

Claims

1. An adenoviral vector for preparation of a prophylactic or therapeutic composition, comprising at least one modification in a capsid protein, wherein said modification comprises the inclusion of a first peptide partner in a capsid protein, and said first peptide is capable of forming a covalent
5 bond with a second peptide partner.
2. An adenoviral vector according to claim 1 where said second peptide partner is attached to an entity, optionally an antigen, a targeting moiety or a shielding entity.
3. An adenoviral vector according to claim 1 or claim 2 wherein at least one modification in a capsid protein is in a major capsid protein or in a minor capsid protein.
- 10 4. An adenoviral vector according to any one of claims 1 to 3 wherein at least one modification in a major capsid protein is in the hexon protein, optionally in a HVR loop.
5. An adenoviral vector according to any one of claims 1 to 3 wherein at least one modification in a minor capsid protein is in the pIX protein.
- 15 6. An adenoviral vector according to any one of claims 1 to 5 wherein at least one modification to a capsid protein is the insertion or fusion of said first peptide partner to the capsid protein.
7. An adenoviral vector according to any one of claims 1 to 6 wherein said covalent bond is an isopeptide.
- 20 8. An adenoviral vector according to claim 4 wherein the first peptide partner is DogTag and wherein the second peptide partner is DogCatcher or SnoopTagJr or SnoopTag.
9. An adenoviral vector according to claim 5 wherein
 - a) a first peptide partner is SpyCatcher, optionally wherein the second peptide partner is SpyTag;
 - 25 b) a first peptide partner is SnoopCatcher , optionally wherein the second peptide partner is SnoopTagJr or SnoopTag;
 - c) a first peptide partner is DogCatcher, optionally wherein the second peptide partner is DogTag;

- c) a first peptide partner is SnoopTagJr, optionally wherein the second peptide partner is SnoopCatcher; or
- d) a first peptide partner is SpyTag, optionally wherein the second peptide partner is SpyCatcher.

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10. An adenoviral vector according to any one of claims 2 to 9 wherein the second peptide is attached to an antigen via genetic fusion or chemically attached to an antigen.
11. An adenoviral vector according to claim 10 wherein said antigen is a tumour-associated antigen, such as a neoepitope or neoantigen, a self-antigen, or an antigen from a pathogen, such as a virus, bacterium, parasite or fungus, optionally wherein the virus is SARS-CoV-2.
12. An adenoviral vector according to any preceding claim wherein the size of said second peptide partner attached to an entity is over 15kDa, 20kDa, 30 kDa, 40 kDa, 50 kDa, 60 kDa, 70 kDa, 80 kDa, 90 kDa or 100 kDa in size.
13. An adenoviral vector according to claim 12 wherein said second peptide partner attached to an entity shields the adenovirus from antibody binding to the capsid.
14. An adenoviral vector according to any preceding claim for use in the manufacture of a vaccine comprising the addition of a second peptide partner attached to an antigen to said adenoviral vector.
15. A vaccine comprising the adenoviral vector of any preceding claim, wherein an antigen is attached to the adenoviral vector via the second peptide partner.
16. A vaccine as claimed in claim 15 wherein said antigen comprises at least one antigen specifically expressed on a tumour or cancer cell, or virus, optionally SARS-Cov-2.
17. A method of producing an adenoviral vector as claimed in any one of claims 1 to 14 comprising:
 - introducing a nucleic acid which encodes a first peptide partner into the nucleic acid encoding a capsid protein;
 - inserting the modified capsid gene into the genome of an appropriate adenovirus; and
 - infecting a cell with said adenovirus and collecting the released progeny virus.

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18. A vaccine comprising an adenoviral vector as claimed in claim 15 or 16 and an attached antigen for use in the treatment or prevention of a disease.
19. A kit comprising an adenoviral vector as claimed in any one of claims 1 to 14.
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20. A vaccine comprising an adenoviral vector as claimed in claim 1, wherein
- a. said first peptide partner is SpyCatcher which is fused to the pIX capsid protein, and said second peptide partner is SpyTag, which is attached to an antigen, and wherein SpyCatcher and SpyTag are bound covalently through an isopeptide bond;
 - 10 b. said first peptide partner is SnoopCatcher which is fused to the pIX capsid protein, and said second peptide partner is SnoopTagJr, or SnoopTag which is attached to an antigen, and wherein SnoopCatcher and SnoopTagJr or SnoopTag are bound covalently through an isopeptide bond; or
 - c. said first peptide partner is DogCatcher which is fused to the pIX capsid protein, and said second peptide partner is DogTag which is attached to an antigen, and wherein DogCatcher and DogTag are bound covalently through an isopeptide bond; or
 - 15 d. said first peptide partner is SnoopTagJr which is fused to the pIX capsid protein, and said second peptide partner is SnoopCatcher, which is attached to an antigen, and wherein SnoopTagJr and SnoopCatcher are bound covalently through an isopeptide bond;
 - 20 e. said first peptide partner is SpyTag which is fused to the pIX capsid protein, and said second peptide partner is SpyCatcher, which is attached to an antigen, and wherein SpyTag and SpyCatcher are bound covalently through an isopeptide bond.
21. A vaccine comprising an adenoviral vector as claimed in claim 1, wherein said first peptide partner is DogTag which is inserted into HVR loops of the hexon protein, and said second peptide partner is DogCatcher or SnoopTagJr, said second peptide partner being attached to an antigen, and wherein DogTag and DogCatcher/SnoopTagJr are bound covalently through an isopeptide bond.
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22. An oncolytic virus preparation comprising an adenoviral vector as claimed in claim 1, wherein said second peptide partner is attached to a shielding entity or a targeting moiety.
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23. An adenoviral vector as claimed in any one of claims 1 to 14 wherein said adenovirus is any serotype or species, optionally a human adenovirus.

5 24. An adenoviral vector as claimed in any one of claims 1 to 14 wherein said adenovirus is replication-competent, optionally modified to replicate only in selective cells.

25. An adenoviral vector as claimed in any one of claims 1 to 14 wherein said adenovirus is replication-incompetent.

10 26. An adenoviral vector as claimed in any one of claims 1 to 14 wherein said adenovirus is genetically modified to encode a transgene and optionally surface decorated via an isopeptide linkage.

15 27. An adenoviral vector capable of surface decoration via an isopeptide linkage via a modified capsid protein.