Claims

1. A nucleic acid molecule comprising a double-stranded structure,

wherein the double-stranded structure is formed by a first strand and a second strand,

wherein the first strand consist of the following nucleotide sequence

5' acGaGcUgGaCcAcUgGuCdT$_S$dT 3',

and the second strand consists of the following nucleotide sequence

5' GAcCaGuGgUcCaGcUcGudT$_S$dT 3',

wherein a minor nucleotide indicates that the nucleotide is 2'-F modified and an underlined nucleotide indicates that the nucleotide is 2'-O-methyl modified and

wherein dT$_S$dT indicates that at the 3' end a dinucleotide is attached consisting of two dT nucletoides, wherein said two dTs are covalently linked through a phosphorothioate bond.

2. The nucleic acid molecule of claim 1, wherein the nucleic acid molecule is capable of causing post-transcriptional silencing of a gene, preferably the gene is human Notch 1.

3. The nucleic acid molecule of any one of claims 1 to 2, wherein post-transcriptional silencing is RNA interference.

4. The nucleic acid molecule of any one of claims 1 to 3, for use in a method for the treatment and/or prevention of a disease, wherein the method comprises administering to a subject the nucleic acid molecule, preferably the disease is selected from the group comprising esophageal cancer, oral squamous cell carcinoma, head and neck cancer, tongue cancer, leukemia, renal cell carcinoma, gastric cancer, colon adenocarcinoma, endometrial

cancer/uterine corpus, cervical cancer/uterine cervix, intrahepatic cholangiocarcinoma, hepatocellular carcinoma, osteosarcoma, urinary bladder carcinoma, malignant melanoma, thyroid cancer, lung adenocarcinoma, prostate cancer, breast cancer, ovarian cancer, pancreatic cancer and glioma.

5. The nucleic acid molecule of claim 4, wherein the method comprises administering a further pharmaceutically active agent to the subject.

6. The nucleic acid molecule of any one of claims 1 to 3, for use in a method for restoring drug sensitivity of cancer cells, wherein the cancer cells exhibit Notch 1 induced chemoresistance.

7. A nanoemulsion comprising a discontinuous phase and a continuous aqueous phase and a nucleic acid molecule of any one of claims 1 to 3.

8. The nanoemulsion of claim 7, wherein the discontinuous phase comprises a perfluorocarbon phase.

9. The nanoemulsion of any one of claims 7 to 8, wherein the nanoemulsion comprises an endocytosis enhancing surface, preferably the endocytosis enhancing surface comprises an endocytosis enhancing component, wherein the endocytosis enhancing component is selected from the group comprising at least one compound inducing cellular uptake of the nanoemulsion or particles of the nanoemulsion via endocytosis.

10. The nanoemulsion of any one of claims 7 to 9, for use in a method for the treatment and/or prevention of a disease, wherein the method comprises administering to a subject the nucleic acid molecule, preferably the disease is selected from the group comprising esophageal cancer, oral squamous cell carcinoma, head and neck cancer, tongue cancer, leukemia, renal cell carcinoma, gastric cancer, colon adenocarcinoma, endometrial cancer/uterine corpus, cervical cancer/uterine cervix, intrahepatic cholangiocarcinoma, hepatocellular carcinoma, osteosarcoma, urinary bladder carcinoma, malignant melanoma,

thyroid cancer, lung adenocarcinoma, prostate cancer, breast cancer, ovarian cancer, pancreatic cancer and glioma.

11. The nanoemulsion of claim 10, wherein the method comprises administering a further pharmaceutically active agent to the subject.

12. The nanoemulsion of any one of claims 7 to 9, for use in a method for restoring drug sensitivity of cancer cells, wherein the cancer cells exhibit Notch 1 induced chemoresistance.

13. A pharmaceutical composition comprising a nucleic acid molecule of any one of claims 1 to 3 or a nanoemulsion of any one of claims 7 to 9, and at least one pharmaceutically active excipient.

14. A kit comprising a nucleic acid molecule of any one of claims 1 to 3 or a nanoemulsion of any one of claims 7 to 9, and at least use instructions.

Claims

1. A nucleic acid molecule comprising a double-stranded structure,

wherein the double-stranded structure is formed by a first strand and a second strand,

wherein the first strand consists of a first stretch of contiguous nucleotides and the second strand comprises a second stretch of contiguous nucleotides,

wherein the first stretch of contiguous nucleotides comprises a nucleotide sequence of

5’ ACGAGCUGGACCACUGGUC 3’ (SEQ ID NO: 1);

and wherein the nucleic acid molecule is capable of causing post-transcriptional silencing of a gene and wherein the gene is human Notch 1.

2. The nucleic acid molecule of claim 1, wherein the second stretch of contiguous nucleotides is at least partially complementary to a part of the first stretch of contiguous nucleotides.

3. The nucleic acid molecule of any one of claims 1 to 2, wherein the first stretch of contiguous nucleotides comprises 19 to 25 nucleotides and more preferably 19 to 23 nucleotides and/or wherein the second stretch of contiguous nucleotides comprises 13 to 29 nucleotides, preferably 17 to 25 or 19 to 25 nucleotides and more preferably 19 to 23 nucleotides.

4. The nucleic acid molecule of any one of claims 1 to 3, wherein the nucleic acid molecule is blunt ended at at least one end, or wherein the nucleic acid molecule has an overhang at at least one end.

5. The nucleic acid molecule of any one of claims 1 to 4, wherein the first stretch of contiguous nucleotides comprises nucleotide sequence 5’ ACGAGCUGGACCACUGGUCdTdT 3’ (SEQ ID NO: 4).

6. The nucleic acid molecule of any one of claims 1 to 5, wherein the second stretch of contiguous nucleotides comprises nucleotide sequence

5’ GACCAGUGGUCCAGCUCGUdTdT 3’ (SEQ ID NO: 5).

7. The nucleic acid molecule of any one of claims 1 to 6, wherein one or more of the nucleotides forming the first stretch of contiguous nucleotides is modified and/or wherein one or more of the nucleotides forming the second stretch of contiguous nucleotides is modified.

8. The nucleic acid molecule of claim 7, wherein the modification of the one or more of the nucleotides is a modification of the sugar moiety of the one or more nucleotides and/or a modification of the phosphate moiety of the one or more nucleotides.

9. The nucleic acid molecule of claim 8, wherein the modification of the sugar moiety is selected from the group comprising 2’O-methyl and 2’-F.

10. The nucleic acid molecule any one of claims 8 to 9, wherein the modification of the phosphate moiety is such that a phosphorothioate linkage is formed between two nucleotides.

11. The nucleic acid molecule of any one of claims 1 to 10, wherein the nucleic acid molecule consists of a

a) a first stretch of contiguous nucleotides comprising the following nucleotide sequence:

5’ acGaGcUgGaCcAcUgGuCdTsdT 3’ (SEQ ID NO: 69), and

a second stretch of contiguous nucleotides comprising the following nucleotide sequence:

5’ GAcCaGuGgUcCaGcUcGudTsdT 3’ (SEQ ID NO: 70), or

b) a first stretch of contiguous nucleotides comprising the following nucleotide sequence:

5’ acGaGcUgGaCcAcUgGuCdTsdT 3’ (SEQ ID NO: 69), and

a second stretch of contiguous nucleotides comprising the following nucleotide sequence:

5’ ACcAgUgGuCcAgCuCgdTsdT 3’ (SEQ ID NO: 72),

wherein a minor nucleotide indicates that the nucleotide is 2’-F modified and an underlined nucleotide indicates that the nucleotide is 2’-O-methyl modified and

wherein dTsdT indicates that at the 3’ end a dinucleotide is attached consisting of two dTs, wherein said two dTs are covalently linked through a phosphorothioate bond.

12. The nucleic acid molecule of any one of claims 1 to 11, for use in a method for the treatment and/or prevention of a disease or for use in a method for restoring drug sensitivity of cancer cells.

13. A nanoemulsion comprising a discontinuous phase and a continuous aqueous phase and a nucleic acid molecule according to any one of claims 1 to 11.

14. The nanoemulsion of claim 13, for use in a method for the treatment and/or prevention of a disease or for use in a method for restoring drug sensitivity of cancer cells.

15. A pharmaceutical composition comprising a nucleic acid molecule of any one of claims 1 to 11 and/or a nanoemulsion of claim 13, and a pharmaceutically acceptable excipient.