SUPPLEMENTARY DATA

Table I. Optimization results of *rE* gene codon

Before Optimization

Codon Adaptation Index: 0.95

Original Codon:

AAGGGTATGAGCTATGTTATGTGTACCGGTAGCTTTAAACTGGAAAAAGAAGTTGCCGAAACCCAGCATGGTAC
CGTTCTGGTGCAGGTTAAATATGAAGGTACCGATGCCCCGTGTAAAATTCCGTTTAGTACCCAGGATGAAAAAG
GTGTGACCCAGAATGGTCGTCTGATTACCGCAAATCCGATTGTGACCGATAAAGAAAAACCGGTTAATATTGAA
GCAGAACCGCCGTTTGGCGAAAGCTATATTGTGGTTGGCGCCGGTGAAAAAGCCCTGAAACTGAGCTGGTTTAA
AAAAGGTAGCAGCGAAGCAGCAGCCAAAGAAGCAGCAGCGAAAGAAGCAGCCGCAAAAGAAGCCGCAGCCAAAA
AAGGTATGAGTTATAGTATGTGCACCGGTAAATTTAAAGTTGTTAAAGAAATCGCGGAGACCCAGCATGGCACC
ATTGTTATTCGTGTGCAGTATGAAGGCGATGGTAGCCCGTGCAAAATTCCGTTCGAAATTATGGATCTGGAAAA
ACGCCATGTGCTGGGCCGCCTGATTACCGTGAATCCGATTGTTACCGAAAAAGATAGTCCGGTTAATATCGAAG
CAGAACCTCCGTTTGGTGATAGCTATATTATTATTGGCGTTGAACCGGGCCAGCTGAAACTGAATTGGTTTAAA
AAGGGTAGTAGCGAAGCCGCCGCCAAAGAAGCGGCAGCAAAAGAAGCAGCGGCAAAAGAAGCTGCAGCAAAAAA
AGGCATGAGCTATGCAATGTGTACCAATACCTTTGTTCTGAAAAAAGAAGTTAGCGAAACCCAGCACGGTACCA
TTCTGATTAAAGTTGAATATAAGGGCGAAGATGCCCCGTGCAAAATCCCGTTTAGCACCGAAGATGGTCAGGGT
AAAGCACATAATGGCCGCCTGATCACCGCAAATCCTGTGGTTACCAAAAAAGAAGAACCGGTTAATATAGAAGC
CGAACCGCCGTTCGGCGAAAGTAATATTGTTATTGGCATTGGTGATAACGCCCTGAAAATTAATTGGTATAAAA
AGGGTAGCAGCGAGGCCGCCGCAAAAGAGGCCGCAGCAAAAGAGGCAGCCGCCAAAGAGGCAGCGGCAAAGAAA
GGCATGAGTTATACCATGTGTAGTGGTAAATTTAGCATTGATAAGGAAATGGCCGAAACCCAACATGGCACCAC
CGTGGTTAAAGTGAAATATGAAGGCGCCGGCGCACCGTGCAAAGTTCCGATTGAAATTCGCGATGTTAATAAAG
AAAAGGTGGTGGGCCGTATTATTAGCAGCACCCCGTTTGCAGAAAATACCAATAGCGTTACCAATATTGAACTG
GAACCGCCGTTTGGTGACAGTTATATTGTGATTGGTGTGGGTGATAGCGCACTGACCCTGCATTGGTTTCGTAA
AGGTAGTAGTTAA

Original Protein:

KGMSYVMCTGSFKLEKEVAETQHGTVLVQVKYEGTDAPCKIPFSTQDEKGVTQNGRLITANPIVTDKEKPVNIE
AEPPFGESYIVVGAGEKALKLSWFKKGSSEAAAKEAAAKEAAAKEAAAKKGMSYSMCTGKFKVVKEIAETQHGT
IVIRVQYEGDGSPCKIPFEIMDLEKRHVLGRLITVNPIVTEKDSPVNIEAEPPFGDSYIIIGVEPGQLKLNWFK
KGSSEAAAKEAAAKEAAAKEAAAKKGMSYAMCTNTFVLKKEVSETQHGTILIKVEYKGEDAPCKIPFSTEDGQG
KAHNGRLITANPVVTKKEEPVNIEAEPPFGESNIVIGIGDNALKINWYKKGSSEAAAKEAAAKEAAAKEAAAKK
GMSYTMCSGKFSIDKEMAETQHGTTVVKVKYEGAGAPCKVPIEIRDVNKEKVVGRIISSTPFAENTNSVTNIEL
EPPFGDSYIVIGVGDSALTLHWFRKGSS

After Optimization

Codon Adaptation Index: 0.95

Optimized Codon:

AAGGGCATGAGTTATGTTATGTGCACCGGCAGCTTTAAACTGGAAAAAGAAGTGGCAGAAACCCAGCATGGCAC
CGTTCTGGTTCAGGTTAAATATGAAGGTACCGATGCCCCGTGCAAAATTCCGTTTAGTACCCAGGATGAAAAAG
GCGTTACCCAGAATGGCCGTCTGATTACCGCCAATCCGATTGTTACCGATAAAGAAAAACCGGTGAATATTGAA
GCAGAACCGCCGTTTGGTGAAAGTTATATTGTGGTTGGCGCAGGCGAAAAAGCCCTGAAACTGAGTTGGTTTAA
AAAAGGTAGTAGCGAAGCCGCAGCAAAAGAAGCCGCAGCCAAAGAAGCCGCGGCCAAAGAAGCAGCCGCCAAAA
AAGGTATGAGCTATAGCATGTGCACCGGTAAATTTAAAGTTGTTAAAGAAATCGCGGAGACCCAGCATGGTACC
ATTGTGATTCGCGTTCAGTATGAAGGTGATGGTAGTCCGTGCAAAATCCCGTTTGAAATTATGGATCTGGAAAA
ACGTCATGTGCTGGGCCGCCTGATTACCGTTAATCCGATTGTGACCGAAAAAGATAGCCCGGTTAATATTGAAG
CGGAACCGCCGTTCGGTGATAGCTATATTATTATTGGTGTGGAACCGGGCCAGCTGAAACTGAATTGGTTTAAA
AAGGGTAGCAGTGAAGCCGCCGCAAAAGAAGCGGCCGCAAAAGAGGCCGCCGCCAAAGAAGCTGCCGCAAAAAA
AGGTATGAGTTATGCCATGTGCACCAATACCTTTGTGCTGAAAAAAGAAGTTAGCGAAACCCAGCACGGTACCA
TTCTGATTAAAGTTGAATATAAGGGCGAAGATGCCCCGTGTAAAATTCCGTTCAGCACCGAAGATGGCCAGGGT
AAAGCACATAATGGTCGTCTGATTACAGCAAATCCGGTTGTGACCAAAAAAGAAGAACCGGTTAATATCGAAGC
AGAACCTCCGTTTGGCGAAAGTAATATTGTGATTGGCATTGGCGATAATGCCCTGAAAATTAATTGGTATAAGA
AGGGTAGTAGCGAGGCAGCAGCAAAAGAGGCGGCAGCAAAAGAAGCAGCAGCCAAAGAGGCCGCGGCCAAGAAA
GGCATGAGTTACACCATGTGCAGTGGTAAATTTAGCATTGATAAAGAAATGGCAGAGACCCAGCACGGCACCAC
CGTGGTGAAAGTGAAATATGAAGGCGCAGGTGCCCCGTGTAAGGTTCCGATTGAAATTCGTGATGTGAATAAAG
AAAAGGTTGTGGGCCGTATTATTAGTAGCACCCCGTTTGCCGAAAATACCAATAGCGTTACCAATATTGAACTG
GAACCGCCGTTTGGCGATAGCTATATCGTTATTGGCGTTGGCGATAGTGCCCTGACCCTGCATTGGTTTCGTAA
AGGTAGTAGTTAA

Optimized Protein:

KGMSYVMCTGSFKLEKEVAETQHGTVLVQVKYEGTDAPCKIPFSTQDEKGVTQNGRLITANPIVTDKEKPVNIE
AEPPFGESYIVVGAGEKALKLSWFKKGSSEAAAKEAAAKEAAAKEAAAKKGMSYSMCTGKFKVVKEIAETQHGT
IVIRVQYEGDGSPCKIPFEIMDLEKRHVLGRLITVNPIVTEKDSPVNIEAEPPFGDSYIIIGVEPGQLKLNWFK
KGSSEAAAKEAAAKEAAAKEAAAKKGMSYAMCTNTFVLKKEVSETQHGTILIKVEYKGEDAPCKIPFSTEDGQG
KAHNGRLITANPVVTKKEEPVNIEAEPPFGESNIVIGIGDNALKINWYKKGSSEAAAKEAAAKEAAAKEAAAKK
GMSYTMCSGKFSIDKEMAETQHGTTVVKVKYEGAGAPCKVPIEIRDVNKEKVVGRIISSTPFAENTNSVTNIEL
EPPFGDSYIVIGVGDSALTLHWFRKGSS

Table II. rE DENV protein C-score value displayed by I-TASSER

Model	C-score
Model 1	−2.64
Model 2	−2.81
Model 3	−3.03

Table III. Characteristic parameters of the DENV rE protein using ProtParam

Parameters	Results
Amino Acids	472
Molecular Weight (kDa)	50.67
Half-life Estimation Index	Mammalian cell reticulocytes (*in vitro*): 1.3 hours Yeast (*in vivo*): 3 minutes *E. coli* (*in vivo*): 3 minutes
Isoelectric Point (pI)	7.17
Instability Index	32.14
Aliphatic Index	75.08

Table IV. B-cell epitope prediction using SVMTriP

Amino Acid Position	Epitope Prediction	Prediction Score
325–336	FGESNIVIGIGD	1.000

Table V. Forward and reverse primers used in the colony PCR assay

Forward Primer	TM (°C)	GC Content	Size (bp)
5′CGAAAAAGCCCTGAAACTGA3′	60.4	45%	20
Reverse Primer	**TM (°C)**	**GC Content**	**Size (bp)**
5′ACTGAACGCGAATCACAATG3′	59.7	45%	20