Claims

1. A gene vector for use in gene therapy comprising a miRNA target sequence and a transgene operably linked to said miRNA target sequence, wherein the miRNA target sequence is for preventing or reducing expression of the transgene in a cell which comprises a corresponding endogenous miRNA.

2. A gene vector for use in therapy comprising a miRNA target sequence, wherein the miRNA target sequence is for preventing or reducing expression of a gene in a cell which comprises a corresponding endogenous miRNA.

3. The gene vector for use according to claim 1 or 2 in the form of a non-viral gene vector.

4. The gene vector for use according to claim 3, wherein the non-viral gene vector comprises an expression vector or plasmid which comprises the miRNA target sequence and optionally at least one transgene.

5. The gene vector for use according to claim 1 or 2 in the form of a viral vector.

6. The gene vector for use according to claim 5 comprising the genome (RNA or DNA) of the viral vector, which genome comprises the miRNA target sequence.

7. The gene vector for use according to claim 6 comprising the genome of the viral vector, which genome comprises at least one transgene which is operably linked to the miRNA target sequence.

8. The gene vector for use according to any one of claims 5 to 7, wherein the viral vector is selected from the group of retroviruses, lentiviruses, adenoviruses, adeno-associated viruses, herpes simplex viruses, picornaviruses, and alphaviruses.

9. The gene vector for use according to any one of claims 5 to 7, wherein the viral vector is derivable from a lentivirus.

10. The gene vector for use according to any one of claims 5 to 8, wherein the viral vector is in the form of a viral vector particle.

11. The gene vector for use according to any one of claims 5 to 10, wherein the miRNA target sequence controls expression of the viral vector in a target cell.

12. The gene vector for use according to any preceding claim which comprises more than one miRNA target sequence, which may be the same or different, in tandem and/or in different orientations.

13. The gene vector for use according to any preceding claim wherein the miRNA target sequence is one targeted by has-mir-142as (also called has-mir-142-3p) miRNA, let-7a, mir-15a, mir-16, mir-17-5p, mir-19, mir-142-5p, mir-145 and/or mir-218 miRNA.

14. The gene vector for use according to any one of claims 1 or 3 to 13, wherein the transgene codes for suitable therapeutic genes include those coding for tumour suppressor proteins, enzymes, pro-drug activating enzymes, immunomodulatory molecules, antibodies, engineered immunoglobulin-like molecules, fusion proteins, hormones, membrane proteins, vasoactive proteins or peptides, cytokines, chemokines, anti-viral proteins, antisense RNAs and ribozymes.

15. The gene vector for use according to any preceding claim, wherein the vector comprises a tissue specific promoter.

16. A set of DNA constructs for producing a viral vector particle comprising a DNA construct encoding a packageable viral vector genome comprising a miRNA target sequence and a transgene operably linked to said miRNA target sequence, wherein the miRNA target sequence is for preventing or reducing expression of the transgene in a cell which comprises a corresponding endogenous miRNA.

17. A process for preparing a viral vector particle comprising introducing the set of DNA constructs of claim 16 into a host cell, and obtaining the viral vector particle.

18. The process according to claim 17, wherein the host cell comprises a corresponding miRNA.

19. A viral vector particle for use in gene therapy, wherein the particle is produced by the process of claim 17 or 18.

20. A pharmaceutical composition for use in gene therapy, wherein the composition comprises the gene vector as defined in any one of claims 1 to 15 or particle as defined in claim 19.

21. A cell for use in gene therapy, wherein the cell is infected or transduced with the gene vector as defined in any one of claims 1 to 15 or particle as defined in claim 19.

22. The cell for use according to claim 21 which is a hematopoietic, kidney, neuronal, lung, liver, spleen, heart, tumour or embryonic stem cell.

23. Use of the gene vector as defined in any one of claims 1 to 15 or pharmaceutical composition as defined in claim 20 comprising a transgene operably linked to the miRNA target sequence for the manufacture of a medicament for preventing or reducing expression of the transgene in a cell which comprises a corresponding miRNA.

24. Use of the gene vector as defined in any one of claims 1 to 15 or pharmaceutical composition as defined in claim 20 comprising a transgene operably linked to the miRNA target sequence for the manufacture of a medicament for treating cancer.

25. Use of the gene vector as defined in any one of claims 1 to 15 or pharmaceutical composition as defined in claim 20 comprising a transgene operably linked to the miRNA target sequence for the manufacture of a medicament for treating haemophilia.

26. Use of the gene vector as defined in any one of claims 1 to 15 or pharmaceutical composition as defined in claim 20 comprising a transgene operably linked to the miRNA target sequence for the manufacture of a medicament for preventing immune-mediated rejection of a transferred gene.

27. Use of the gene vector as defined in any one of claims 1 to 15 or pharmaceutical composition as defined in claim 20 for the manufacture of a medicament for preventing immune mediated rejection of a transferred gene.

28. Use of the gene vector as defined in any one of claims 1 to 15 or pharmaceutical composition as defined in claim 20 for the manufacture of a medicament for preventing immune response to a circulating antigen.

29. Use of the gene vector as defined in any one of claims 1 to 15 or pharmaceutical composition as defined in claim 20 for the manufacture of a medicament for treating a disease selected from cancer, neurological diseases, inherited diseases, heart diseases, stroke, arthritis, viral infections and diseases of the immune system.

30. Use of the gene vector as defined in any one of claims 1 to 15 or pharmaceutical composition as defined in claim 20 for the manufacture of a medicament for gene therapy.

~~31. Use of a miRNA target sequence for use in a therapeutic application.~~

~~32. The use according to claim 32, wherein the therapeutic application involves regulating a gene using the corresponding endogenous miRNA.~~