Claims

1. An adeno associated virus (rAAV) particle comprising a chemically modified capsid protein, wherein the chemically modified capsid protein comprises one or more of: a ligand binding site comprising a dibenzocyclooctyne group or an azide group.

2. The rAAV particle of claim 1, further comprising a ligand that is attached to the ligand binding site.

3. The rAAV particle of claim 1 or claim 2, wherein the ligand binding site is attached to an ε-amino group or primary amine of a lysine residue of the capsid protein.

4. The rAAV particle of any one of claims 1-3, wherein the attachment between the ligand binding site and the ligand comprises bioorthogonal crosslinkers.

5. The rAAV particle of any one of claims 1-4, wherein the ligand binding site comprises a dibenzocyclooctyne group and the ligand comprises an azide group.

6. The rAAV particle of any one of claims 1-4, wherein the ligand binding site comprises an azide group and the ligand comprises a dibenzocyclooctyne group.

7. The rAAV particle of any one of claims 1-4, wherein the ligand is attached to the ligand binding site via a Staudinger reaction or a strain-promoted click reaction.

8. The rAAV particle of any preceding claim, wherein the modified capsid protein is selected from one or more of VP1, VP2 and VP3.

9. The rAAV particle of any preceding claim, wherein the AAV particle has a higher infectivity rate at lower titers compared to an unmodified AAV particle of the same serotype.

10. The rAAV particle of any preceding claim, wherein the modified capsid protein is further modified to remove a natural mammalian cell binding site.

11. The rAAV particle of claim 10, wherein the natural mammalian cell binding site is a heparan sulfate proteoglycan binding site.

12. The rAAV particle of any preceding claim, wherein the AAV particle has a modified tropism compared to an unmodified AAV particle of the same serotype.

13. The rAAV particle of any preceding claim, wherein the ligand is selected from a protein ligand, a toxin subunit, a lectin, an adhesion factor, an antibody, a peptide and an enzyme.

14. A method of producing an adeno associated virus (AAV) particle comprising a chemically modified capsid protein, the method comprising the steps of:

attaching at least one ligand binding site comprising an azide group or a dibenzocyclooctyne group to a capsid protein; and

attaching a ligand to the ligand binding site.

15. The method according to claim 14, wherein the ligand is attached to the ligand binding site via a product of a Staudinger reaction or a strain-promoted click reaction.

16. The method according to claim 14 or claim 15, further comprising the step of modifying the capsid to remove a natural mammalian cell binding site.

17. A pharmaceutical composition, comprising the rAAV particle according to any one of claims 1-13, and at least one pharmaceutically acceptable carrier and/or diluent.

18. The rAAV particle according to any one of claims 1-13 or the pharmaceutical composition according to claim 17, for use in gene therapy, such as gene therapy treatment of cancer, an inherited monogenic disease, a genetic skin disease, an infectious disease, type I diabetes, and wound healing.

19. The rAAV particle according to any one of claims 1-13 or the pharmaceutical composition according to claim 17, for use in treating a patient having a genetic abnormality, the use comprising administering the rAAV particle according to any one

of claims 1-13 or the pharmaceutical composition according to claim 17 to a subject in need thereof, wherein said genetic abnormality is one that can be treated by gene therapy.

20. The rAAV particle of claim 19, wherein the genetic abnormality is selected from cancer, an inherited monogenic disease, a genetic skin disease, an infectious disease, type I diabetes, and wound healing.

21. Use of the rAAV particle according to any one of claims 1-13 for the transfection of a cell *in vitro*.

22. Use of the rAAV particle according to any one of claims 1-13 in the manufacture of a medicament for treating a patient having a genetic abnormality that can be treated by gene therapy.

23. The use of claim 23, wherein the genetic abnormality is selected from cancer, an inherited monogenic disease, a genetic skin disease, an infectious disease, type I diabetes, and wound healing.