Claims

1. An artificial nucleic acid molecule comprising

   a. at least one open reading frame (ORF); and

   b. at least one 3'-untranslated region element (3'UTR element) comprising a nucleic acid sequence which is derived from the 3'UTR of an albumin gene or from a variant of the 3'UTR of an albumin gene,

   wherein the open reading frame does preferably not code for beta-globin, in particular in case the 3'UTR element is derived from the 3'UTR of the rat albumin gene, and

   wherein the open reading frame does preferably not code for human factor IX, in particular in case the 3'UTR element is derived from the 3'UTR of the human albumin gene.

2. The artificial nucleic acid molecule according to claim 1, wherein the at least one 3'UTR element stabilizes/prolongs protein production from said artificial nucleic acid molecule.

3. The artificial nucleic acid molecule according to claim 1 or 2, wherein the at least one 3'UTR element comprises a nucleic acid sequence which is derived from the 3'UTR of a vertebrate albumin gene or from a variant thereof, preferably from the 3'UTR of a mammalian albumin gene e.g. of the mouse albumin gene or from a variant thereof, more preferably from the 3'UTR of a primate albumin gene, particular of the human albumin gene or the albumin gene from *Olive baboon*, or from a variant thereof, even more preferably from the 3'UTR of the human albumin gene according to GenBank Accession number NM_000477.5 or from a variant thereof.

4. The artificial nucleic acid molecule according to any one of claims 1-3, wherein the at least one 3'UTR element comprises or consists of a nucleic acid sequence which has an identity of at least about 40%, preferably of at least about 50%,

preferably of at least about 60%, preferably of at least about 70%, more preferably of at least about 80%, more preferably of at least about 90%, even more preferably of at least about 95%, even more preferably of at least about 99% to the nucleic acid sequence according to SEQ ID No. 1, SEQ ID No. 2, SEQ ID No. 32, SEQ ID NO. 33, SEQ ID No. 34, or SEQ ID No. 35, or wherein the at least one 3'UTR element comprises or consists of a fragment of a nucleic acid sequence which has an identity of at least about 40%, preferably of at least about 50%, preferably of at least about 60%, preferably of at least about 70%, more preferably of at least about 80%, more preferably of at least about 90%, even more preferably of at least about 95%, even more preferably of at least about 99% to the nucleic acid sequence according to SEQ ID No. 1, SEQ ID No. 2, SEQ ID No. 32, SEQ ID NO. 33, SEQ ID No. 34, or SEQ ID No. 35.

5. The artificial nucleic acid molecule according to claim 4, wherein the fragment exhibits a length of at least about 50 nucleotides, preferably of at least about 75 nucleotides, more preferably of at least about 100 nucleotides, even more preferably of at least about 125 nucleotides, most preferably of at least about 150 nucleotides.

6. The artificial nucleic acid molecule according to any one of claims 1-5, wherein the at least one 3'UTR element exhibits a length of at least about 50 nucleotides, preferably of at least about 75 nucleotides, more preferably of at least about 100 nucleotides, even more preferably of at least about 125 nucleotides, most preferably of at least about 150 nucleotides.

7. The artificial nucleic acid molecule according to any one of claims 1-6 further comprising

c. a poly(A) sequence and/or a polyadenylation signal.

8. The artificial nucleic acid molecule according to claim 7, wherein the polyadenylation signal is located within the 3'UTR element.

9. The artificial nucleic acid molecule according to claim 7 or 8, wherein the polyadenylation signal comprises the consensus sequence NN(U/T)ANA, with N = A or U, preferably AA(U/T)AAA or A(U/T)(U/T)AAA.

10. The artificial nucleic acid molecule according to any one of claims 7-9, wherein the polyadenylation signal, preferably the consensus sequence NNUANA, is located less than about 50 nucleotides upstream of the 3'-end of the 3'UTR.

11. The artificial nucleic acid molecule according to any one of claims 7-10, wherein the poly(A) sequence has a length of about 20 to about 300 adenine nucleotides, preferably of about 40 to about 200 adenine nucleotides, more preferably of about 50 to about 100 adenine nucleotides, even more preferably of about 60 to about 70 adenine nucleotides.

12. The artificial nucleic acid molecule according to any one of claims 1-11, wherein the open reading frame does not code for albumin, preferably not for human albumin.

13. The artificial nucleic acid molecule according to any one of claims 1-12, further comprising a 5'-cap structure, a poly(C) sequence, a histone stem-loop, and/or an IRES-motif.

14. The artificial nucleic acid molecule according to any one of claims 1-13, wherein the nucleic acid comprises an additional 5'-element, preferably a 5'UTR, a promoter, or a 5'UTR and a promoter containing-sequence.

15. The artificial nucleic acid molecule according to any one of claims 1-14, wherein the artificial nucleic acid molecule, preferably the open reading frame, is at least partially G/C modified, preferably wherein the G/C content of the open reading frame is increased compared to the wild type open reading frame.

16. The artificial nucleic acid molecule according to any one of claims 1-15, wherein the open reading frame comprises a codon-optimized region, preferably, wherein the open reading frame is codon-optimized.

17. The artificial nucleic acid molecule according to any one of claims 1-16, which is an RNA, preferably an mRNA molecule.

18. A vector comprising

a. an open reading frame and/or a cloning site; and

b. at least one 3'-untranslated region element (3'UTR element) comprising a nucleic acid sequence which is derived from the 3'UTR of an albumin gene or from a variant of the 3'UTR of an albumin gene

wherein the open reading frame does preferably not code for beta-globin, in particular in case the 3'UTR element is derived from the 3'UTR of the rat albumin gene, and

wherein the open reading frame does preferably not code for human factor IX, in particular in case the 3'UTR element is derived from the 3'UTR of the human albumin gene

19. The vector according to claim 18, wherein the at least one 3'UTR element comprises or consists of a nucleic acid sequence which is derived from the 3'UTR of a vertebrate albumin gene or from a variant thereof, preferably from the 3'UTR of a mammalian albumin gene e.g. of the mouse albumin gene or from a variant thereof, more preferably from the 3'UTR of a primate albumin gene, particular of the human albumin gene or the albumin gene from *Olive baboon*, or from a variant thereof, even more preferably from the 3'UTR of the human albumin gene according to GenBank Accession number NM_000477.5 or from a variant thereof.

20. The vector according to claim 18 or 19, wherein the at least one 3'UTR element comprises or consists of a nucleic acid sequence which has an identity of at least about 40%, preferably of at least about 50%, preferably of at least about 60%, preferably of at least about 70%, more preferably of at least about 80%, more preferably of at least about 90%, even more preferably of at least about 95%, even more preferably of at least about 99% to the nucleic acid sequence according to SEQ ID No. 1, SEQ ID No. 2, SEQ ID No. 32, SEQ ID NO. 33, SEQ ID No. 34, or SEQ ID No. 35, or wherein the at least one 3'UTR element comprises or consists of a fragment of a nucleic acid sequence which has an identity of at least about 40%, preferably of at least about 50%, preferably of at least about 60%, preferably of at least about 70%, more preferably of at least about 80%, more preferably of at least about 90%, even more preferably of at least about 95%, even more preferably of at least about 99% to the nucleic acid

sequence according to SEQ ID No. 1, SEQ ID No. 2, SEQ ID No. 32, SEQ ID NO. 33, SEQ ID No. 34, or SEQ ID No. 35.

21. The vector according to claim 20, wherein the fragment exhibits a length of at least about 50 nucleotides, preferably of at least about 75 nucleotides, more preferably of at least about 100 nucleotides, even more preferably of at least about 125 nucleotides, most preferably of at least about 150 nucleotides.

22. The vector according to any one of claims 18-21, wherein the at least one 3'UTR element exhibits a length of at least about 50 nucleotides, preferably of at least about 75 nucleotides, more preferably of at least about 100 nucleotides, even more preferably of at least about 125 nucleotides, most preferably of at least about 150 nucleotides.

23. The vector according to any one of claims 18-22 further comprising

c. a poly(A) sequence and/or a polyadenylation signal.

24. The vector according to claim 23, wherein the polyadenylation signal is located within the 3'UTR element.

25. The vector according to claim 23 or 24, wherein the polyadenylation signal comprises the consensus sequence NN(U/T)ANA, with N = A or U, preferably AA(U/T)AAA or A(U/T)(U/T)AAA.

26. The vector according to any one of claims 23-25, wherein the polyadenylation signal, preferably the consensus sequence NNUANA, is located less than about 50 nucleotides upstream of the 3'-end of the 3'UTR element.

27. The vector according to any one of claims 23-26, wherein the poly(A) sequence has a length of about 20 to about 300 adenine nucleotides, preferably of about 40 to about 200 adenine nucleotides, more preferably of about 50 to about 100 adenine nucleotides, more preferably of about 60 to about 70 adenine nucleotides.

28. The vector according to any one of claims 18-27, wherein the open reading frame does not code for human albumin, preferably not for albumin.

29. The vector according to any one of claims 18-28, wherein the open reading frame does not code for human factor IX or a reporter protein, preferably not for a GFP protein, a luciferase protein or a globin protein, or variants thereof.

30. The vector according to any one of claims 18-29, further comprising a poly(C) sequence, a histone stem-loop, and/or an IRES-motif.

31. The vector according to any one of claims 18-30, further comprising a 5'-element, preferably a 5'UTR, a promoter, or a 5'UTR and a promoter containing-sequence.

32. The vector according to any one of claims 18-31, which is at least partially G/C modified, preferably wherein the open reading frame is at least partially G/C modified, preferably wherein the G/C content of the open reading frame is increased compared to the wild type open reading frame.

33. The vector according to any one of claims 18-32, wherein the open reading frame comprises a codon-optimized region, preferably wherein the open reading frame is codon-optimized.

34. The vector according to any one of claims 18-33, which is a DNA vector.

35. The vector according to any one of claims 18-34, which is a plasmid vector or a viral vector, preferably a plasmid vector.

36. The vector according to any one of claims 18-35, which comprises an artificial nucleic acid molecule according to any one of claims 1-17.

37. The vector according to any one of claims 18-36, which is a circular molecule.

38. The vector according to claim 37, wherein the poly(A) sequence or the 3'UTR element of the coding strand is followed in 5'→3' direction by a restriction site for linearization of the circular vector molecule.

39. A cell comprising the artificial nucleic acid molecule according to any one of claims 1-17 or the vector according to any one of claims 18-38.

40. The cell according to claim 39, which is a mammalian cell.

41. The cell according to claim 39 or 40, which is a cell of a mammalian subject, preferably an isolated cell of a mammalian subject, preferably of a human subject.

42. A pharmaceutical composition comprising the artificial nucleic acid molecule according to any one of claims 1-17, the vector according to any one of claims 18-38, or the cell according to any one of claims 39-41.

43. The pharmaceutical composition according to claim 42, further comprising one or more pharmaceutically acceptable diluents and/or excipients and/or one or more adjuvants.

44. The artificial nucleic acid molecule according to any one of claims 1-17, the vector according to any one of claims 18-38, the cell according to any one of claims 39-41, or the pharmaceutical composition according to claim 42 or 43 for use as a medicament.

45. The artificial nucleic acid molecule according to any one of claims 1-17, the vector according to any one of claims 18-38, the cell according to any one of claims 39-41, or the pharmaceutical composition according to claim 42 or 43 for use as a vaccine or for use in gene therapy.

46. A method for treating or preventing a disorder comprising administering the artificial nucleic acid molecule according to any one of claims 1-17, the vector according to any one of claims 18-38, the cell according to any one of claims 39-41, or the pharmaceutical composition according to claim 42 or 43 to a subject in need thereof.

47. A method of treating or preventing a disorder comprising transfection of a cell with an artificial nucleic acid molecule according to any one of claims 1-17 or with the vector according to any one of claims 18-38.

48. The method according to claim 47, wherein transfection of a cell is performed *in vitro/ex vivo* and the transfected cell is administered to a subject in need thereof, preferably to a human patient.

49. The method according to claim 48, wherein the cell which is to be transfected *in vitro* is an isolated cell of the subject, preferably of the human patient.

50. The method according to any one of claims 46-49, which is a vaccination method or a gene therapy method.

51. A method for stabilizing and/or prolonging protein production from a nucleic acid molecule, preferably from an mRNA molecule or a vector, the method comprising the step of associating the nucleic acid molecule, preferably the mRNA molecule or the vector, with a 3'UTR element, wherein the 3'UTR element comprises or consists of a nucleic acid sequence which is derived from the 3'UTR of an albumin gene or from a variant of the 3'UTR of an albumin gene.

52. Use of a 3'UTR element for stabilizing and/or prolonging protein production from a nucleic acid molecule, preferably from an mRNA molecule or a vector, wherein the 3'UTR element comprises or consists of a nucleic acid sequence which is derived from the 3'UTR of an albumin gene or from a variant of the 3'UTR of an albumin gene.

53. The method according to claim 51 or the use according to claim 52, wherein the 3'UTR element comprises or consists of a nucleic acid sequence which is derived from the 3'UTR of a vertebrate albumin gene or from a variant thereof, preferably from the 3'UTR of a mammalian albumin gene e.g. of the mouse albumin gene or from a variant thereof, more preferably from the 3'UTR of a primate albumin gene, particular of the human albumin gene or the albumin gene from *Olive baboon*, or from a variant thereof, , even more preferably from the 3'UTR of the human albumin gene according to GenBank Accession number NM_000477.5 or from a variant thereof.

54. The method or the use according to any one of claims 51-53, wherein the 3'UTR element comprises or consists of a nucleic acid sequence which has an

identity of at least about 40%, preferably of at least about 50%, preferably of at least about 60%, preferably of at least about 70%, more preferably of at least about 80%, more preferably of at least about 90%, even more preferably of at least about 95%, even more preferably of at least about 99% to the nucleic acid sequence according to SEQ ID No. 1, SEQ ID No. 2, SEQ ID No. 32, SEQ ID NO. 33, SEQ ID No. 34, or SEQ ID No. 35, or wherein the 3'UTR element comprises or consists of a fragment of a nucleic acid sequence that has an identity of at least about 40%, preferably of at least about 50%, preferably of at least about 60%, preferably of at least about 70%, more preferably of at least about 80%, more preferably of at least about 90%, even more preferably of at least about 95%, even more preferably of at least about 99% to the nucleic acid sequence according to SEQ ID No. 1, SEQ ID No. 2, SEQ ID No. 32, SEQ ID NO. 33, SEQ ID No. 34, or SEQ ID No. 35.

55. The method or the use according to claim 54, wherein the fragment exhibits a length of at least about 50 nucleotides, preferably of at least about 75 nucleotides, more preferably of at least about 100 nucleotides, even more preferably of at least about 125 nucleotides, most preferably of at least about 150 nucleotides.

56. The method or the use according to any one of claims 51-55, wherein the 3'UTR element exhibits a length of at least about 50 nucleotides, preferably of at least about 75 nucleotides, more preferably of at least about 100 nucleotides, even more preferably of at least about 125 nucleotides, most preferably of at least about 150 nucleotides.

57. A kit or kit of parts comprising an artificial nucleic acid molecule according to any one of claims 1-17, a vector according to any one of claims 18-38, a cell according to any one of claims 39-41, and/or a pharmaceutical composition according to claim 42 or 43.

58. The kit according to claim 57 further comprising instructions for use, cells for transfection, an adjuvant, a means for administration of the pharmaceutical composition, a pharmaceutically acceptable carrier and/or a pharmaceutically

acceptable solution for dissolution or dilution of the artificial nucleic acid molecule, the DNA-vector or the pharmaceutical composition.

Claims:

1. An invention not claimed in any divisional application.