CLAIMS

WHAT IS CLAIMED IS:

1. An isolated polynucleotide sequence comprising at least one mRNA translational enhancer element (TEE), wherein the TEE consists of $R_1N_1S_1GAGM_1GR_2M_2R_2R_3R_4$ (SEQ ID NO:3) or $R_5M_3S_2CS_3GCN_2GM_4WR_6$ (SEQ ID NO:4), or a substantially identical sequence thereof, wherein:

R_1 is absent, or A or G if present; N_1 is absent, or A, C or G if present, preferably A, C or G; S_1 is absent, or C or G if present, preferably C or G; M_1 is A or C; R_2 is absent, or A or G if present, preferably A or G, and R_1 and R_2 can be the same or different; M_2 is absent, or A or C if present, preferably A or C; R_3 is absent, or A or G if present, preferably absent; R_4 is absent, or C if present, preferably absent; and

R_5 is absent, or A if present, preferably absent; M_3 is absent, or C or A if present, preferably C or A; S_2 is absent, or C or G if present, preferably C or G; S_3 is G or C; N_2 is G, C or T; M_4 is A or C; W is absent, or A or T if present and R_6 is absent, or A if present.

2. The isolated polynucleotide sequence of claim 1, wherein the TEE consists of $R_1N_1S_1GAGM_1GR_2M_2R_2R_3R_4$, wherein R_1, R_3 and R_4 are absent; N_1 is A, C or G; S_1 is C or G; M_1 is A or C; R_2 is A or G and M_2 is A or C.

3. The isolated polynucleotide sequence of claim 1, wherein the TEE consists of $R_5M_3S_2CS_3GCN_2GM_4WR_6$, wherein R_5 and R_6 are absent; M_3 is absent, or A or C if present; S_2 is C or G; S_3 is C or G and S_2 and S_3 can be the same or different; N_2 is G, C or T; M_2 is A or C; W is absent, or A if present.

4. The isolated polynucleotide sequence of claim 1, 2 or 3, wherein the TEE consists of a sequence that is at least 90% identical to a sequence selected from the group consisting of SEQ ID NOs: 5-35.

~~5. The isolated polynucleotide sequence of claim 1, 2 or 3, wherein the TEE consists of a~~ sequence that is identical to a sequence selected from the group consisting of SEQ ID NOs: 5-35.

6. The polynucleotide sequence of claim 1, 2 or 3 which comprises at least 2 copies of the TEE.

7. The polynucleotide sequence of claim 1, 2 or 3 which comprises at least 5 copies of the TEE.

8. The polynucleotide sequence of claim 1, 2 or 3 which comprises at least 10 copies of the TEE.

9. A vector for recombinantly expressing a polypeptide in a eukaryotic cell, comprising a eukaryotic promoter operably linked to a polynucleotide sequence comprising at least one mRNA translational enhancer element (TEE), wherein the TEE is selected from the TEEs of claims 1, 2 or 3.

10. The vector of claim 9, wherein the mRNA translational enhancer element consists of a sequence that is substantially identical to a sequence selected from the group consisting of SEQ ID NOs: 5-35.

11. The vector of claim 9, wherein the mRNA translational enhancer element consists of a sequence that is identical to a sequence selected from the group consisting of SEQ ID NOs: 5-35.

12. The vector of claim 9, wherein the mRNA translational enhancer element is located 3' to the promoter and adapted for directional ligation of a second polynucleotide sequence encoding a polypeptide of interest.

13. The vector of claim 9, further comprising a second polynucleotide sequence encoding a polypeptide of interest which is operably linked to the mRNA translational enhancer element.

14. The vector of claim 13, wherein the mRNA translational enhancer element is located in the 5' leader sequence of the second polynucleotide sequence.

~~15. A DNA vaccine comprising the vector of claim 9.~~

16. A eukaryotic host cell transfected with the vector of claim 9.

17. The host cell of claim 16, wherein the host cell is a CHO cell.

18. A method for recombinantly producing a polypeptide comprising:

(i) constructing an expression vector which comprises a eukaryotic promoter and a mRNA translational enhancer element that are each operably linked to a polynucleotide encoding the polypeptide, wherein the TEE is selected from the TEEs of any one of claims 1, 2 or 3;

(ii) transfecting the expression vector into a eukaryotic host cell; and

(iii) culturing the host cell transfected with the expression vector; thereby producing the polypeptide.

19. The method of claim 18, wherein the mRNA translational enhancer element consists of a sequence that is substantially identical to a sequence selected from the group consisting of SEQ ID NOs: 5-35.

20. The method of claim 18, wherein the mRNA translational enhancer element consists of a sequence that is identical to a sequence selected from the group consisting of SEQ ID NOs: 5-35.

21. The method of claim 18, further comprising purifying the recombinant polypeptide.

22. The method of claim 18, wherein the host cell is CHO cell.

23. The method of claim 18, wherein the polypeptide is a therapeutic protein.

CLAIMS

1. A cloning or expression vector comprising the following elements: (1) a transcriptional promoter, (2) a polynucleotide sequence having a eukaryotic translation initiation codon and encoding a polypeptide operably linked to the transcriptional promoter, (3) a 5' untranslated sequence located between the transcriptional promoter and the eukaryotic translation initiation codon, and (4) a translational enhancer polynucleotide located within the 5' untranslated sequence,

wherein the translational enhancer polynucleotide consists of at least two translational enhancer elements (TEEs) adjacent to each other or separated by one or more spacer sequences of 1 to 100 nucleotides in length, said at least two TEEs consisting of the sequence $R_5M_3S_2CS_3GCN_2GM_4WR_6$ (SEQ ID NO. 4) wherein:

R_5 is absent, or A if present;

M_3 is absent, or C or A if present;

S_2 is G;

S_3 is G or C, and S_2 and S_3 can be the same or different;

N_2 is G, C or T;

M_4 is A or C;

W is absent, or A or T if present; and

R_6 is absent, or A if present,

wherein the said at least two TEEs are located within 1-50 nucleotides 5' of the eukaryotic translation initiation codon, and

wherein the cloning or expression vector exhibits increased cap-dependent translation compared to the same vector lacking the translational enhancer polynucleotide.

2. The cloning or expression vector of claim 1, wherein said at least two TEEs consists of at least two sequences selected from one or more of the following sequences:

5′-CGCGGCTGA-3′ (SEQ ID NO: 31) or a full-length sequence that is at least 90% identical thereto;

5'AGCCGCCGCA-3' (SEQ ID NO:34) or a full-length sequence that is at least 90% identical thereto; or

5'-ACGCCGCCGA-3' (SEQ ID NO:35) or a full-length sequence that is at least 90% identical thereto.

3. The cloning or expression vector of claim 1, wherein said at least two TEEs consists of at least two full-length nucleotide sequences that are at least 95% identical to one or more of SEQ ID NO: 31, SEQ ID NO:34 or SEQ ID NO:35.

4. The cloning or expression vector of claim 1, wherein said at least two TEEs consists of at least two full-length sequences that are identical to SEQ ID NO: 31, SEQ ID NO:34 or SEQ ID NO:35.

5. The cloning or expression vector of claim 1, wherein said translational enhancer polynucleotide consists of at least five copies of the same translational enhancer element (TEE).

6. The cloning or expression vector of claim 1, wherein said translational enhancer polynucleotide consists of at least ten copies of the same translational enhancer element (TEE).

7. The cloning or expression vector of any one of claims 1-4, wherein the said at least two TEEs are identical to each other.

8. A DNA vaccine comprising the cloning or expression vector of any one of claims 1-7.

9. A eukaryotic host cell transfected with the cloning or expression vector of any one of claims 1-7, optionally wherein the host cell is a Chinese Hamster Ovary (CHO) cell.

10. A method for recombinantly producing a polypeptide comprising:
(i) constructing the cloning or expression vector of any one of claims 1-7;
(ii) transfecting said vector into a eukaryotic host cell; and
(iii) culturing the host cell transfected with said vector; thereby producing the polypeptide.

11. The method of claim 10,
(i) further comprising purifying the recombinant polypeptide, or
(ii) wherein the host cell is CHO cell, or
(iii) wherein the polypeptide is a therapeutic protein.