGTTCCACTGGAGGTTTCT
TGACTTCGGTAGGCAAAGCGCTGCACACAGTCCTCGGCGGAGCCTTCAACAGCATC
TTTGGGGGAGTGGGGTTTCTGCCCAAGCTCCTGTTGGGTGTGGCCTTAGCCTGGTT
GGGCCTGAACATGAGGAACCCCACCATGTCCATGAGTTTCCTCTTGGCTGGGGGAC
TGGTCCTGGCTATGACACTTGGAGTGGGTGCT

Figure 78

SEQ ID NO: 178 Nucleic acid sequence of EIII+

ATGGAAAAATTGCAGTTGAAGGGAACAACCTATGGCGTCTGTTCAAA
GGCTTTCAAGTTTCTTGGGACTCCCGCAGACACAGGTCACGGCACTG
TGGTGTTGGAATTGCAGTACACTGGCACGGATGGACCTTGCAAAGTT
CCTATCTCGTCAGTGGCTTCATTGAACGACCTAACGCCAGTGGGCAG
ATTGGTCACTGTCAACCCTTTTGTTTCAGTGGCCACGGCCAACGCTAA
GGTCCTGATTGAATTGGAACCACCCTTTGGAGACTCATACATAGTGG
TGGGCAGAGGAGAACAACAGATCAATCACCATTGGCACAAGTCTGG
AAGCAGCATTGGCAAA

Figure 79

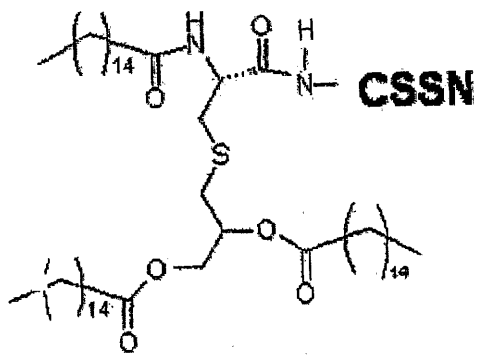


Figure 80