Claims

1. A single strand anti-gene oligonucleotide complementary to the anti-sense DNA strand of a target gene, comprising 6-30 nucleotides, preferably 12-24 nucleotides, said oligonucleotide being characterized by a sequence comprising at least three groups of at least two consecutive guanines.

2. The oligonucleotide according to claim 1, wherein the groups of at least two consecutive guanines are continuous with each other or spaced apart by at least one nucleotide, said nucleotide not being a guanine.

3. The oligonucleotide according to claim 1 or 2, wherein the groups of at least two consecutive guanines are at least four, five or six in number.

4. The oligonucleotide according to any one of claims 1-3, wherein said oligonucleotide is conjugated with a carrier sequence at the 3' and/or 5' end of said oligonucleotide, preferably a carrier selected from the group consisting of: SEQ ID NO: 47-56.

5. The oligonucleotide according to any one of claims 1-4, wherein said oligonucleotide is at least one molecule of natural nucleic acid, preferably DNA or RNA, possibly chemically modified, or synthetic nucleic acid, preferably PNA, LNA or morpholino, possibly chemically modified, or a combination of said natural nucleic acid and said synthetic nucleic acid.

6. The oligonucleotide according to claim 5, wherein 1) said at least one DNA molecule comprises at least one LNA, methylphosphonate-LNA, BNA, RNG, DNG, GNA, UNA, ENA, ANA, F-ANA, PNA, G-PNA or morpholino nucleotide; or comprises a 2'O-Methyl, 2'O-Methoxyethyl or 2'-fluoro RNA nucleotide; or 2) said at least one RNA molecule comprises at least one RNA nucleotide selected from among: a 2'0-Methyl nucleotide, a 2'0-Methoxyethyl nucleotide, a 2'-fluoro nucleotide; or at least one nucleotide of a nucleic acid selected from among: LNA, Methylphosphonate LNA, BNA, RNG, DNG, GNA, UNA, ENA, ANA, F-ANA, PNA, G-PNA or morpholino.

7. The oligonucleotide according to claim 6, wherein said at least one DNA molecule or said at least one RNA molecule comprises at least one nucleotide modified at the level of the phosphodiester bond as a phosphorothioate bond.

8. The oligonucleotide according to claim 5, wherein said PNA has a modified backbone wherein the alpha carbon has the side chain of arginine or lysine as a substituent.

9. The oligonucleotide according to any one of claims 1-8, wherein said oligonucleotide is directed against at least one gene responsible for a disease of genetic or viral origin or against at least one tumour gene, wherein said gene is preferably selected from the group consisting of: at least one gene belonging to the MYC family, preferably MYC, MYCN or MYCL1, BIRC5, BCL2, PLK4, ALK, PKM2, CASP8 and RASSF1.

10. The oligonucleotide according to any one of claims 1-9, wherein said oligonucleotide is selected from among: SEQ ID NO: 2, 4, 5, 6, 46, and SEQ ID NO: 68-84.

11. The oligonucleotide according to claim 10, wherein SEQ ID NO: 2, 4, 5, 6, 68 and 69 are directed against the MYCN gene.

12. The oligonucleotide according to claim 10, wherein SEQ ID NO: 70-74 are directed against the gene MYC; wherein SEQ ID NO: 75, 76 are directed against the gene BIRC5; wherein SEQ ID NO: 77-79 are directed against the gene ALK; wherein SEQ ID NO: 80-82 are directed against the gene BCL2; wherein SEQ ID NO: 83, 84 are directed against the gene PLK4.

13. A composition comprising at least one oligonucleotide according to any one of claims 1 to 12 and at least one pharmacologically acceptable excipient.

14. The composition comprising at least one oligonucleotide according to any one of claims 1 to 12 in combination with a selected compound with pharmacological action, preferably in the group consisting of: NGF, somatostatin, retinoic acid, actinomycin D, asparaginase, bleomycin, busulphan capecitabine, carboplatin, cyclophosphamide, cyclosporine, cisplatin, cytarabine, clorambucil, dacarbazine, daunorubicin, docetaxel, doxorubicin hydrochloride, epirubicin hydrochloride, etoposide, fludarabine phosphate, fluorouracil, gemcitabine, idarubicin hydrochloride, hydroxyurea, ifophosphamide, irinotecan hydrochloride, melphalan, mercaptopurine, methotrexate, mitomycin, mitoxantrone, oxaliplatin, paclitaxel, procarbazine, raltitrexed, streptozocin, tegafur-uracil, temozolomide, thioguanine, thiotepe, topotecan, vinblastine, vincristine sulphate, vindesine and vinorelbine; wherein said combination is preferably: SEQ ID: NO 5 and carboplatin, or etoposide or cisplatin or vincristine.

15. An oligonucleotide according to any one of claims 1 to 12 or a composition according to claim 13 for use as a medicament.

16. An oligonucleotide according to any one of claims 1 to 12 or a composition according to claim 13 for use in the treatment of a tumour wherein said tumour is an adult or a pediatric tumour, preferably selected from the group consisting in: neuroblastoma, retinoblastoma, medulloblastoma, ependymoma, pheochromocytoma, embryonal carcinoma, germ cell tumour, alveolar rabdomyosarcoma, embryonal rabdomiosarcoma, Wilms' tumour, clear cell sarcoma of the kidney, synovial sarcoma, hepatoblastoma, acute lymphoid leukaemia, chronic lymphoid leukaemia, acute lymphoblastic leukaemia, chronic lymphoblastic leukaemia, Burkitt's lymphoma, acute myeloid leukaemia, chronic myeloid leukaemia, acute megakaryoblastic leukaemia, B chronic lymphoid leukaemia, T-cell leukaemia, lymphomas, small cell lung cancer (microcytoma), lung adenocarcinoma, squamous cell lung carcinoma, typical and atypical primary lung cancer, large cell lung carcinoma, large-cell neuroendocrine lung carcinoma, glioblastoma, hepatocarcinoma, basal cell carcinoma, ovarian tumour, breast tumour and colon cancer.

17. Use of an oligonucleotide according to any one of claims 1 to 12 or a composition according to claim 13, in the manufacture of a medicament for the treatment of a tumour wherein said tumour is an adult or a pediatric tumour, preferably selected from the group consisting in: neuroblastoma, retinoblastoma, medulloblastoma, ependymoma, pheochromocytoma, embryonal carcinoma, germ cell tumour, alveolar rabdomyosarcoma, embryonal rabdomiosarcoma, Wilms' tumour, clear cell sarcoma of the kidney, synovial sarcoma, hepatoblastoma, acute lymphoid leukaemia, chronic lymphoid leukaemia, acute lymphoblastic leukaemia, chronic lymphoblastic leukaemia, Burkitt's lymphoma, acute myeloid leukaemia, chronic myeloid leukaemia, acute megakaryoblastic leukaemia, B chronic lymphoid leukaemia, T-cell leukaemia, lymphomas, small cell lung cancer (microcytoma), lung adenocarcinoma, squamous cell lung carcinoma, typical and atypical primary lung cancer, large cell lung carcinoma, large-cell neuroendocrine lung carcinoma, glioblastoma, hepatocarcinoma, basal cell carcinoma, ovarian tumour, breast tumour and colon cancer.