

enabling a limited unspecific activity of the adjuvant; (x) enabling a limited toxicity; (xi) enabling an easy co-formulation of antigen(s) and adjuvant(s); (xii) enabling simultaneous co-localized action of antigen(s) and adjuvant(s).

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SUMMARY

In one aspect, the present disclosure relates to a vaccine composition comprising: (1) a first set of one or more vectors comprising a nucleic acid encoding one or more adjuvants, wherein the first set of one or more vectors are human adenoviral vectors selected from hAd6 and hAd57, and (2) an antigen or a combination of antigens or a nucleic acid encoding said antigen or combination of antigens or a second set of one or more vectors comprising said nucleic acid. In one example, the present disclosure relates to a vaccine composition comprising (1) a first set of one or more vectors comprising a nucleic acid encoding one or more adjuvants, wherein the first set of one or more vectors are adenoviral vectors, and (2) an antigen or a combination of antigens or a nucleic acid encoding said antigen or combination of antigens or a second set of one or more vectors comprising said nucleic acid.

In another aspect, the present disclosure refers to a vaccine composition as disclosed herein for use in therapy. In yet another aspect, the present disclosure refers to a use of a vaccine composition as disclosed herein in the manufacture of a medicament for the treatment or prophylaxis of cancer. In an example, the present disclosure relates to a vaccine composition as disclosed herein for use in the treatment or prophylaxis of a disease.

In a further aspect, the present disclosure refers a use of a

- (1) a first composition comprising
 - a first set of one or more vectors comprising a first nucleic acid encoding one or more adjuvants, wherein the first set of one or more vectors are human adenoviral vectors selected from hAd6 and hAd57, and
- (2) a second composition comprising
 - an antigen or a combination of antigens or
 - a second nucleic acid encoding an antigen or a combination of antigens or
 - a second set of one or more vectors comprising said second nucleic acid, in the manufacture of a vaccine composition or vaccine kit for combination therapy to induce an immune response against an antigen or combination of antigens;

wherein

- a. (1) is to be administered to a patient at a first location and (2) is to be administered to the patient and at a second location, wherein the first location is within 20 cm, 17.5 cm, 15 cm, 12.5 cm, 10 cm, 7.5 cm, 5 cm, 2.5 cm, 1 cm, 0.5 cm, 0.25 cm or 0.1 cm of the second location and the lymphatic system of the first location drains to the same lymph

nodes as the lymphatic system of the second location or wherein the first location and the second location are the same; and optionally

- b. the adjuvant comprises a transmembrane domain and an ER sorting signal.

5 In an example, the present disclosure relates to a vaccine composition or vaccine kit for inducing an immune response against an antigen or combination of antigens comprising (1) a first composition comprising a nucleic acid encoding one or more adjuvants or a first set of one or more vectors comprising said nucleic acid, and (2) a second composition comprising an antigen or a combination of antigens or a nucleic acid encoding said antigen or combination of antigens or a second set of one or more vectors comprising said nucleic acid, wherein (1) is administered to a
10 patient at a first location and (2) is administered to the patient at a second location, wherein the first location is within 20 cm of the second location and the lymphatic system of the first location drains to the same lymph nodes as the lymphatic system of the second location or wherein the first location and the second location are the same.

In a further example, the present disclosure relates to a vaccination regimen comprising a
15 first and a second administration step, wherein (a) the first administration step comprises administration of a vaccine composition as disclosed herein, and (b) the second administration step comprises administration of (1) a first composition comprising a nucleic acid encoding one or more adjuvants, or a first set of one or more vectors comprising said nucleic acid; and/or (2) a second composition comprising an antigen or a combination of antigens, or a nucleic acid encoding
20 said antigen or combination of antigens, or a second set of one or more vectors comprising said nucleic acid.

CLAIMS

1. A vaccine composition comprising:
 - (1) a first set of one or more vectors comprising a nucleic acid encoding one or more adjuvants, wherein the first set of one or more vectors are human adenoviral vectors selected from hAd6 and hAd57, and
 - (2) an antigen or a combination of antigens or a nucleic acid encoding said antigen or combination of antigens or a second set of one or more vectors comprising said nucleic acid.
2. The vaccine composition according to claim 1, wherein the first set of one or more vectors are human adenoviral hAd6 vectors.
3. The vaccine composition according to any of claims 1 to 3, wherein the antigen or combination of antigens is encoded by a nucleic acid that is not comprised in the first set of one or more vectors.
4. The vaccine composition according to any of claims 1 to 4, comprising the second set of one or more vectors comprising a nucleic acid encoding the antigen or combination of antigens as specified in (2) of claim 1.
5. The vaccine composition according to any of claims 1 to 4, wherein the second set of one or more vectors are adenoviral vectors, preferably derived from non-human Great Apes, more preferably derived from chimpanzee or bonobo or gorilla, most preferably derived from gorilla.
6. The vaccine composition according to any of claims 1 to 5, wherein the one or more adjuvants are selected from the group consisting of:
 - a. a modulator of an immune checkpoint molecule, preferably selected from the group consisting of:
 - an agonist of a tumor necrosis factor (TNF) receptor superfamily member or a B7-CD28 superfamily member, preferably an agonist of CD27, CD40, OX40, GITR, CD137, CD28 or ICOS, wherein preferably the agonist is a ligand or an agonistic antibody or antibody like protein (e.g. CP-870,893 for CD40);

- an antagonist of PD-1, PD-L1, A2AR, B7-H3 (e.g. MGA271), B7-H4, BTLA, CTLA-4, IDO, KIR, LAG3, TIM-3, TIGIT or VISTA, wherein preferably the antagonist is an (antagonistic) antibody or antibody like protein;
 - b. a cytokine, preferably IL-2, IL-1 β , IL-7, IL-15, IL-18, GM-CSF, or INF- γ , and/or a cytokine analogue;
 - c. a cytokine receptor, preferably CD25 (IL-2 alpha receptor);
 - d. an activator of interferon (IFN) genes, preferably STING;
 - e. adenosine deaminase (ADA) or proliferator-activated receptor gamma coactivator 1-alpha (PGC-1 α).
 - f. a polynucleotide adjuvant.
7. The vaccine composition according to any of claims 1 to 6, wherein the one or more adjuvants are selected from the group consisting of an agonist of OX40, preferably OX40L, an agonist of ICOS, preferably ICOSL, an agonist of CD40, preferably CD40L and an antagonistic CTLA-4 specific antibody or antibody like protein, wherein the antagonistic CTLA-4 specific antibody or antibody like protein may be soluble or may comprise a transmembrane domain and an ER sorting signal.
8. The vaccine composition according to any of claims 1 to 7, wherein the one or more adjuvants comprise a transmembrane domain and an ER sorting signal.
9. The vaccine composition according to any of claims 1 to 8, wherein the antigen or the combination of antigens elicits no or only a suboptimal immune response in a subject in the absence of the adjuvant.
10. The vaccine composition according to any of claims 1 to 9, wherein the antigen or the combination of antigens comprises or consists of one or more cancer antigens selected from:
- a. tumor associated antigens (TAAs), preferably TAAs specific for a defined tumor type, and/or
 - b. cancer neo-antigens, preferably cancer neo-antigens selected from the group consisting of a single amino acid mutant peptide, a frame-shift peptide, a read-through mutation peptide, and a splice site mutant peptide.
11. A vaccine composition according to any of claims 1 to 10 for use in therapy.

12. Use of a vaccine composition according to any of claims 1 to 10 in the manufacture of a medicament for the treatment or prophylaxis of cancer.

13. Use of a

(1) a first composition comprising

a first set of one or more vectors comprising a first nucleic acid encoding one or more adjuvants, wherein the first set of one or more vectors are human adenoviral vectors selected from hAd6 and hAd57, and

(2) a second composition comprising

an antigen or a combination of antigens or

a second nucleic acid encoding an antigen or a combination of antigens or

a second set of one or more vectors comprising said second nucleic acid, in the manufacture of a vaccine composition or vaccine kit for combination therapy to induce an immune response against an antigen or combination of antigens;

wherein

a. (1) is to be administered to a patient at a first location and (2) is to be administered to the patient and at a second location, wherein the first location is within 20 cm, 17.5 cm, 15 cm, 12.5 cm, 10 cm, 7.5 cm, 5 cm, 2.5 cm, 1 cm, 0.5 cm, 0.25 cm or 0.1 cm of the second location and the lymphatic system of the first location drains to the same lymph nodes as the lymphatic system of the second location or wherein the first location and the second location are the same; and optionally

b. the adjuvant comprises a transmembrane domain and an ER sorting signal.

14. The use of claim 13, wherein (1) and (2) are to be administered by intramuscular, subcutaneous, intradermal, intra-peritoneal or intra-pleural injection, wherein preferably, (1) and (2) are to be administered by the same route.

15. The use of claim 13 and 14, wherein (1) and (2) are to be administered within a time interval of 30 min or less, 20 min or less, 15 min or less, 10 min or less, 5 min or less, 3 min or less, or 1 min or less.

16. The use of any of claims 13-15, comprising a first and a second administration step, wherein

- a. in the first administration step, the vaccine composition according to any one of claims 1 to 14 is to be administered, and
- b. in the second administration step comprising

- (1) a first composition is to be administered, wherein the first composition comprises

- a first nucleic acid encoding one or more adjuvants, or

- a first set of one or more vectors comprising said first nucleic acid; and/or

- (2) a second composition is to be administered, wherein the second composition comprises

- an antigen or a combination of antigens, or

- a second nucleic acid encoding an antigen or a combination of antigens,
 - or

- a second set of one or more vectors comprising said second nucleic acid.

17. The vaccine composition according to claims 10 or 11, wherein the TAA are specific for bladder cancer, head and neck cancer, non-small cell lung cancer (NSCLC), melanoma, thymoma, colon cancer; breast cancer, ovarian cancer, liver cancer; or kidney cancer.

18. The vaccine composition according to any one of the claims 10 to 11, or 17 wherein the second set of vectors comprises a nucleic acid encoding at least 1, at least 3, at least 5, at least 8, at least 10, at least 20, at least 30, at least 40, at least 50 TAA.

19. The vaccine composition according to claims 10 or 11, wherein the second set of vectors comprises a nucleic acid encoding at least 5, at least 8, at least 10, at least 20, at least 30, at least 40, at least 50, at least 100 cancer neo-antigens.

20. The vaccine composition according to any one of the claims 10 to 11, or 19 wherein the cancer neo-antigens are selected from the group consisting of a single amino acid mutant peptide, a frame-shift peptide, an intron read-through mutation peptide, and splice site mutant peptide.