Claims

1. An isolated modified capsid protein VP1 from adeno-associated virus serotype 5 (AAV5) for production of viral vectors based on recombinant adeno-associated virus serotype 5 (rAAV5), said isolated modified capsid protein VP1 comprising a wild-type AAV5 capsid protein VP1 amino acid sequence encoded by the *Cap* gene with substitutions that are selected from the groups:

i) G226V, or

ii) S2A, G226V and T711S,

wherein the wild-type AAV5 capsid protein VP1 amino acid sequence has the amino acid sequence represented by SEQ ID NO: 1.

2. The isolated modified AAV5 capsid protein VP1 according to claim 1, comprising a substitution at position G226V; or

the substitutions S2A, G226V and T711S4.

3. The isolated modified AAV5 capsid protein VP1 according to claim 1, comprising a substitution at position G226V and having the amino acid sequence represented by SEQ ID NO: 3; or

comprising the substitutions S2A, G226V and T711S and having the amino acid sequence represented by SEQ ID NO: 4.

4. An isolated nucleic acid encoding the modified capsid protein VP1 from adeno-associated virus serotype 5 according to any one of claims 1 to 3, said capsid protein VP1 being used for production of viral vectors based on recombinant adeno-associated virus serotype 5.

5. The isolated nucleic acid according to claim 4 encoding a modified capsid protein VP1 from adeno-associated virus serotype 5 with the amino acid substitution G226V, said isolated nucleic acid being represented by a nucleic sequence with SEQ ID NO: 11 or by any other sequence encoding the respective amino acid sequence; or

encoding a modified capsid protein VP1 from adeno-associated virus serotype 5 with the amino acid substitutions S2A, G226V and T711S, said isolated nucleic acid being represented by a nucleic sequence with SEQ ID NO: 12 or by any other sequence encoding the respective amino acid sequence.

6. An isolated capsid for production of viral vectors based on recombinant adeno-associated virus serotype 5, said isolated capsid including the modified capsid protein VP1 from adeno-associated virus serotype 5 according to any one of claims 1 to 3.

7. The isolated capsid according to claim 6 comprising the modified capsid protein VP1 from adeno-associated virus serotype 5 according to any one of claims 1 to 3, the AAV5 capsid

protein VP2 or a modified variant thereof, and the AAV5 capsid protein VP3 or a modified variant thereof.

8. The isolated capsid according to claim 7 comprising the wild-type AAV5 capsid protein VP2.

9. The isolated capsid according to claim 8 comprising the wild-type AAV5 capsid protein VP2 that has an amino acid sequence represented by SEQ ID NO: 17.

10. The isolated capsid according to claim 7 comprising a modified capsid protein VP2 from adeno-associated virus serotype 5.

11. The isolated capsid according to claim 10 comprising a modified AAV5 capsid protein VP2 comprising the substitution G90V; or

comprising a modified AAV5 capsid protein VP2 comprising the substitutions G90V and T575S.

12. The isolated capsid according to claim 11 comprising a modified AAV5 capsid protein VP2 comprising the substitution G90V and having an amino acid sequence represented by SEQ ID NO: 19; or

comprising a modified AAV5 capsid protein VP2 comprising the substitutions G90V and T575S and having an amino acid sequence represented by SEQ ID NO: 20.

13. The isolated capsid according to claim 7 comprising the wild-type AAV5 capsid protein VP3.

14. The isolated capsid according to claim 13 comprising the wild-type AAV5 capsid protein VP3 that has an amino acid sequence represented by SEQ ID NO: 33.

15. The isolated capsid according to claim 7 comprising a modified capsid protein VP3 from adeno-associated virus serotype 5.

16. The isolated capsid according to claim 15 comprising a modified AAV5 capsid protein VP3 comprising the substitution G34V; or

comprising a modified AAV5 capsid protein VP3 comprising the substitutions G34V and T519S.

17. The isolated capsid according to claim 16 comprising a modified AAV5 capsid protein VP3 comprising the substitution G34V and having an amino acid sequence represented by SEQ ID NO: 35; or

comprising a modified AAV5 capsid protein VP3 comprising the substitutions G34V and T519S and having an amino acid sequence represented by SEQ ID NO: 36.

18. An isolated nucleic acid encoding the capsid according to any one of claims 6 to 17, said capsid being used for production of viral vectors based on recombinant adeno-associated virus serotype 5.

19. A vector based on recombinant adeno-associated virus serotype 5 for delivering a heterologous nucleic acid sequence to a subject, said vector comprising:

1) the modified capsid protein VP1 from adeno-associated virus serotype 5 according to any one of claims 1 to 3 or the capsid according to any one of claims 6 to 17, and

2) a heterologous nucleic acid sequence comprising regulatory sequences that promote the expression of the product encoded by the heterologous nucleic acid sequence, in the target cells.

20. The rAAV5 vector according to claim 19, wherein the product of expression of the heterologous nucleic acid sequence is a therapeutic polypeptide or reporter polypeptide.

21. A pharmaceutical composition for the delivery of a gene product to a subject in need thereof, comprising:

a) the rAAV5 vector according to any one of claims 19 to 20; and

b) a pharmaceutically acceptable excipient.

22. A method for producing the rAAV5 vector according to any one of claims 19 to 20, comprising transfection of producer cells with the nucleic acid encoding a modified capsid protein VP1 from adeno-associated virus serotype 5 according to any one of claims 4 to 5, or with the nucleic acid encoding a capsid according to claim 18.